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7th ISS 2022

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# 7TH INSPIRATIONAL SCHOLAR SYMPOSIUM (ISS 2022)

**"Build the Future"**

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## Cover Design:

**Nuraliyya Balqis Razali**

Pusat Pengajaran Pembelajaran Universiti (UTLC)
Universiti Utara Malaysia
06010 UUM Sintok
Kedah Malaysia

Tel: 04-9284701
Fax: 04-9284702
E-mail: utlcnet@uum.edu.my
Laman Web: utlc.uum.edu.my



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# ABOUT THE 7TH ISS 2022

## About Inspirational Scholar Symposium

**The 7 Inspirational Scholar Symposium (ISS 2022)** was held **virtually on 25 – 27 September 2022.** This year's symposium theme, "Build the Future", was set in conjunction with UTLC's 21 anniversary of its establishment, to reflect UTLC's aspiration to soar forward in stimulating/advocating teaching and learning excellence. The theme emphasizes the shaping up of the future education by steering teaching and learning trends, within the period of uncertainties, towards positive and progressive outcomes.

**ISS 2022** aimed to promote and disseminate knowledge and ideas about innovations and technologies related to teaching and learning from various field.

**ISS 2022** was a virtual congregation of esteemed academics, researchers, and practitioners from various institutions who shared knowledge, ideas and best practices in teaching and learning. Together we strived to leverage the best in creativities, innovations, digital learning, and collaborative technologies to build future education that is winning for all.

## Objective

Educators are important agents of change in developing quality human capital. Thus, reflecting on our teaching practices to enhance students' learning using innovative pedagogies and technologies has become central to human capital development. **ISS 2022** focused on sharing of knowledge and practices in education for community and human capital development and inspired educators to implement the best practices in classroom.

## Theme

"BUILD THE FUTURE"

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# One-Minute Paper (OMP): The Implementation and Assessment in Accounting Class

Zakiyah Sharif*[a], Mohd Farid Asraf Md Hashim[b]
[ab]Tunku Puteri Intan Safinaz School of Accountancy (TISSA)
College of Business
Universiti Utara Malaysia, Sintok, Kedah, Malaysia
*Corresponding Author: zaez2205@uum.edu.my

## Abstract

One-minute paper (OMP) is one of the available teaching assessment methods used to assess students' understanding at the end of each class session. In a piece of paper, lecturers ask simple questions to the students for them to answer in that piece of paper. The questions are generally about "what do you understand from today's lectures?" and "what/which parts of the lectures that you still do not understand?" The use of OMP gives benefits to both students and lecturers. Thus, this study was conducted with an aim to examine how one-minute paper can be used in the accounting class in UUM and to examine how one-minute paper can help students' to better understand the accounting lectures. The respondents are students who enrolled for Financial Accounting and Reporting 1 in semester A182 and A191. This study found that OMP provides valuable sources for the lecturers to identify their students problems in regards to the lectures contents and also for the students to have a space to tell their lecturers parts they need extra guidance in regards to the lectures contents. Students' responses/feedback in the OMP give inputs to the lecturers about the state of understanding of their students on the lectures. Written feedback from the students (as compared to verbal feedback) provides advantages where students are more confident to share with lecturers parts they need more explanation and guidance.

*Keywords:* one-minute paper, assessment, accounting

## Introduction

Education is the process of facilitating the transmission of knowledge, skills, values and beliefs. Education involves both the act of teaching or transmitting knowledge to learners and the act of receiving the knowledge from the teachers. Therefore, successful of an education process is always been evaluated via its teaching and learning techniques or methods used. Literature review in education field has seen many researches been done on the teaching methods and assessment methods and the findings has consistently become an inspiration to the introduction of new teaching methods that more relevant to time, subject matter, class size, students background and so forth.

Education process started with informal basis and later the formal education system been introduced. In the formal education itself, there are many teaching methods or instruments, either online or software based used such as Edmodo, Socrative, Projeqt, TED-Ed, eduClipper, Kahoot and Animoto, and traditional methods such as role-play, experiments, one-minute paper and simulations, to name a few. All these teaching methods are created with an aim to increase the interaction between students and teachers and make the learning session becomes more dynamic. Teaching methods refer to the general principles, pedagogy and management strategies used in the classroom.

It relates with the instruction applies in the classroom. All of the teaching techniques or methods that are available in the market are introduced with an aim to ensure the teaching and learning is successful.

Interactive learning is essential elements to ensure teachers-learners interaction in class is happening in class. One-minute paper (hereafter "OMP") is one of the teaching techniques that have been practiced by educators in tertiary level and the OMP requires students' participation. Basically, the OMP is introduced with an aim to create an interactive learning environment. The OMP is designed to diagnose, in one-minute, students understanding of the key concepts, topics or the subject matter that were taught for the session. Typically, using the OMP, lecturers will ask the students to identify what they found most useful and what they found most challenging in the topics taught to help identify if further support is needed by the students. Students need to write their responses or feedbacks in a piece of paper. Students' responses will be discussed before or at the start of the next class as group feedback, and lecturers may offer for remediation or further explanation if needed.

## Research Objective

Teaching and learning process for the financial accounting and reporting paper should be implemented in a way that can attract the attention among students in class. Apart from that, lecturers also need to practice a teaching style which guides the students' attention from the beginning of the class till the end of class. By this way, the students will be more attentive to the lectures and becoming more alert to the content of the lectures. This will eventually reduce the situation of 'leaving the class with no input' among the students. In other words, lecturers should conduct the class in a way that make the students put an attempt to be an active learner and knowing very well what they have learnt in class. This OMP method is used with an objective to minimize the numbers of students that leave the class with very minimal to zero understanding of the lectures contents.

In practice, most lecturers always practicing asking students verbally of the lectures contents with an aim to know whether they understand the lectures. Some students may not feel the verbal method of asking them questions motivating them to share any inputs. The verbal method may exposed them with various uneasy feeling. Instead of asking the students verbally, the OMP is used to ask students in a written way of sharing any inputs from the students.

This research was conducted with an aim to examine the willingness of the students to share (in written) their understanding of the lectures content and/or make inquiries on the parts of the lectures that they do not understand with their lecturer?

## Research Question

The research question of this study is "Do students willing to share their understanding of the lectures content with the lecturer and/or make inquiries on the parts of the lectures that they do not understand with their lecturer?"

## Methodology

This research is a qualitative based study. Data were taken from students who took Financial Accounting and Reporting 1 (BKAR1013) paper in 2019. This paper is taken by students from both accounting and non-accounting students.

### Research Populations and Samples

In this study, students who enrolled for Financial Accounting and Reporting 1 in TISSA-UUM are the samples. Data was taken for two consecutive semesters; A182 and A191, involving four classes in each semester. Approximately, there are 320 students participating in this study. Students come from various background (Diploma/Matriculation/Asasi) and various courses (Accounting/Economic/Education in Accounting/Finance).

**OMP administration.** The OMP was conducted by distributing a piece of paper containing two questions and students are required to answer the questions on that piece of paper at the end of lectures. The two questions were adapted from Angelo and Cross (1993), Ashakiran and Deepthi (2013), Stead (2005) and Whittard (2015).The questions are:

1. *In your own words, write down what you understand about the Chapter _____ that you have learned today?*
2. *What is the muddiest point remaining at the conclusion of today's class?*

Students were required to answer the questions individually. They were reminded that there is no right or wrong answer; instead they were informed that their feedbacks are very important for the teaching and learning purposes. For the first session of the OMP, the students were given a short briefing by the lecturers on the instructions and the purpose of doing the OMP. This is to ensure that the students understand the objective of the OMP execution and provide the relevant information or answers needed by the lecturers regarding the OMP.

Students were given one to two minutes to write their feedbacks. Also, students were informed that the feedbacks should be anonymous. It is to encourage students to give honest responses to the questions (Angelo & Cross, 1993; Kwan, 2011). Other than that, students were informed in advance that the lecturers will respond to only few most commonly and significant issues rose in the OMP. Students should submit their feedbacks before leaving the class. After collecting the papers, lecturers read the students' feedbacks and make a brief analysis of the students' level of understanding of the lectures contents and knew which part of the contents that need to be re-explaining.

In the following class, the first five to ten minutes were set aside to discuss to the selected students feedbacks which the students had submitted in the previous class. This is essential to ensure students' questions, concerns and the lectures contents that they found unclear in the previous class were raised and answered. Due to time constraint, the OMP, however, was conducted on selected topics. In this study, the researchers conduct the OMP in four topics (out of twelve topics in FAR 1). The selected topics are topics that are tested in the final exam. This is because these topics are relatively harder as it belongs to the higher level of course learning outcome (CLO 3 and CLO 4) than the topics that are tested in mid-semester examination (CLO 1 and CLO 2). In fact, based on the data obtained from semester A181 (two lecture groups of BKAR1013), it was found that the final semester examination's performance was considerably lower as compared to the mid- semester examination performance.

The final (fifth) set of question asked students on their opinions on the implementation of OMP during the semester. For data analyses, all of the students' reflections/feedbacks were collected at the end of semester (week 14) from the lecturers who participated in this OMP research project and then analysis were conducted. This process was also applied by Ashakiran and Deepthi (2013) and Whittard (2015).

## Literature Review

### The One Minute Paper (OMP)

Active learning has become a common topic of discussion among educators. The challenges of traditional classroom based teaching, partly, are to retain students' attention, get students' participation and create active learning environment. In a traditional classroom based teaching, students tend to be passive learners where they listen to the lectures without being interested in asking questions to the lecturers especially when they do not understand the lectures content. They keep all the questions and leave them unanswered. As a result, the learning session is not fully successful.

In most lectures, students are passive and resist participating in class either to answer the questions raised by the lecturers or to raise questions to their lecturers. Stowe (2010) claims that it is common that lecturers active in class while students are not. Indeed, it is a challenging task for lecturers to transform this 'passive' learning environment into a more active and stimulating learning experience (Whittard, 2015). Thus, the shift of focus from 'teacher-centered' to students' engagement is vital to improve learning outcomes (Stowe, 2010).

Light (1990, pp.6) claims that 'modest, relatively simple and low-tech innovations can improve students' learning and active participation in class' (as cited in Chizmar and Ostrosky, 1998). The innovation is called One-Minute Paper (Chizmar & Ostrosky, 1998). Basically, previous research on the OMP asked students two questions at the end of class: (1) What is the most important thing you learned today? (2) What is the muddiest point still remaining at the conclusion of today's class? The first question needs students to focus on the lectures contents learned in class and the second question ask students on the progression of the learning (Chizmar & Ostrosky, 1998).

According to Davis, Wood and Wilson (1983) (as cited in Stead, 2005), the OMP is used to prompt students to reflect the day's lesson and provides the lecturer with useful feedback. The OMP involves a very short in-class writing activity. The main objective of OMP is to let the lecturers know which part of the day's lectures that have not been well understood by the students. The OMP indirectly requires students to know well the lesson they learned in the class. By this, they can easily note it down in the OMP.

In other words, the OMP necessitates students to keep focus and be attentive in class. OMP is a method or teaching tool that is simple, flexible and offers beneficial outcome without having to consume so much time, effort (Stead, 2005) and costs (Whittard, 2015). OMP is not only has been proven to be a versatile and easy to be employed assessment method but also allows quick and effective responses from the students (Ashakiran and Deepthi, 2013).

**Attentive in Class**

Stead (2005) claims that the OMP is needed to re-engage students' attention during the lecture. This is especially true if the OMP is applied in the middle of the lecture session particularly when the students' concentration becoming lesser. Data gained by Whittard (2015) indicated that this learning tool stimulates active listening. The similar questions being asked in the OMP is repeated in every class sessions helps to trigger students to think when they are in the lecture session (Whittard, 2015). Anderson and Burns (2013) and Whittard (2015) suggest that the OMP questions which focuses on the content of the lecture or topic may stimulate students to connect key ideas, build up knowledge and applications of concepts.

**Active learning**

OMP encourages active learning as well as active listening in the class (Stead, 2005). It is achievable because the OMP foundation is based on the interaction or flow of information between students and lecturers, which is potentially promoting positive relationship between them. This allows better engagement and reflections by the students particularly, as it makes the lecturers more approachable (Whittard, 2015). Study by Whittard (2015) provides a support that the OMP helps in creating an environment of trust and consequently nurtures confidents as well as active learning among the students. The OMP is deemed to facilitate active learning. Not only students should recall what they have learned, they also need to evaluate and assess by asking to themselves to what extent they understand the content of the lectures (Angelo & Cross, 1993 as cited in Ashakiran and Deepthi, 2013).

Receiving feedbacks from the students helps lecturers to determine what corrective actions or instructional adjustment that the lecturers should do that may help the learning sessions to become more successful (Angelo & Cross, 1993). It also encourages shy or withdrawn students to provide insights and posing questions (Kwan, 2011, Whittard, 2015).

**OMP in accounting class**

Accounting is a course that include not only calculations. The subject also needs students to understand concepts, theories, principles and assumptions related to the accounting. Thus, this subject is often found difficult by students. There are many levels of accounting papers that students need to take, for example, there are five levels of financial and accounting papers, two levels of management accounting papers and two levels of audit and assurance papers. The levels of papers indicates the stage of difficulties of the papers. Therefore, the OMP is a good method of assessing students understanding of the lectures content as it may give beneficial effect on the learning of the students. Applying the OMP in every chapters or in every class can overcome or reduce the increasing incomprehension of the lectures contents.

## Findings

**Findings on the OMP**

***Topic: Cash***

The learning objectives of the topic Cash are to: (1) identify items considered cash (2) prepare statement of cash flow and (3) prepare bank reconciliation. This topic is covered in one 3-hour class. At the beginning of the class, lecturers explain to the students about the objectives of the

topic which indirectly means there are three important parts in the topic which students need to understand. The OMP was handed to the students at the end of the class.

The responses from the students mainly mentioned that they understand about what cash is about and the examples of cash items.

Among the responses received from the students in regards to the first questions are:

*"I understand what cash is and the way how to record it in the cash flow statement"*

(GA191, 1)

*"I understand about the bank reconciliation as I have learned it during form 5. But, for cash flow statement, I think the hardest part is on the operating part….it is confusing".*

(GA191, 2)

*"Cash flow statement is a statement that gives details on what are the used cash for, cash in, cash out details – it's just that we got to understand how to evaluate the increase and decrease in items".*

(GA191, 5)

"*I understand about the topic Bank Reconciliation but on the Cash Flow Statement, there are still some things that make me confused".*

(HA191, 10)

*"I know the function of Cash Flow Statement and it is consists of operating, investing and financing activities. I understand the general format of the statement".*

(BA191, 2)

Among the responses received from the students in regards to the second questions are:

*"The muddiest point that still remains is I am quite poor in identifying the dividend whether it is under financing or investing activities".*

(HA191, 8)

*"Sometimes I cannot differentiate whether the items should be added or deducted from the operating, investing and financing activities".*

(HA191, 9)

"*It is extremely confusing on how to calculate the non-cash items".*

(HA191, 11)

*"Sometimes get confused with the deposit and transit and outstanding cheque".*

(HA191, 14)

*"I find it is hard to differentiate the activities in the Cash Flow Statement".*

(BA191, 2)

***Topic: Payables***

The learning objectives of the topic Payables are to: (1) outline and apply the definition of liability and financial liabilities, (2) describe the nature, type of current liabilities and (3) explain and apply the recognition criteria, measurement and de-recognition criteria of financial liabilities (of

current liabilities). This topic is covered in one 3-hour class. At the beginning of the class, lecturers explain to the students about the objectives of the topic which indirectly means there are three important sections in the topic which students need to understand. The OMP was handed to the students at the end of the class.

Among the responses received from the students in regards to the first questions are:

*"I know how to prepare journal entries for payables".*

(HA191, 1)

*"I understand what de-recognition means".*

(HA191, 10)

*"I understand fully this topic, because this topic is easier than others and I can learn it very well".*

(HA191, 27)

*"Payable is what you owe".*

(HA191, 30)

*"Obligations can be legal and constructive obligations…obligations that cannot be avoided by company".*

(GA191, 8)

Among the responses received from the students in regards to the second questions are:

*"I do not know when the current liabilities are change into con-current liabilities".*

(HA191, 2)

*"I do not know how to recognize non-current liabilities into current liabilities, income tax payable and what is interest and non-interest bearing note payable".*

(HA191, 3)

*"I do not really understand about account debit and credit and still confuse between them".*

(HA191, 12)

*"I do not know how to write correct journal entry with the correct amount".*

(HA191, 13)

*"I do not know how to prepare some journal entries especially when there is interest".*

(HA191, 16)

*"I don't really understand the compensated absences".*

(HA191, 26)

***Topic: Equity***

The learning objectives of the topic Equity are to: (1) identify the key components of equity, (2) explain the accounting procedure for issuing shares, (3) describe the accounting for share buyback, (4) understand the content and format of the Statement of Changes in Equity and (5) prepare a Statement of Changes in Equity. The topic is covered in two classes. At the beginning of the class, lecturers explain to the students about the objectives of the topic which indirectly means there are five important sections in the topic which students need to understand. The OMP was handed to the students at the end of the second class.

Among the responses received from the students in regards to the first questions are:

*"I know the types of shares and issuance of shares".*

(HA191, 1)

*"I understand how to recognize share buyback".*

(HA191, 2)

*"I understand how to report cash dividend and share dividend in journal. I also understand to record treasury share and knows how to prepare Statement of Changes in Equity".*

(GA191, 15)

*"Now I know why company gives dividend".*

(GA191, 17)

*"Equity consists of share capital, dividend. Dividend is recorded once declared".*

(GA191, 22)

Among the responses received from the students in regards to the second questions are:

*"A little bit confuse about treasury shares and how to recognize it".*

(HA191, 3)

*"I do not know how to calculate dividend payment".*

(HA191, 4)

*"I still cannot understand the preferred shares and ordinary shares".*

(HA191,9)

*"In my opinion, the chapter is easy but a little confusing but needs a lot of practices. The muddiest point would be the Statement of Changes in Equity".*

(GA191, 1)

*"I confuse how to calculate dividend, what percentage should we take, and where to record it".*

(GA191, 7)

*"I don't know".*

(GA191, 16)

***Topic: Intangible assets***

The learning objectives of the topic Intangible Assets are to: (1) identify and explain the key characteristics of an intangible asset, (2) explain and apply the recognition criterion, (3) explain and apply the requirements for initial measurement, and (4) explain the disclosure requirements. The topic is covered in one 3-hour class. At the beginning of the class, lecturers explain to the students about the objectives of the topic which indirectly means there are four important sections in the topic which students need to understand. The OMP was handed to the students at the end of the class.

Among the responses received from the students in regards to the first questions are:

*"I know the characteristics of intangible assets. Know the common items of intangible assets".*

(HA191, 1)

*"I understand about good will and how to record it".*

(HA191, 8)

Among the responses received from the students in regards to the first questions are:

*"I still do not understand what items should be classified as IA cost/value".*

(HA191, 1)

*"I do not understand about R&D".*

(HA191, 5)

*"I do not know how to know that cost in development phase should be expensed or capitalised? Also, I do not know how to know that R&D will be successful?*

(HA191, 8)

*"Still confuse between copyright and patent".*

(HA191, 11)

*"Need revision first".*

(HA191, 14)

**Overall feedback regarding OMP**

At the end of semester, students were given a piece of paper for them to write their personal opinion regarding the OMP implementation. This is essential for the researcher to get feedbacks regarding the strengths, weaknesses and future planning for exercising the OMP.

There are two questions that students need to answer. The questions are:

(1) "What is your opinion on the execution of the One-Minute Paper by your lecturer in your class"?
(2) "Do you think other lecturers should execute the OMP in class"?

Among the responses received from the respondents for the first questions are:

*"It is good to continue because the lecturer will know more about the students and about the part that students don't understand."*

(BO1)

*"I think the OMP is a good way of approaching the students in order to make sure we understand the subtopic that we do not understand. Personally, I like the OMP because there is a communication between students and lecturer because usually we do not have time to meet lecturer".*

(BO2)

*"It is useful, refresh my mind and can clearly ask what I don't understand".*

(BO4)

*"I think it is good to have this kind of teaching method because it helps students to say about what they don't understand because students always shy to ask in public".*

(AO2)

Among the responses received from the respondents for the second questions are:

*"Yes, it is very good because we will understand more about the lectures. Sometime we already blur, if we get explanation, we will more understand".*

(BO1)

*"Yes, I strongly agree about this. This is due to some students who are very shy to ask directly to lecturer. And also lecturers will know what the students' weaknesses are and at the same time lecturer can improve his/her teaching style".*

(BO2)

*"Yes, because surely for me it helps students a lot and the OMP will give overview to lecturer if what they are teaching is really understand by students. This OMP is necessary".*

(AO2)

## Discussion

Getting feedbacks from students on parts of the lectures contents that need further explanation or additional exercises in every class sessions are very important in ensuring the students are not left behind at the end of semester. Responses from the students reveal that students always have questions to ask to their lecturers regarding the lectures contents but they do not feel encouraged or confident to raise questions in the class. The reasons are varies; partly is because they feel shy and not confident to ask questions in the class.

The responses from the students also show that there are students who are easily used the approach to "remembering/memorizing" the content without fully "understanding' the content as disclosed here:

"need to **remember** the items in cash flow"

(HA191, 9)

Choosing to memorize without understanding the lectures always be the last resort the students have. Matters may become worse if they are not provided with a medium to share with their lectures parts that they need assistance regarding the lecture contents.

In the *Cash* topic, for example, the lecture notes contains format of Cash Flow Statement and Bank Reconciliation. The lecture notes also contains list of items that should be add/deduct in the cash flow statement using direct or indirect method. It needs students to understand the logic behind the reasons of why items should be added or deducted in the statement. Memorizing the list items is not the right way of learning as it is not align with the learning objectives. Same goes to the Bank reconciliation.

From the overall responses of all the topics, lecturers noted that attention should be given to almost every part of the lectures. This is because the students are coming from various background and not all of them have good basic in accounting. Some of them have zero basic in learning accounting subject and taking the FAR1 paper will necessitate them to do extra readings, in particular the principles in accounting, and also additional guidance from the lecturers which in return may help them to better understand the lectures.

## Conclusion

Findings from this study reveal that OMP is a suitable teaching method to be used by lecturers. The OMP gives opportunity for students to share their problems regarding their understanding level on the lectures contents with their lecturers. At the same time, OMP also gives room for lecturers to assess students' understanding on the lectures content directly from the students themselves. Lecturers, in particular who teach accounting subjects, are recommended to execute the OMP in their lectures as one way for them to monitor their students' performances in the subjects from time to time. It is advisable for lecturers to implement the OMP in every class, however, if lecturers find it is time consuming, lecturers are recommended to implement the OMP on selected topics which lecturers think suitable.

## References

Anderson, D., and Burns, S. 2013. One Minute Assessment: Student Perception of Learning Gains. *College Student Journal*, 47 (1), 219-225.

Angelo, T. A., and Cross, K. P. 1993. Classroom Assessment Techniques: A Handbook for College Teachers. San Francisco: Jossey-Bass Publishers.

Ashakiran, S., and Deepthi, R. 2013. One-Minute Paper: A Thinking Centered Assessment Tool. Internet Journal of Medical Update - EJOURNAL, 8 (2), 1-9.

Chizmar, J. F., and Ostrosky, A.L. 1998. The One-Minute Paper: Some Empirical Findings. Journal of Economic Education, 29, 3-10.

Stead, D. R. 2005. A Review of the One-Minute Paper, Active Learning in Higher Education, 6, 118-131.

Kwan, F. 2011. Formative Assessment: The One-Minute Paper vs. the Daily Quiz. *Journal of Instructional Pedagogies.* 5, 1-8.

Stowe, K. 2010. A Quick Argument for Active Learning: The Effectiveness of One Minute Paper. *Journal For Economic Educators,* 10 (1), 33-39.

Whittard, D. 2015. Reflections on the One-Minute Paper. *International Review of Economics Education,* 20, 1-12.

# Integrated And Collaborative Assessment for Empowering Learning in Postgraduate Educational Psychology Courses

Fauziah Abdul Rahim
School of Education
Universiti Utara Malaysia
Corresponding Author: ziah@uum.edu.my

## Abstract

To build the future of any nation requires collaboration amongst its citizens as thinkers who are equipped with the capacity to be empowered when learning. Higher education, as the threshold development of intellectuals, becomes the breeding ground to germinate the notion of empowered learners and this can be done through integrated and collaborative assessment. The objective of this qualitative study is to explore the processes of learning through integrated and collaborative assessment, specifically involving two course learning outcomes respectively from two different postgraduate courses in a Master of Education (Educational Psychology) programme. The participants were 4 females enrolled as postgraduate students in a university in northern Malaysia. Data collection involved 12 weeks (one semester) through online classroom interaction, written online interview and content analysis of students' assignments and reflection. Using sociocultural theory as the theoretical framework, the unit of analysis involved each student's learning processes treated as individual cases, although students were engaged in classroom activities and interaction for the two courses and the learning outcomes collaboratively as formative assessment, whilst completing a mini study, as summative assessment, individually. Students' overall performance varied from one another due to various constraints faced throughout the semester. Nevertheless, all the students expressed that although the experience when doing both the formative and summative assessment through the integrated and collaborative assessment was challenging but the ability to make connection between the two courses provided deeper engagement in learning, especially when witnessing the transformation of their students in the intervention during the mini study. Integrated and collaborative assessment provided during the formative and summative assessment to fulfil the requirement of the two course learning outcomes from the two courses, afforded an innovative way to the instructors' ways of working when assessing students as catalyst, all in the hope to build better educators for the future.

*Keywords:* integrated assessment, collaborative assessment, postgraduate, higher education

## Introduction

Higher education has undergone many transformations especially so after the effect of the Covid-19 pandemic which involve not only how future curriculum is developed but also how learning is managed, delivered, and assessed. Since assessment drives learning a greater emphasis need to be placed in assessment, in meeting the demands and challenges of what lies ahead in the 21st century and beyond. Ensuring that every opportunity has been given to learners to build their

capacity to learn is at the heart of every higher education provider, especially in Malaysia, to meet the aspiration of becoming a developed nation.

To build the future of any nation requires collaboration amongst its citizens as thinkers who are equipped with the capacity to be empowered when learning. Higher education, as the threshold development of intellectuals, becomes the breeding ground to germinate the notion of empowered learners and this can be done through integrated and collaborative assessment. However not many have ventured into carrying out integrated and collaborative assessment due to many challenges such as time for planning, executing, and assessing as well as fear that it may be too daunting for students to partake. This paper attempts to deliberate the use of integrated and collaborative assessment for empowering learning amongst postgraduate students who were enrolled in two different courses in a Master of Education (Educational Psychology) courses.

**Background and Problem Statement of the study**

Postgraduate studies have always been designed to challenge the learners especially cognitively, through thought provoking discussions and solving real-world problems in the hope that these learners not only obtain mastery of the knowledge but can also contribute and transform the society they live in. Learners who are engaged in learning may possess deeper approaches and understanding of their learning processes that will benefit them and others. Engaging learners also involve change in the cognitive, affective and behaviour domains.

In educational context having in service teachers, who are enrolled as students, experience themselves how they can benefit from the deeper understanding of the knowledge through various active learning activities and meaningful assessment, hopefully will enable them to create a ripple effect when they teach their own students. Having this in mind, the Master of Education (Educational Psychology) programme was designed to help students of the programme to be exposed to learning theories, pedagogies and factors involved to influence learning. This paper discusses two out of the eight specialisation courses that students must take to fulfil the requirement of the programme, namely *SGDY5023 Human Learning* and *SGDY5043 Learning and Individual Differences*. These two courses are usually offered in the second semester, however due to restructuring of the School of Education management, these two courses were offered in the third semester.

Both the courses have four course learning outcomes (CLO) respectively. Table 1 below shows the course assessment plan which entails the topic involved, course learning outcomes, assessment methods, weightage of the assessment and domain covered designed for the courses.

| TOPICS SGDY5023 | ASSESSSMENT METHOD | COURSE LEARNING OUTCOME | WEIGHTAGE | SELECTED DOMAIN |
|---|---|---|---|---|
| 1-12 | Presentation (mind map) | CLO1 Discuss the assumptions of **Behaviourism, Cognitivism, and social learning** to understand human learning | 15 | A2, C2, LOC3c (Communication Skill) Responding to Phenomena Application |
| 1-12 | Quiz | | 15 | |
| 2,3,6, 7,8 | Comparative table/Literature review/reflection<br>My reflective journal | CLO3 Compare the theoretical perspectives in terms of **their implications on instruction and educational research.** | 20 | A4, C4, LOC4a (Personal skill) Organizing values Analysis |
| 2-8 | Field work ( Mini study) | CLO2 Apply and integrate knowledge related to human learning assumptions to investigate current educational issues | 25 | C3. LOC3b (Interpersonal skills) Application |
| 9-12 | Intervention (Plan of Action) | CLO4 Design appropriate solutions based on a specific **theory or assumptions for practice** | 25 | C6,P7, LOC2 (Cognitive) Create Origination |

| TOPICS SGDY5043 | ASSESSSMENT METHOD | COURSE LEARNING OUTCOME | WEIGHTAGE | SELECTED DOMAIN |
|---|---|---|---|---|
| 1-2 | Presentation<br>Case study-table | CLO1 Discuss the basic assumptions of the **taxonomy of individual differences** constructs: **cognitive, affective, and conative** | 15 | A2, C2, LOC3c (Communication Skill) Responding to Phenomena Application |
| 1-2 | Quiz | | 15 | |
| 3-5 | Comparative table | CLO3 Compare theoretical perspectives on the **sources of variance in individual differences to seek solutions for educational issues** | 20 | A4, C5, LOC4a (Personal skill) Organizing values Analysis |
| 1-8 | Field work (mini study) | CLO2 Apply and integrate knowledge related to individual difference constructs: cognitive, affective, and conative to investigate current educational issues | 25 | C3. LOC3b (Interpersonal skills) Application |
| 9-12 | Intervention (action plan) | CLO4 Design appropriate solutions based on a specific **theory or assumptions for practice.** | 25 | C6,P7, LOC2 (Cognitive) Create Origination |

*Figure 1.* Course Assessment Plan for SGDY5023 and SGDY5043

The ones highlighted are the two CLOs (CLO 2 and CLO4) of each course that are used to design the integrated and collaborative assessment, which comes in a form of a mini study project that requires each student to embark on a study and provide intervention as well as solution (refer to Appendix A i and ii). This assessment was done on an individual basis. In both the courses, the levels of cognitive requires the ability for students to apply and integrate knowledge related to the respective courses in relation to either human learning or learning and individual differences as well as design appropriate solution based on the theory learnt in the respective courses.

However, to equip the students with the skills before executing individually, students were given cases to solve i.e., one in pairs and the other in groups, as a form of formative assessment. These courses which was initially designed to be taught face to face were delivered online due to the decision made by the school and the university to curb the threat of Covid-19 amongst the campus community. In A213 (third semester of May 2022), four students were enrolled in both the courses. These students ranged from semester 3 to 6 students with three pursuing the postgraduate studies on a part time basis and one full time student. The three part-time students are in-service teachers, of which two are teaching in the primary school and one in a secondary school.

Often in the higher education context, educators are being asked to inculcate skills that will benefit students when they embark in the workforce (Knight & York, 2003; Sewagegn & Diale, 2019). Conversely, in terms of assessment, greater emphasis is still given to reproduction or regurgitation of knowledge (Boud & Soler, 2016). Even if assessment is done to focus on students learning, it is usually done within a course or subject (Hartley & Whitfield, 2012; Reiser, 2017). In contrast, students are expected to learn in a holistic way (Siegel et al., 2015), whilst integrating the knowledge they acquire from various courses structured in a programme (Blikstad-Balas & Engelien, 2017). However, in practice they are often evaluated by courses rather than a combination of courses

removing the opportunity for students to transfer what they have learned from various courses in a transcendent way. Therefore, there is a need to investigate how students learn if assessment is done in an integrated and collaborative way for two separate courses via one assessment.

**Purpose of the Study**

Having the same students enrolled in both courses and observing that the two of the course learning outcomes have similar domain, provided an opportunity for the author as the course instructor, to investigate the learning experiences of these students if they embark on an assessment that requires them to have deeper understanding of the phenomenon that they are solving considering theories and perspectives from two different courses.

This first-time experience of using integrated and collaborative assessment was also important for the author as instructor. Getting feedback from the learners' experiences not only will provide avenue for innovative transformation in assessment but also gained insights into its possibilities when advocating this type of assessment in the future. Collecting research-based evidence of own practices is crucial for continuous self-improvement and so this paper deliberates how students learn when the author used integrated and collaborative assessment to teach both courses.

**Research Objectives and research questions**

The objective of this qualitative study is to explore the processes of learning through integrated and collaborative assessment, specifically involving two course learning outcomes respectively from two different postgraduate courses in a Master of Education (Educational Psychology) programme.

The overarching research question is *how do the students learn in both courses when embarking on integrated and collaborative assessment for both courses*? This is further delineated through sub questions that include:

1. How do the students perceive embarking on the integrated and collaborative assessment?
2. How do they reflect on the learning experiences and learning engagement (cognitive, affective and behaviour) when doing the assessment?
3. How do the students perform when doing integrated and collaborative assessment?
4. What are the challenges faced by the students?

Findings from the research questions are also referred to as a form of reflective practice when improving the course in the future.

**Sociocultural theory perspective of learning**

Teaching postgraduate level, requires a need to engage students as learners, in discussion and learning activities, including assessment, that challenges them to learn through the interaction with others and learning from others, before solving the problems on their own. Sociocultural theory provides a relevant framework to serve this purpose because the theory focuses on the importance of social interaction in which learners learn through the interaction with others before internalising the knowledge to then solve the problem on their own.

Vygotsky (1986), the proponent of this theory, explains that learning precedes development and occur in two dimensions, which is the social and the individual or what he termed as the inter-

psychological plane and the intra-psychological plane. He argues that when learners are challenged and are not able to solve on their own depicts the actual developmental level and through interaction and mediation in which facilitation is provided during the interaction influences the higher mental functions to begin to make sense of what and how to solve on their own. When this occurs, it brings the learners to the potential developmental level, in which they can solve the problem on their own what they could not do before, as a result of internalisation of knowledge (Vygostky, 1986). Placing this theory in the context of teaching the two courses and planning for the assessments, requires considerations on providing opportunities to solve challenging problems in groups during the formative assessment in which learners are required to interact with each other to solve the problem. In so doing, collaboration in socio cultural theory's perspective is crucial as it enables the learners to learn and gain from the interaction and contest of ideas that may influence their higher mental function.

## Literature Review

Education in the 21st century that requires a move from memorisation and regurgitation of knowledge to ability to solve real world problems, has strengthened the focus on harnessing knowledge and skills. This is apparent when having to deal with the demands of the industry that often lament the lack of soft skills like creative and critical thinking, communication, and ability to work in teams amongst the graduates. Many aspects in learning and teaching need to be considered for change in meeting this demand however the one most influential to learning is assessment. Learners are often concerned about how they are going to be assessed when taking a course.

Moving away from the conventional method of assessing, usually found in paper pencil or online final examination, that measures their ability to remember information, to assessment that requires them to solve problems is bound to help learners make the connections between theories that they have learned to the observations of the phenomenon. Providing the avenues via assessment for learners to be challenged and make the connections between theory and practice influence their critical thinking among other things, when solving the problems. More so is the use of integrated assessment and collaborative assessment that has the potential to empower learning amongst learners at tertiary level.

### Integrated Assessment

The notion of integrated assessment or also referred to as multidisciplinary assessment refers to the idea of combining two or more course learning outcomes within a course (Reiser, 2017) or between two or more courses from within the discipline or between disciplines (Blikstad-Balas & Engelien, 2017). Typically in an integrated assessment, the learners are asked to respond to case studies that are able to combine various learning outcomes or topics assessed together and getting learners to do this, help them to gather deeper understanding of their knowledge and skills to solve real world problems (Boud & Soler, 2016). According to Boud and Soler (206) integrated assessment requires educators to plan strategically how the assessment can be done within a period of time with numerous formative and summative assessment. By relating several learning outcomes or multiple modules into a single meaningful assessment provide a holistic view of learning experiences to the learners. Compared to conventional method of assessment that may focus on regurgitation of knowledge, integrated assessment provide many benefits to the learners, including

ability to make connections of the knowledge acquired between courses in the programme as well as increase in motivation and confidence when they have better grasp of the knowledge obtained.

According to Hartley and Whitfield (2012), who introduced the Programme Assessment Strategies project examined the use of integrated assessment to measure programme learning outcomes. They divided integrated assessment into four types which varies in its integration that include integrative semester, integrative level, final, heavily weighted integrative assessment and assessment by submission of personal evidence. For example integrative semester, is used for students to demonstrate how they fulfil the programme learning outcomes in a specified semester or term. Integrative level is when students demonstrate their achievement of the programme learning outcomes in a horizontal progression, in which they complete the assessment to demonstrate learning for the year or vertical progression where it involves several years within the programme. An example of assessment for vertical progression type of integration level is teaching methodology courses being introduced in the third year of an education programme is combined with and practicum that students begin in the final year.

Final, heavily weighted integrative assessment requires students to complete an assessment that has significant bearing to the overall programme assessment strategy such as the capstone project in which students are able to exemplify authentic application of the knowledge and skills they have acquired throughout the programme whilst solving the problem through higher order thinking skills which involved analysis, evaluation and synthesis. In so doing the integrative assessment students are better able to harness their thinking skills (Cloete, 2018) and able to make the connection between theory and practice synoptically (Fung, 2017) providing the evidence of understanding with breadth and depth of the subject (Jessop & Tomas, 2017). Instances where students need to demonstrate their personal evidence of learning usually in the form of portfolio is the example of the final type of integrative assessment suggested by Hartley and Whitfield (2012).

Therefore combining these perspectives on integrated assessment warrants the possibilities of enhancing students capacity to learn by combining learning outcomes from various modules within discipline that requires them to have some elements of mini capstone project so as to provide a richer learning experiences for the students in achieving the programme learning outcomes. In so doing, students may have a greater view of how to apply and even create knowledge that will benefit them in their workplace or being employed for the confidence that they have due to their past rich learning experiences (Knight & Yorke, 2003). In this particular study, assessment by submission of personal evidence as well as integrative semester was found to be appropriate to be used during the formative assessment and summative assessment respectively.

**Collaborative Assessment**

In supporting the sociocultural theory that places collaboration as important element for social interaction to take place, gives light to the use of collaborative assessment. Collaborative assessment has been popular at the turn of the millennium because across the globe employers demand the ability for graduates to work collaboratively, think critically and solve problems effectively (Boud & Soler, 2016). Collaborative assessment is part of the alternative assessment that warrants active learning in the classroom in which the learning environment is conducive for pair or group work tasks. In addition, collaboration assessment can also be done in digital context with the

use of technology (Dittman, Hawkes, Deokar & Sarnikar, 2010; LaPlante, 2019; Siegel, Roberts, & Freyermuth, 2015).

Siegel et al. (2015) argue that collaborative assessment provides various advantages in that students contest ideas and reach agreement to solve problems which enable them to not only develop a better understanding of the knowledge and skills but also increase their intrinsic motivation, retention of memory, interpersonal skill whilst engaging in evidence based argumentation and justification which are needed skills in any workforce (Ioannou & Artino, 2010). Learning from others when involved in collaborative assessment improve students' understanding and critical thinking as well exam performance (Cloete, 2018; Ioannou & Artino, 2010) because students are better able to contest their ideas and in so doing fill the knowledge gaps and clear misconception compared to if they only rely on asking their lecturers.

Ioannou and Artino (2010) shares their findings of how collaborative assessment was used among 31 undergraduate students enrolled in educational psychology course. From their mixed method study they found that collaborative assessment can promote collaborative learning, alleviate test anxiety and when used as in class testing provided a more positive educational experience for the students. Their study have shown that even when used as in-classroom testing, collaborative assessment was found to be perceived as positive by the students. Therefore, if used as a form of formative assessment it has the potential to provide a safer learning environment conducive for learning among students even at the postgraduate level, especially when students become empowered to learn.

**Empowering learning in higher education**

In line with ensuring that graduates become equipped with employability skills, higher education providers develop various strategies from developing innovative curriculum to appropriate teaching delivery as well as meaningful assessment that promotes learners to become empowered as active skilful problem solver and competent graduates. In line with sociocultural theory that perceives the role of the teacher or instructor as facilitator and student as playing a pertinent role to take charge of learning (Abdul Rahim et al. 2009), assessment that are designed to be holistic and enabling for collaboration and learning to take place within the peers and the community, become crucial to help students, as learners, to develop a sense of confidence (moving from their actual development to potential development). This in itself help learners to increase their intrinsic motivation and self-esteem, capability, competence and enabling them to meet life's challenges more effectively having been challenged and able to solve the problem themselves (Gleason & Jaramillo, 2021).

Gleason and Jaramillo (2021) introduce the use of design thinking approach to encourage global collaboration and empowered learning among their students. They recommend the use of student-centered approach which has assessment that enable students to become engaged in active learning in solving problems, as it brings benefit to the students' increase in competence and creativity when solving problems. This is concurred by Sewagegn, and Diale (2019) whose work exemplifies the contribution of active learning in the empowerment of learners even in tertiary context. When students engage themselves in active learning where they have to think critically, make sound decisions based on evidence and provide justification as well as reflect their action enable students to develop a sense of self efficacy, the fact that they are able to solve problems,

research the information and articulate their thoughts orally or in written form (Sewagegn, and Diale, 2019). This in itself has the potential to increase students' interest and ability to become engaged in the real world issues and to a certain extend transform themselves and others. which is the ultimate aim of any higher institution of learning. Understanding the benefits of empowering learning, the assessment in this study was developed to engage students in active learning in both the formative and summative assessment.

Hence understanding the benefits of integrated and collaborative assessment and its potential to empower learning provided by previous studies warrants the crucial need to investigate in the context of postgraduate studies at the tertiary level.

## Methodology

This qualitative study involves four female participants. Pseudonyms were given to the participants for ethical reasons so as not to cause harm to the participants and to maintain confidentiality and anonymity. The names do not depict ethnicity of the participants. However, due to the small number of participants to what extent the anonymity can be truly uphold may be difficult to be ensured.

Table 1
*Profile of the participants.*

| Name | Suzy | Tina | Lola | Pat |
|---|---|---|---|---|
| Occupation | Teacher (primary school) | Full time student | Teacher (primary school) | Teacher (secondary school) |
| Civil status | single | single | single | Married with a new-born |
| Semester | 3 | 4 | 4 | 3 |

As explained in the course assessment plan (see Figure 1), the two course learning outcomes (CLO2 and CLO4) from both courses were used to design the integrated and collaborative assessment in this study.

### Data Collection

Data collection involved 12 weeks (one semester) through online classroom interaction, written online interview and content analysis of students' assignments and reflection. Using sociocultural theory as the theoretical framework, the unit of analysis involved each student's learning processes treated as individual cases although students engaged in classroom activities and interaction for the two courses and the learning outcomes collaboratively as formative assessment, whilst completing a mini study, as summative assessment, individually.

| | Integrated and Collaborative Assessment | |
|---|---|---|
| **Courses** | **Formative Assessment** | **Summative Assessment** |
| **SGDY5023**<br>**SGDY5043** | In pairs, given a case for students to solve using learning theories learnt in the course<br>In a group given a case to solve based on what influences learning and individual differences | Mini study – individually to embark on a project to carry out intervention in helping learning. |
| **Duration** | 12 hours of class time | 6 hours of class time (to prepare their study)<br>(36 hours of student learning time – to carry out the study) |
| **Type of Integrated Assessment** | Assessment by submission of personal evidence | Integrative semester |
| **PART 1**<br>**Sources of data as a form of triangulation** | Classroom interaction and reflection<br>Written interview<br>Students' work (portfolio) | Written interview<br>Students' work |
| **PART 2**<br>**Source of data of students' performance** | Students' performance by CLO in both courses by using rubric that was designed based on the two CLOs from both courses for the mini study | |

*Figure 2.* The sources of data, formative and summative assessment, duration, and type of integrated assessment

As illustrated in Figure 2, the data collection is divided into two parts. Part 1 collects evidence of students' classroom interaction, reflection from their portfolio, written interview based on google form and students' actual work (during formative assessment). During the formative assessment, students in pairs are asked to solve problem based on a given case (see Appendix B) and they then took turns to evaluate the other group by using a rubric based on the criteria (see Appendix C i and ii).

In this particular study, assessment by submission of personal evidence was used during the formative assessment in the form of solving case studies and written portfolio of their reflection of the case. In addition, integrative semester was used for the summative assessment in which each student was asked to embark on doing a mini research to fulfil the programme learning outcomes between the two courses in the semester. The rubric was designed based on the fundamental criteria originating from the course learning outcomes and tailored to the requirement of the task (formative assessment to solve the case, and for the summative to carry out a study and solve issues on learning and individual differences for the mini study). The summative assessment was to conduct a mini study individually in solving the issue and provide intervention and solution. The duration of the mini study was 42 hours in total, out of which six hours were allocated to be done during class time. Students were required to conduct a mini study (see Appendix A i and ii) to investigate how they could design a project of study and provide a solution related to how human learn (SGDY5023) and

how they learn differently (SGDY5043). The same rubric that was given to the students during the formative assessment was also used when assessing students' work for the summative assessment.

## Data Analysis

Data was analysed by comparing the information obtained from the various sources of data in answering the research questions. The major themes include:

- *Perception of integrated and collaborative assessment*
- *Reflection of learning experiences*
- *Reflection on cognitive engagement/affective engagement/ behaviour engagement*
- *Challenges faced*

Data in this study is divided into two parts. Part 1 which was gathered from the classroom interaction and reflection, written interview and content analysis of students' work were used to triangulate evidence of learning when using integrated and collaborative assessment.

While data from Part 2 was also obtained from students' performance of the two CLOs in the respective courses to substantiate data gathered from Part 1. Information from students' performance were obtained from a rubric as a measuring tool that was designed based on the two CLOs from both courses.

## Results of findings and discussion

Findings from this study (see Table 2) shows interesting results from the diverse learners for both parts.

Table 2
*Overall results by theme*

| | Major Themes | Suzy | Tina | Lola | Pat |
|---|---|---|---|---|---|
| *Part 1* | *Perception of integrated and collaborative assessment* | *Scared but exciting* | *Challenging yet interesting* | *Mind boggling* | *Overwhelming* |
| | *Reflection of learning experiences* | *First time experience doing a mini study and both courses help to understand learners better* | *The two courses and doing the mini study provided hands on experience since coming from non-education background* | *Felt challenged and every time the head feels heavy and hot* | *Have been teaching students by lecturing but through learning the theories and impact on learning have started using active leaning activities* |
| | *Reflection on cognitive engagement* | *Discussion and sharing from others about the mini study help to understand better* | *Initially thought the programme was difficult but now influenced thinking and motivated to read more* | *Already considering to pursue and expand the topic for research report* | *Tasks that requires thinking and challenging in the courses made me reflect my practices* |
| | *Reflection on affective engagement* | *Empathise with students* | *Felt an increase in confidence to continue learning* | *Felt a sense of relief and surge of energy to teach better* | *Empathise with students* |

| | | | | | |
|---|---|---|---|---|---|
| | *Reflection on behaviour engagement* | *Observe students reaction in the mini study change ways of working* | *Discussion and learning from peers also help to prepare if going to be a teacher in the future* | *Observe students reaction in the mini study change ways of working* | *Change in students' behaviour convinced the need to change* |
| | *Challenges faced* | *Work load and sense of anxiety and less confidence when completing the course requirements* | *Felt lack of teaching experiences like the other peers that require more effort to read and catch up.*<br>*Getting the participant in the study to be involved.* | *Work load in school that requires attention to be diverted at times from course assignment* | *Family matters that impede concentration and focus when completing both course requirements* |
| *Part 2* | *SGDY 5023 CLO2* | 19/25 | 24 /25 | 22/25 | 19/25 |
| *Students' performance by CLO* | *SGDY 5023 CLO4* | 19.16 /25 | 22.5 /25 | 20.83/25 | 19.16/25 |
| | *SGDY5043 CLO2* | 18/25 | 15/25 | 21/25 | 15/25 |
| | *SGDY5043 CLO4* | 16.88 /25 | 21.25 /25 | 20/25 | 16.88/25 |
| | *Mini study performance* | 73.04/100 | 82.75/100 | 83.83/100 | 70.04/100 |

**Students' perception when embarking on the integrated and collaborative assessment**

All the participants felt that the integrated and collaborative assessment in the form of mini study was thought provoking yet stimulating as mentioned by Lola ("mind boggling") and Tina ("challenging yet interesting"). To a certain extent both Suzy and Pat felt anxious as they felt "scared" and "overwhelming". Understandably Tina who was a full-time student have greater control of time spent to understand what is needed to complete the assessment whilst the rest who also had to juggle between work and learning, may have contributed to their overwhelming feeling.

**Students' reflection on the learning experiences and learning engagement from doing the assessment**

Embarking on integrated and collaborative assessment was a new experience for all the participants in this study. Suzy, who admitted that this was "the first-time experience doing a mini study" what more involving two courses. This was also concurred by Tina who being someone with no Bachelor of Education background, initially thought the Master programme was difficult but felt that the mini study provided hands on experience to help her make sense of the two courses. However, like Suzy, Tina whose first-time experience doing integrated and collaborative assessment made her become motivated to read more as they both felt that the assessment not only helped them to understand better about how people learn but also understand the two courses better. This finding concurs with that of Ioannou and Artino (2010).

Lola confessed that she felt challenged when completing both the courses that every time she felt her head heavy with information which she described as "heavy and hot" due to the amount of thinking that she had to do. Ironically, this experience has changed her in the way that she is "already considering (to) pursue and expand the topic for (her) research report". Transcending the cognitive stimulation, she received from the actual course(s) to the potential course (research report) that she will do in the future signalled the cognitive and affective transformation that she has

developed that builds her sense of confidence as found by Cloete (2018). Having done the mini study made Lola "felt a sense of relief" when she could connect the theory into practice and a "surge of energy to teach better" as she gained some ideas on teaching and learning from the courses as well as the learning activities and assessment done in both the courses.

This surge of emotion is also felt by Tina who mentioned that through the assessment in the courses and discussion with her peers, who were in-service teachers, had resulted in her increase of self-confidence to continue learning and better prepare herself, if she is to become a teacher one day. This also resonates well with Lola and Suzy who claimed that observing their "students' reaction in the mini study" changed their ways of working as reiterated by Pat that observing the changes in the "students' behaviour convinced the need to change" on her part. The findings of this study supported that of Sewagegn, and Diale (2019).

Of the four, Pat's transformation was phenomenal even when she struggled to learn due to her family constraint as she just delivered her baby a few days before the semester began. Pat was in the process of receiving support, to take care of her baby up to the time when the semester almost ended. Having to juggle between family and studies was overwhelming for her. However, her reflection on her teaching experiences prior to taking the two courses and embarking on the mini project, enabled her to look at how her students learn history using digital storytelling. This was her innovation in itself, as she almost always resorted to lecture or reading "have been teaching students by lecturing". However, taking the courses has helped her to understand "the learning theories" and how the theories gave "impact on learning" so much so that she has already started using active learning activities with her students. Pat confessed that the "tasks that requires thinking and challenging in the courses" made her reflect her own practices. Through the mini project she began to empathise with her students, and this is also concurred by Suzy. Findings from this study resonates with that of Siegel et al. (2015) and Boud and Soler, (2018).

**Students' performance when doing integrated and collaborative assessment**

Overall, all the participants showed acceptable (above 70%) Masters level performance for the two CLOs for both the courses. Of the four, Tina by virtue of her being a full-time student who received inspiration from her peers and is motivated to learn, scored the second highest (see Table 2). Interestingly, Lola who kept lamenting that the assessment was challenging but later felt motivated to apply what she has learnt to her students, scored the highest. As pointed out by Ioannou and Artino (2010) and Sewagegn, and Diale (2019), when students are involved in active learning they tend to perform better. However, looking in detail of the participants' performance of each of the CLO of the two courses, showed some participants performed below the 70% standard for example, Suzy for CLO4 of SGDY5043 whilst Tina and Pat scored less than 70% for CLO 2 of SGDY5043. Comparatively between the two courses, SGDY5043 Learning and Individual Differences tend to be more demanding compared to SGDY5023 Human Learning.

**Challenges faced by the students when doing integrated and collaborative assessment.**

The participants' overall performance varied from one another due to various constraints faced throughout the semester. Suzy and Lola felt that the workload in school at times hinder their better attention when preparing for the courses and doing the assessment. Suzy felt that her greater challenge is her "sense of anxiety and less confidence". While Tina felt that apart from her lack of

prerequisite knowledge her greater challenge was also dealing with her own participant in the mini study who provided to her a snapshot of how dealing with students can be demanding should she decide to be a teacher one day. Lastly, Pat who has a great potential felt that her greatest challenge for the semester was having to cope with her family matters that "impede concentration and focus when completing both course requirements".

Nevertheless, all the participants expressed that although the experience when doing both the formative and summative assessment through the integrated and collaborative assessment was challenging but the ability to make connection between the two courses provide deeper engagement in learning, especially when witnessing the transformation of their students in the intervention during the mini study.

**Limitation**

This is an explorative study that due to time constraint and ethical reason had its limitations in referring to the type of data collection. Data were only able to be collected after students' marks have been transmitted. This is done with the ethical consideration of not wanting students to feel obliged to participate in this study. Due to time constraint written interview was resorted and not face-to-face interview. Unlike face-to-face interview written interview lacks the ability to ask spontaneously to follow up questions or probing questions where applicable. Online synchronous interview was also not an option as by the time data were collected it was nearing the school holidays and festive occasion that the participants as teachers were not able to commit.

**Recommendation**

To ensure a better understanding from the participants' view it would be recommended that face-to-face interview be conducted and for integrated and collaborative assessment to be expanded to involve other subjects from other disciplines. Since this study involved intact classroom participants, the participants were all just female. It is recommended that getting male participants' perspectives is crucial to detect if there are any gender influences.

## Conclusion

Integrated and collaborative assessment provided during the formative and summative assessment to fulfil the requirement of the two course learning outcomes from the two courses, provided an innovative way to the instructors' ways of working when assessing students as catalyst, all in the hope to build better educators for the future.

## References


Abdul Rahim, F., Hood, P., & Coyle, D. 2009. "Becoming Experts": Learning through Mediation. *Malaysian Journal of Learning and Instruction*, *6*, 1–21.

Blikstad-Balas, L. M. & Engelien, K.L. 2017. Integrating assessment for learning in the teacher education programme at the University of Oslo, *Assessment in Education: Principles, Policy & Practice*, 24:2, 164 184, DOI: 10.1080/0969594X.2016.1239611

Boud, D. and Soler, R. 2016. Sustainable assessment revisited. *Assessment & Evaluation in Higher Education*, Vol. 41, No. 3, pp. 400-413

Cloete, M. 2018. The impact of an integrated assessment on the critical thinking skills of first-year university students, *Accounting Education*, 27:5, 479-494, DOI: 10.1080/09639284.2018.1501717

Dittman, D. R; Hawkes, M.; Deokar, A. V. and Sarnikar, S. 2010. Improving virtual team collaboration outcomes through collaboration process structuring, Quarterly Review of Distance Education, 11, 195-210 & 289-290.

Fung, D. 2017. *A Connected Curriculum for Higher Education*, London, UCL Press

Gleason, B., and Jaramillo C. N. 2021. Design thinking approach to global collaboration and empowered learning: Virtual exchange as innovation in a teacher education course. *TechTrends*, *65*(3), 348-358.

Hartley, P. and Whitfield, R. 2012. Programme Assessment Strategies (PASS) final report, *Higher Education Academy*. Available from: https://www.brad.ac.uk/pass/about/PASS_final_report.pdf

Ioannou, A., and Artino, A. R., Jr. 2010. Learn more, stress less: exploring the benefits of collaborative assessment. *College Student Journal*, 44(1), 189+. https://link.gale.com/apps/doc/A221092150/AONE?u=anon~7bf23f&sid=googleScholar&xid=b19408ad

Jessop, T. and Tomas, C. 2017. The implications of programme assessment patterns for student learning. *Assessment and evaluation in Higher Education*, Vol. 42, No. 6, pp. 990-999

Knight, P. T. and Yorke, M. 2003. *Assessment, Learning and Employability*, Maidenhead, OU Press.

LaPlante, R. 2019. Assessing Language in an E-Learning Environment. In E. White, & T. Delaney (Eds.), *Handbook of Research on Assessment Literacy and Teacher-Made Testing in the Language Classroom* (pp. 244-261). IGI Global. https://doi.org/10.4018/978-1-5225-6986-2.ch012

Reiser, E. 2017. Blending individual and group assessment: A model for measuring student performance. *Journal of the Scholarship of Teaching and Learning* 17 (4): 83–94.

Sewagegn, A. A. , and Diale, B. M. 2019. Empowering Learners Using Active Learning in Higher Education Institutions. In (Ed.), *Active Learning - Beyond the Future*. IntechOpen. https://doi.org/10.5772/intechopen.80838

Siegel, M., T. Roberts, S., Freyermuth, S. Witzig, and K. Izci. 2015. Aligning assessment to instruction: Collaborative group testing in large-enrollment science classes. *Journal of College Science Teaching* 44 (6): 74–81. *https:// doi.org/10.2505/4/jcst15_044_06_74*

| | | | | | |
|---|---|---|---|---|---|
| SGDY5043 6-8 | Field work ( mini study) | CLO2<br>Apply and integrate knowledge related to individual difference constructs: cognitive, affective, and conative to investigate current educational issues | 25 | C3. LOC3b (Interpersonal skills)<br>Application | 25 |
| 9-12 | Intervention (Plan of Action) | CLO4<br>Design appropriate solutions based on a specific **theory or assumptions for practice** | 25 | C6,P7, LOC2 (Cognitive)<br>Evaluation<br>Origination | 25 |

| | | | | | |
|---|---|---|---|---|---|
| SGDY5023 2-4 | Field work ( Mini study) | CLO2<br>Apply and integrate knowledge related to human learning assumptions to investigate current educational issues | 25 | C3. LOC3b (Interpersonal skills)<br>Application | 25 |
| 9-12 | Intervention (action plan) | CLO4<br>Design appropriate solutions based on a specific **theory or assumptions for practice.** | 25 | C6,P7, LOC2 (Cognitive)<br>Evaluation<br>Origination | 25 |

# APPENDIX A (i)

## Instruction for the summative assessment -individual mini study.

**Learning outcomes**

Instruction:

1. You are to carry out a mini project on learning.
2. Find an issue that you would want to explore on learning.
3. The context can be in school, home or any workplace in which learning takes place.
4. You can replicate a study based on an article that you have found. Please ensure that the article comes from reputable Scopus journals (*e.g. Journal of Learning and Instruction, Journal of Learning and individual differences, Journal of Educational Psychology etc.*)
5. There will be two parts in this project:
    a. PART A: To apply and integrate knowledge on how human learn and design appropriate intervention plan (SGDY5023) – 50%
    b. PART B: To apply and integrate knowledge on individual differences that influence learning and design intervention plan (SGDY5043) -50%
6. So what this two parts really mean is that once you have determined an issue and have found a study (from a reputable journal) that you would want to replicate (whole or part of) you will then apply it to your contexts and gather evidence on learning Part A) -so discuss related learning theory(ies) to apply and explain what you have found before designing appropriate solutions based on the theory and what you have found. This is where your knowledge on SGDY5023 Human Learning is helpful.
   Once you have understood from your mini project about learning then you are to also apply your knowledge on learning and individual differences (SGDY5043) to apply related theory based on your evidence this time to look at how factors on individual differences that influence learning and design solution based on related theory(ies) and the context of your mini study. Since these two courses are about learning you could refer to the same theory to do both parts (in fact this is ideal) so that you will be able to apply the concepts you have learned from both courses to help you have an in-depth knowledge about the interplay between diversity (individual differences) and learning.
7. Format:
   This semester I would like you to write the project as if you are a consultant to a learning project. I have given you the example in the folder SGDY5023 https://bit.ly/3Q9fVui

# APPENDIX A (ii)
## Instruction for the summative assessment -individual mini study.

The basic information should be:

a. Introduction
b. About your study
c. About the replicated study
d. Part A – Theory used, methodology used or adopted, findings and design for solution
e. Part B - Theory used, methodology used or adopted, findings and design for solution
f. Reflection of theory used and what was done and learned in understanding Part A and Part B assignments
g. Conclusion
h. Font: Times New Roman 12
i. Spacing: 2.0
j. Language: English/Bahasa Melayu
k. Margin: Normal
l. Length: Maximum 40 pages
m. Referencing style: APA; List of references: include at least 6 reading references (last 10 years)
n. Turnitin similarity check: <15%

Progress report will be asked from time to time by the instructor (maximum 3)

Enjoy your discovery!

# APPENDIX B
## Example of a case study used during formative assessment (pair work).

*The Case of Ziden*

Ziden is 16 years old and come from a disadvantaged family of 6 siblings. He is the fourth child. His parents both work as security guards in the mall and factory nearby their house. Being the middle child Ziden has got used to being on his own while the rest of his siblings get to do tasks together. To his parents, Ziden is a good boy who seldom had problems that needs his parents' attention. Ziden likes to listen to music and every time when the house is just too noisy, he will leave and go the mall to sit at the music shop. That was when Ziden met Eizaz, an only child of a teacher and an accountant, who likes spending his pocket money on almost anything.

Both Ziden and Eizaz are of the same age. They both have one thing in common, which is, they find school boring even when they come from different schools. Eizaz's school is a private school whilst Ziden's a public nonperforming school. Although they dislike schooling, both are perceived as 'good' students. 'Good' as in referring to them being part of the majority students who are rather obedient by staying away from trouble but not necessarily doing well academically but not failing either. They both are the majority average performance students.

After meeting Eizaz, Ziden tends to spend more time in the mall than at home, to which none of his family members notice. Both spent a lot of time at the amusement centre. Both felt that they were a perfect match for each other. To enjoy, Eizaz needs the company and Ziden needs the money. Understandably, their conversation was very rarely about school or schooling but centres around either the game they play or the music they listen to.

In order not to get in trouble with his parents Eizaz make sure that all his school work is done. He sometimes had to do it at the mall so that he can have more time to play before his parents get back to work. Ziden rarely have homework even if he has he would not really know how to answer and the last thing he would do was to ask his teacher. Having not many friends in school he practically has no one to ask. His older siblings were not of much help since they too struggled with schooling. His eldest brother works at a restaurant as a waiter and his two elder sisters are housewives with a child each but have problems staying on their own and so decided to stay at their parents' house. The second sister is married to a lorry driver and only meets her husband every fortnight. The third sister's husband was killed in a car accident. He was a taxi driver.

Having siblings with problems of their own and parents who had to work twice as hard to fend for the growing family, Ziden turned to Eizaz to help him with schoolwork if ever he had any. If not Ziden often observes Eizaz completing his school work which to Ziden looks a lot tougher than his, especially when it is in English. Sometimes Ziden would ask Eizaz the meaning of certain words that he finds peculiar to him or ask to explain about the pictures in the book that intrigued him. When this happens both seem to be engrossed in trying to make sense in which Eizaz to make sure he gets to explain well to Ziden and the latter to understand well his new buddy's explanation. Of course both would get the whole work done quickly so that they can play together. Most of the time when Eizaz could not explain to Ziden because he too was not sure, they would just shrug it off and continue playing.

# APPENDIX C (i)
## Criteria designed for the assessment

| | |
|---|---|
| **PART A** | **CLO4** Design appropriate solutions based on a specific **theory or assumptions for practice (C6,P7,Cognitive Skill – evaluation origination)**<br>**CLO2** Apply and integrate knowledge related to human learning assumptions to investigate current educational issues (C3. LOC3b (Interpersonal skills) -Application |
| | **Criteria** |
| **Cognitive (C3 – apply)** | **Provide clear description of the study and methodology on human learning** |
| | **Discuss problems that learner(s) faced when learning** |
| | **Ability to apply related theory in human learning to relate to the study** |
| | **Apply relevance of argument of the study based on current research articles chosen to review** |
| **Cognitive (C6- create)** | **Evaluate various related studies related to human learning to help understand the study** |
| | **Relate to theory in human learning (or theories) to guide the solutions for improvement** |
| | **Ability to synthesise findings to provide solution that can overcome basic education problems in relation to human learning (such as reading, writing, math, science)** |
| | **Argue why solution is the right thing to do in relation to the human learning theory chosen and context** |
| **Psychomotor P7 (Origination)** | **Ability to conduct a study to design innovative solution to solve problems related to human learning** |
| **Interpersonal Skill** | **Ability to present the relevant information (Interpersonal skill – clear communication that is harmonizing)** |
| **Cognitive skill** | **Create -The act of making, produce or invent something into existence** |

APPENDIX C (ii)
Criteria designed for the assessment

| **PART B** | **CLO2** Apply and integrate knowledge related to individual difference constructs: cognitive, affective, and conative to investigate current educational issues (C3, Interpersonal skill) |
|---|---|
| | **Criteria** |
| | Apply relevance of argument based on current research articles chosen to review |
| **(C3 - apply)** | **Apply theory (or theories) related to individual differences to guide the solutions for learning improvement** |
| | **The ability to find the appropriate information from various sources (Interpersonal skill - collaborate)** |
| **Interpersonal skills** | **Ability to present the relevant information (Interpersonal skill - clear communication that is harmonizing)** |
| | Interpersonal skills - Respect<br>The ability to recognize and respect the attitude, behaviour, belief and the rights of other people |

| **PART B** | **CLO4** Design appropriate solutions based on a specific **theory or assumptions for practice (C6,P7,Cognitive Skill – evaluation origination)** |
|---|---|
| | **Criteria** |
| **Cognitive (C6- create)** | **Provide clear description of the study and methodology on learning and individual differences** |
| | **Analyse the factors related to individual differences that may influence learning** |
| | **Evaluate various related studies related to learning and individual differences to help understand the present study** |
| | **Relate to theory related to individual differences to findings and guide the solutions for improvement** |
| | **Ability to design the solution that shows influences of individual differences to learning to overcome basic education problems (such as reading, writing, math, science)** |
| | **Argue why solution is the right thing to do in relation to learning and individual differences and context** |
| **Psychomotor P7 Origination** | **Ability to conduct a study to design innovative solution** |
| **Cognitive Skill** | **Integration -<br>The act or process of bringing together elements, ideas, solutions, people, systems etc. to function as one (sample verbs: integrate ideas, provide solution)** |

# Pedagogical Sales Email Writing Framework:From Needs Analysis to Course Development

Nur Baiti Ismail Shauki*[a], Nor Fazura Mohamed Zulkifle[a], Hafizah Hajimia[b], CheeSie Ching[b], Wan Irham Ishak[c],
[a]Faculty of Language and Generic Development, Universiti Malaysia Kelantan, Bachok, Kelantan, Malaysia
[b]Akademi Pengajian Bahasa, Universiti Teknologi MARA Perlis, Arau, Perlis, Malaysia
[c] Akademi Pengajian Bahasa, Universiti Teknologi MARA Kedah,Merbok, Kedah, Malaysia
*Corresponding Author: nurbaiti.is@umk.edu.my

## Abstract

In order to accomplish the objectives outlined in the Malaysian government's Educational Blueprint 2016 that highlighted the importance of business and entrepreneurship in learning, the curriculum needs to be reorganised and restructured in a strategic manner into specific programmes. In the process of establishing a curriculum for a language, needs analysis plays a significant role in determining the end result that the students should be able to reach. This study explores the needs of a pedagogical sales email framework to assist educators in designing teaching activity and material using suitable vocabulary and content of business courses. (1) Although business courses enrolments continue arising, only a few researches can be found highlighting generic structures and relevant contexts of sales emails writing. (2) Thus,this paper proposes a needs analysis of sales email writing modules for the undergraduates of business courses. The methodology utilised data gathered from semi-structured interviews with industry informants and subject specialists and the data was analysed using thematic analysis. In order to have an extensive understanding of the undergraduates' writing needs, the interview questions were constructed based on Munby's (1978) Communicative Needs Processor (CNP). (3) Three general themes were found from the recorded responses with the interviewees which are; Purposive Domain, Strategies Used in Writing Sales Emails (Instrumentality) and Target Level of Knowledge. (4) The findings of this study enable ESP practitioners to investigate the needs of learners and educators in understanding pedagogical sales emails. This study also allows a systematic and detailed study of the learner's linguistics behaviour, especially from the responses given by the subject specialists.

*Keywords:* ESP, Needs Analysis, Pedagogical Writing, Sales Emails, Thematic Analysis

## Introduction

When it comes to the many ways that businesses can communicate with one another, business letters have been and continue to be of utmost significance in building and sustaining business connections, both within an organisation and with their contacts outside of the organisation. As different companies adopt different structural writing, the format and conventions of writing business letters vary from organisation to organisation and country to country. The ever-changing structure in business correspondence makes it complicated and confusing for those involved in drafting the letter. Not only are those structures inconsistent in the business world, but the method is also now shifted to a less time-consuming communication approach which iselectronic mail or email.

Email is progressively supplanting more conventional written and spoken modes, hence it becomes the prevailing method of communication for most companies around the world. Attributable to this developing slant towards the utilisation of emails, it has turned out to be progressively vital to reveal the idea of this moderately new mode of communication and how it fulfils different communicative purposes in various discourse communities. To reach this goal, researchers worked on the genre examination of email and writing in various contexts among others are Flowerdew & Wan (2006), Jensen (2009), Jucker & Dürscheid (2012), Mehrpour & Mehrzad (2013) and AlAfnan (2015).

In utilising email at the workplace, a newly appointed worker, though freshly graduated from an entrepreneurship university, is likely to face difficulties if asked to draft sales email for the first time. Thus, a standard generic structure of correspondence incorporated at target situations should be developed to ensure an efficient administrative task. A needs analysis prior to developing a framework of writing sales emails would help detect the problem that the undergraduates endure to prepare their emails appropriately and convincingly when they start working in the business-related field.

The problem has been addressed further by Kaur (2013, p. 13) mentioning that "a comprehensive and systematic vocabulary teaching has not taken a place at the Malaysian higher learning institutions". Woodin and Ojanguren (1995) reported that in email writing, students are occasionally "unsure about the correct usage of the language or the reasons for the application of specific grammatical rules". In point of fact, the scarcity of corpus in entrepreneurship means there is also a lack of a systematic list of vocabulary suitable for this genre.

### Purpose of the Study

For many years, genre analysis has provided pedagogical implications for ESP classrooms regarding internal structures and language features. Since its inception in 1960, ESP has engaged three major methodologies in exploring language. The first approach, more popular as register analysis, focused on differences in language and vocabulary at the sentence level. Its application was limited due to its inability to elucidate why certain linguistic and grammatical features are more frequent or less frequent in a given variety. Then, discourse analysis took over, with the goal of putting sentences together in socio-cultural contexts to epitomise specific communicative acts. Discourse analysis was popular for a few years until it was critiqued by Bhatia (1993) for

failing to demonstrate the essential relationship between constraints and conventions. Thus, genre analysis has given a significant framework to inquiring about parts of writing, and its academic uses are arranged for instructing as well as studying in academic settings.

The forerunner in the genre domain, Bhatia (1993) trusts the studies of genre are advantageous to the understudies and instructors of ESP because these studies give a prior formal and content schemata information that will encourage both the linguistic assets and non-specific conventions learning which could assist in acknowledging these conventions. Based on both the researchers thought of the genre, there are various non-specific structure of communications (i.e. letters and emails) have been investigated; Park, Dillon, & Mitchell's (1998) research on business complaint letter, Santos (2002) on business letter of negotiation, Vergaro (2004) on sales promotion letter and Liao & Nesi (2017) on business request emails to cite a few.

On the other hand, compared to the tradition of using a letter as the means to connect, a business email is a professional communication method that can reach across boundaries and is less time-consuming compared to the traditional business letter. However, some may claim that certain types of messages are rather effective using the common practice of sending a letter. For instance, Hanel & Cortes (2010) assert, in their studies of 'collection letter', their worry over the use of electronic mail which may affect collection letter's functionality. Much earlier, Gimenez (2006) enquires 123 international business communication emails which have accumulated in three stages of the study. The finding proposes that the business emails acknowledge the demands of the new world and give users the possibility to practice textual features.

**Research Objectives**

These studies of the schematic structure and textual communicative goals in various disciplines and cultures have recently sparked many researchers' interests in genre analysis. However, based on the studies done on business email writing, there is not much exposure given to the generic and communicative purpose of the emails from the point of the study of language. Therefore, we do not know much about the generic structure of the business emails written internally, and whether there are similar social or cultural factors in the writing of business emails among university students. Hence, having a needs analysis will identify the necessary details to be included in the teaching and learning of pedagogical sales emails.

There are three objectives of the current study which are;

1) To find out what language skills a learner needs in order to write an effective sales email
2) To help determine if an existing course adequately addresses the needs of potential students.
3) To collect information about particular problem learners are experiencing.

**Theoretical Framework**

Needs analysis first made its way into the linguistics field through English for Specific Purposes (ESP) movement. Around the 1960s, specific language courses were in demand and applied linguists employed a needs analysis procedure to investigate the requirement and relevancy of the subjects and the module offered. Evans & John (1998, p. 45) mentioned, the necessity to conduct needs analysis for ESP courses and subjects is because "It asks questions about students' needs and wants, the expectations of the institution, the features of the actual teaching situation". What needs analysis offers to researchers and ESP practitioners is essential information regarding students, their needs, the subject requirements, and aids in the decision-making process to meet the needs (Graves, 2000; Long, 2005; Workineh, 2018). Therefore, needs analysis in second or foreign language teaching can be summed up as the process of understanding what to teach to the L2 learners and how to teach it.

Fuentes (2006) mentioned that in Europe, the need to communicate in specialised domains such as academic and scientific disciplines at university, is heavily emphasised. This is of a different situation in the Asian region especially in Malaysia. There is an apparent dearth of researches in needs analysis on English for Specific Purposes particularly in sales and business fields. The Malaysian Education Blueprint 2016 has stated in its guideline referred to by all institutions in this country that, in order for the Malaysian education system to keep evolving with the global pace, it is crucial to instil entrepreneurial traits among the graduates. The pressure in realising this vision into the ESP field led many educators to pursue a complete guide, especially in the mastery of the four essential skills; reading, writing, listening and speaking. Although writing is an exceedingly important skill for most foreign language learners, the skill is deteriorating among the undergraduates that companies are complaining about (Slutsky & Sardegna, 2018; Samsudin, 2015). Slutsky & Serdegna (2018) further reported that a survey revealed the lack of preparation problem among college graduates in their workplace. Thus, having a pedagogical framework of writing sales emails would be an excellent assistance for the undergraduates and the instructors in the process of teaching and learning.

There are many ways of conducting a need analysis research for example using questionnaire (Ibrahim, 2020), interviews (Rubab et. al., 2019), and mix-mode (Thepseenu, 2020). Apart from the parameters of variation mentioned above, the lack of researches in generic structure in the ESP context and comparative study of business emails composed in English by the undergraduates has yet to be discovered. It can be a noteworthy example of research as it reveals insights into an obscure method of correspondence, i.e. email. Hence, the examination of the way diverse individuals with various dialect foundations embrace the English language in their emails can produce useful discoveries and show the degree to which the interlingual and intercultural exchange impact the email messages.

Through this study, organisation mediators can be prepared in more viable rhetorical techniques and linguistic conventions that can improve the exchanges with the local English speakers.

This study adopts McKillips (1987) method of needs analysis focusing on its Discrepancy Model. This model is the easiest to understand and the one that is utilised the most, particularly in the field of education. The following three phases are included in this model, which places an emphasis on normative expectations:

1. Establishing objectives and determining what should be done.
2. The measurement of performance, or the identification of what is.
3. Identifying discrepancies and ranking the appropriateness of differences between what is and what should be.

## Literature Review

Because of the tremendous growth that has taken place in the fields of business and technology over the past several decades, English language programmes all over the world have experienced a paradigm shift over the course of those years. This shift has occurred both in regard to the professional users and learners of the language (Ministry of Education Malaysia, 2015). Malaysia is not an exception to these paradigm shifts. The Malaysian Education Blueprint 2016 has stated in its guideline referred to by all institutions in this country that, in order for the Malaysian education system to keep evolving with the global pace, it is important to instil entrepreneurial traits among the graduates.

To achieve its goal of developing an effective curriculum for tertiary education, the government must first gain an accurate understanding of the situation facing the Malaysian educational system as it currently exists in the country's many local universities. Therefore, one of the ways to discover the true state of education in Malaysia is to do a needs analysis, which is one of the many ways this may be done. The purpose of this study is to investigate the function that needs analysis plays in the process of designing curriculum and developing materials. There includes a discussion of the reasons for conducting a requirements analysis during the curriculum building process, as well as the fundamental principles of language curriculum design.

Numerous academics have acknowledged that conducting a needs analysis is beneficial not only in the process of initially developing a curriculum but also in the process of maintaining and renewing a curriculum in order to assess the efficacy of the curriculum (Smith et. al., 2022; Brown, 2016). This is significant in a course development because evaluation of programmes based on the participants' needs not only encourages the growth of effective pedagogy but also assists programmes in avoiding curricular crises and the complaints of dissatisfied stakeholders.

Users of needs analysis will vary depending on the aim of the needs analysis they are participating in. For instance, when conducting a needs assessment to assist in the revision of the tertiary English curriculum in a country, the end users include curriculum officers in the ministry of education, who may wish to use the information to evaluate the adequacy of existing syllabuses, curricula, and materials; lecturers whowill teach from the new curriculum; learners who will be taught from the curriculum; authors who are preparing new textbooks; testing personnel, who are involved in the

development of assessment instruments; and companies, who are interested in knowing what the expected level will be of the undergraduates and what problems they may face (Richards, 2001).

According to Macalister and Nation (2019), the needs analysis is the first step in the design of a course, and they feel that it offers validity, reliability, and practicality for all subsequent activities involved in the design of a course. The targeted results or expectations of a high-quality programme, the role of assessment, the present level of student success, and the actual programme content should all be included in this material.

The material should also consider the concerns and perspectives of the learners, as well as those of the administrators, parents, and teachers. While the data should include examples of assessments, lessons from teachers, assignments, scores on state standardised tests, the textbooks that are currently being utilised, students' perceptions, and feedback from parents, the data should also cover all of these things.

## Methodology

This section focuses on the writing needs of Business courses in a public university in Malaysia. The sampling for the semi-structured interviews is small, purposive and is chosen to fulfil the fundamental purpose of this research only. The aim is to explore the written communicative events produced by the undergraduates from the perspectives of the lecturers teaching them and also from the perspectives of local entrepreneurs. With further regard to methodology, this study delved on utilising thematic analysis where interview responses were transcribed and analysed using an iterative, data-driven process that categorizes interview data into common themes. This method of combining interview with thematic analysis for data ttriangulation has been adopted by many studies (Fama et. al., 2022; Guest, 2012; Bernard & Ryan, 2009; Braun & Clarke, 2006; Boyatzis, 1998)

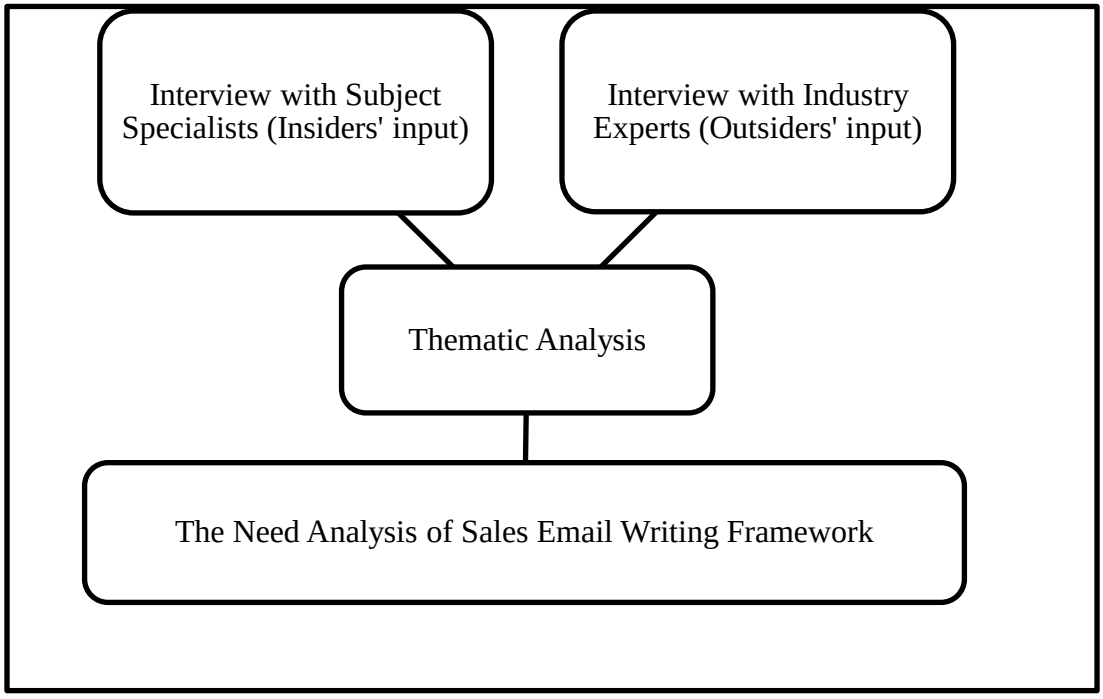
In Fama's et. al. (2022) study, an innovative, structured interview was conducted with 53 persons who had post stroke aphasia. The interview included an open-ended question about the general experience of anomia. The data from the 37 participants who provided adequate responses was analysed using thematic analysis that yielded five primary themes: strategies to cope with or compensate for anomia; comments on awareness of the level of breakdown (for example, "I have an idea, but can't get the right words"); negative emotions; the impact on relationships; and changes in frequency over time.

Nonetheless, according to Braun and Clarke (2006), employing a rigorous theme approach can result in an analysis that is informative and provides answers to specific research problems. Further, the researchers said that in order for something to be considered a theme, it must be something that encapsulates the central concept regarding the data in respect to the study question and which also shows some level of patterned response or meaning within the data set. The triangulation of the data is initiated by preparing the data for analysis by transcribing, reducing the data into themes by a process of coding, and expressing the data, as shown in Figure 1 below. This

illustration also demonstrates how the data are represented.

Figure 1

*Triangulation of the study*




The interview questions were tailored based on the literature from the genre analysis. In order to strengthen the content and the structure of the interview questions, parameters from the Communicative Needs Processor (CNP) model of Munby's (1978) are adapted. The three parameters from Munby's 1978 model, which are Purposive Domain, Instrumentality and Target Level were modified to construct the semi-structured interview questions. Modifications were made in order to gather the necessary information from the respondents. It applies especially on the information related to the extent of the identified moves in the genre. The details of the parameters adapted are as below;

**Purposive domain**: in this area, the goals for which the learner would use the second language at the end of the ESP training will be considered and investigated.

**Instrumentality**: this area investigates the medium of the language to be used whether written or spoken-, the mode of the language to be used- whether in monologue, dialogue or any other form-, and the channel of communication in the language to be used- whether face to face, on the phone, or any other.

**Target level**: this area predicts the language proficiency level of the L2 users by the end of ESP training, which might not necessarily be the same for all skills.

Overall, there were four lecturers and three entrepreneurs were involved in the interview. The lecturers are teaching English for Business and entrepreneurship subjects in a Malaysian public university; thus, they have in-depth experience and knowledge in the structure of pedagogical sales emails and its criterion. Meanwhile, the local

entrepreneurs were chosen from the companies attached to the university's Entrepreneurship Unit.

In order to achieve reliable clarity, depth, equality and validity of the responses elicited, the attention was given to the formality of the interviews conducted, the settings of the interviews and the approach used. However, due to the constraint from Covid-19, all the interviews were conducted online; via video conference application and google forms. Clarifications were sought for confusing and contradictory explanations, and extensive opinions were made using prompts when necessary. As the interviewees requested a high level of confidentiality and to remain anonymous throughout the research, the responses were taken as short notes and then transcribed into a word document. Therefore, the recording was avoided as it was deemed necessary to create a sense of confidence during the interviews and to avoid being obstructive.

Before embarking in the analysis and interview session, determining the experts for the task is the difficult part of the process. Specialist informant according to Bhatia (1993, p. 80) "is a practising member of the disciplinary culture in which the genre is routinely used." Huckin & Olsen (1984, p. 129, as quoted in Bhatia, 1993) mention that "Perhaps the most useful specialist informant one can find for an LSP text is the actual author of that text." While acknowledging the fact that no one is a better informant of its own text rather than the author himself, for this study even if the students are experts in their roles, they are not suitable to be chosen as the informants in the validation. Lacking of exposure in the specific field of the course they are taking and in-depth knowledge in text and context of the discourse, the students might not be able to provide relevant judgment and insight of generical analysis. Thus, to achieve these objectives, the analysis and interview conducted involves these experts:

(i) industry informants: three local entrepreneurs from various business sectors
(ii) subject specialists: two English II lecturers and two business course lecturers

The industry informant (1) is a 33 years old entrepreneur, who inherited his business from his parents and is actively involved in the local and international business society and programmes. He has 10 years' experience in the field and continuously seeks to improve his company. Industry informant (2) is a 55 years old retailer who has operated her business from age 15. She uses sales email constantly with her agents and manufacturers. Industry informant (3) is an online marketer who sells beauty products and street clothing. She has vast experience in modern marketing and uses sales emails daily to communicate with her drop shippers and managers. Table 1 below summarises industry informants' details.

Table 1
*Details of the Industry Informants*

| Age | Gender | Business Field | Experience |
|---|---|---|---|
| 33 years old | Male | Inheritance | 10 years |
| 55 years old | Female | Retailing | 40 years |
| 25 years old | Female | Drop shipping | 5 years |

For subject specialist (1), a lecturer with PhD in linguistics and has 8 years' experience in teaching English for Business. For subject specialist (2), a lecturer teaching in the Faculty of Business and is responsible for handling the Entrepreneurship Unit of the university. Subject specialist (3) is a lecturer in the Language Faculty with more than 10 years teaching experience. Subject specialist (4) is a lecturer with PhD and teaching students Business subjects. The information of the subject specialists involved in this study is illustrated in Table 2.

Table 2
*Details of the Subject Specialists*

| Age | Gender | Subject niche | Experience |
|---|---|---|---|
| 43 years old | Male | Linguistics | 4 years |
| 45 years old | Female | Business and Entrepreneurship | 8 years |
| 45 years old | Female | Language | 10 years |
| 45 years old | Male | Business | 12 years |

There are many studies in the field of linguistics that utilise specialist informants to validate theories and confirm the findings. For instance, Huckin & Olsen (1984) did a study on genetics and used the author of the genetics article as their specialist informants. While much earlier, Selinker (1979) utilised the help from geneticsprofessor to interpret a journal article in the said field. Moreover, Tarone et. al. (1981)used astro-physics specialists for their journal analysis and a much extensive study using specialist informants from Bhatia (1982).

## Findings

Thematic analysis was used to analyse responses from the semi-structured interview questions—the emergence of three general themes recorded from the responses of the interviews. The themes found were based on Munby's (1978) model of Communicative Needs Processor (CNP), which are; Purposive Domain, Strategies used in writing sales emails (Instrumentality), and Target Level of Knowledge. The following section discusses each classified theme emerging from the responses of the interview questions probed. The discussion is supported by samples of the responses collected.

a) Interview Analysis with Industry Informants

In order to add validity to the analysis, a series of interviews with the industry informants from the Entrepreneurship Unit of a Malaysian public university were conducted.

Table 3

*Semi-structured interview questions for industry informants.*

| Interview questions | Classified Themes |
|---|---|
| 1. How frequent do you use email at work?<br>2. What purpose do you usually use it for? To promote your company's service? To build a network?<br>3. Do you struggle to write an effective sales email? Why? | Purposive domain |
| 1. Is there any specific structure that your company applies in writing sales emails?<br>2. Could you explain the writing structure in detail?<br>3. What would you emphasize when writing a sales email? Is it the price or quality of your product/ service?<br>4. Would you consider making a comparison with your competitor's company in the email?<br>5. Is it significant to mention how your company's product/ service can provide a solution to your client's problem? | Strategies used in writing sales emails (instrumentality) |
| 1. What are your desired outcomes when writing sales emails?<br>2. What do you like best about your current email writing structure?<br>3. Is there anything you like to change about the structure? If yes, what and why?<br>4. If you can give advice to those who are preparing for a job, what would you recommend them to prepare in terms of writing skills? | Target level of knowledge |

The discussion of themes found from the interview is supported with samples of the responses collected.

Theme 1: Purposive domain

The first theme was derived from the first part of the interview, which is related to the purpose of email application in the business field. A semi-structured question was asked to indicate the occurrences and examples of the responses received are shown below.

Sample 1: On what purpose do you usually use it for?

*ERC5520: I usually use sales emails to promote our products and services to existing customers because they are familiar with the nature of our company so (the use of sales emails) more towards updating our current or new product and services.*

Sample 2: How frequent do you use email at work?

*ECC20520: Umm…quite frequent actually because it is easier using email. We do not waste paper and ink. The response also fast. So I use it always.*

Hereon, the first theme suggested that sales email is often regarded as a great kind of marketing because of its ability to attract customers as well as to encourage individuals to purchase a product that is tailored and updated to their specific requirements and preferences. Furthermore, the sentence of '*We do not waste paper and ink*' indicated that the costs of sending sales emails is at cheap cost and it provides high level of quality in the delivery of information to the target customer based on their wants and concerns.

Theme 2: Strategies used when writing the sales emails (instrumentality)

The second theme was identified from the content of writing that the company used involving the strategies applied to achieve the company's goal. Specific structure points priorities and the organisation of the moves used are among the information gathered from the theme. Basically, this area investigates the details of the language used. The sample of responses are as recorded below:

Sample 2: Could you explain the writing structure in detail?

*ETH18520: First, we introduce ourselves, our company. Next, our tujuan (purpose of writing).*

*ECC20520: We write our name, nama (name of) company. Then, we inform about our products and services. We also update our customers if we have new product and the offer.*

The second theme illustrated the fundamental framework of the sales emails that these business insiders have utilised in the past. The first thing that we should do is present ourselves and the firm that we are here to represent. The next step is to bring the consumer up to speed on the most recent information that has been circulating around the product.

Theme 3: Target level of knowledge

The third theme was derived from the predictions given by the local entrepreneurs of the future of writing sales emails. The improvement needed, the current contents and the highlight acquired in the structure. Below are the response samples.
Sample 3: Is there anything you like to change about the structure? If yes, what and why?

*ETH18520: We hope that we can write more of the solution for our customer's problem. Also, if possible, to have knowledge of new words (vocabulary) in business field.*

*ERC5520: It helps to have basic info...umm about the company and maybe some powerful words to inform...attract the customer about our products.*

The final theme indicated the need of using appropriate language and effective rhetorical devices in order to pique the interest of potential customers in the goods and services that

are being offered. Additionally, it is essential to possess fundamental knowledge concerning the business or company information which is a highly valued aspect by the industry informants.

From the interview with industry informants, the needs assessment revealed that Business undergraduates are expected to know the basic writing structure and its relevant content. The interviewees also showed that they are well aware of the fundamental format and specific information required in the email. Managers of the company recommended additional information to be included when teaching sales emails, for example, providing solutions and updated business jargon. Upon being asked about the frequency of the utilisation of sales email as their business communication means, the employers all agree that they used sales emails quite frequently due to its massive benefits.

a) Interview analysis with subject specialists

In order to avoid any faulty inferences occurring from the time-constrained observations or due to personal postulation on the issue, it was necessary to consult and interview the subject experts directly. The subject experts involved in this interview are two lecturers from the English Language Department of a Malaysian university and two lecturers from the Business Faculty who have been teaching language and business subjects for more than three years. This has led to the major findings of this particular study which is the need analysis for a framework of sales email that suits pedagogical content-based ESP courses in the tertiary learning institutions in this country.

Table 4

*Semi-structured interview questions with subject specialists.*

| Interview questions | Classified Themes |
|---|---|
| 1) Do the students have problem writing emails? If yes, what problems do they face? | Purposive domain |
| 1) What are the skills that need to be developed for students to succeed at their workplace in future? | Strategies used in writing sales emails (instrumentality) |
| 2) Is it necessary to teach them the writing structure of a sales email? | |
| 1) Do you think the students have sufficient knowledge to write sales emails at their future workplace? | Target level of knowledge |
| 2) Would having a specific module in writing sales emails help to improve their writing skills? | |
| 3) If you can give advice to those who are preparing for a job, what would you recommend them to prepare in terms of writing skills? | |

Theme 1: Do the students have problems in writing emails? If yes, what problems do they face? Example of responses given by the interviewee;

*PBI12420:*

*"…students mostly do not know how to write feedback (reply) email"*

*PBI61020:*

*"The most crucial thing in their writing is their grammar and vocabulary. In class, it may be that this is their first semester writing business related email, yet majority of the have no working experience in business. Even if they do work, they are not asked to send emails to clients. Thus, their approach in writing is only satisfactory, only to fulfill academic purposes."*

Theme 2: Do you think the students have sufficient knowledge to write sales emails at their future workplace? Example of responses given by the interviewee;

*PBI28420:*

*"…not really. Students need to constantly update their vocabulary especially business jargons in order to be reliable in this field. Furthermore, basic grammar knowledge is also a requirement to be successful in their future workplace."*

*FKP25420:*

*"Yes, students have basic knowledge to write letter. They know the format and basic words."*

Theme 3: What are the skills that need to be developed for students to succeed at their workplace in future? Example of responses given by the interviewee;

*FKP26420:*

*"Students must have sufficient English language knowledge to succeed at their future workplace. It (will) help them a lot. Also they must be fully aware of all the business skills for example sales emails, marketing, interpersonal and intrapersonal must be excellent."*

Theme 3: Do you think the students have sufficient knowledge to write sales emails at their future workplace?

*PBI61020:*

*"With syllabus specifically focusing students to polish their English language and require them to write few sales emails; yes. Only then it will be sufficient."*

In general, there are three distinct underlying elements that can be gleaned from the interview response that was shown earlier:

1) The subject matter experts agree that students only have fundamental knowledge of email writing. (research objective 1)
2) The specialists in the relevant fields all concurred on the need of keeping one's

terminology and jargon up to date. (research objective 2)

3) In order to thrive in this industry, learners need to gain a fundamental understanding of grammar. (research objective 3)

It was observed that from the observation of the lecturers, students faced difficultiesin writing sales emails when they entered the working field. Lecturers from both courses agree that students are lacking the skills of writing and are not aware of the importance of the subject. This may be because students have limited information about the actual target situation or limited exposure of what to expect in their future job. Instructors also repeatedly mentioned the needs to equip the learners with sufficient vocabulary and knowledge on the structure of sales emails.

When both fluency and accuracy are taken into consideration, the subject specialists and industry informants choose the former option the majority of the time. Grammar skills are ones that subject matter experts estimate they would like students to improve on to a medium level rather than a high level, and this is the goal that schools strive to help students achieve. In addition to the perceived needs of the subject specialists, deficiencies in suitable teaching materials were identified.

When it comes to the methodology of teaching a language, however, both fluency and correctness should be taken into consideration. Learners should be instructed to adjust their level of communication based on who is receiving their information. It can be summed up that from the need analysis, specialised English language framework for sales emails is a necessity.

## Conclusion

The current study proposes an organised and effectively designed framework focusing on sales reply writing instruction to be initiated at business college or entrepreneurship university level. The present English language writing framework at tertiary level education may not be able to cater to the specific genres of entrepreneurship that future graduates will encounter in their career. In turn, by having a sales writing framework investigated, it will give students the advantages in a careerfield that meet the market needs and the requirements of the industries for a consistentand reliable supply of educated and skilled graduates.

Although the findings demonstrate that learner awareness of basic writing skills is extremely low, both of the sources that are responsible for the triangulation give an accurate evaluation regarding the quality of the work that entrepreneurship students produce when sending sales emails. Therefore, further efforts on the part of teachers are required to raise the understanding among learners that good writing abilities plays a significant role in maintaining one's competitive edge especially in entrepreneurship field.

Therefore, it is hoped that future researchers, English teachers, and business-related students can get useful information based on the findings. Future study may include a more thorough frequency analysis of communicative purpose in professional writingto identify their relationship with the genre. Besides, the researchers can stimulate interest to conduct studies in more critical details regarding candidates' culture and also educational background. Overall, teachers may impart associated email writing skills which also involve teaching suitable discourse to a particular context, especially to those who are ESP writers. Lastly, the applicants should also be aware of the significance of certain moves in the sales reply emails and the related implications of missing some moves that might impede understanding of the structure.

## References


Bernard, H. R., & Ryan, G. W. (2009). *Analyzing qualitative data: Systematic approaches.* Thousand Oaks, CA: Sage Publications.

Boyatzis, R. (1998). *Transforming qualitative information: Thematic analysis and code development*. Thousand Oaks, CA: Sage.

Braun, V., & Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2): 77–83. https://doi: 10.1191/1478088706qp063oa.

Brown, J. D. (2016). Introducing needs analysis and English for specific purposes. Routledge https://doi.org/10.4324/2F9781315671390.

AlAfnan, M. A. (2015). Language Use in Computer-Mediated Communication: An Investigation into the Genre of Workplace Emails. *International Journal of Education & Literacy Studies. 3*(1), 1-11. Doi: 10.7575/aiac.ijels.v.3n.1p.1

Askehave, I., & Swales, J. M. (2001). Genre identification and communicative purpose: A problem and a possible solution. *Applied Linguistics*, *22*(2), 195–212. https://doi.org/10.1093/applin/22.2.195

Baron, A., Rayson, P., & Archer, D. (2009). Word frequency and key word statistics in historical corpus linguistics. *Anglistik: International Journal of English Studies, 20*(1),41-67.

Bhatia, V. K. (1993). *Analysing Genre: Language Use in Professional Settings*. Pearson Education Limited (Vol. 19). https://doi.org/10.1016/0889-4906(95)90021-7

Crystal, D. (1997). *Making Sense of English Usage*. Edinburgh: Chamber.

Evans, D. T., & John, S. M. J. (1998). Developments in ESP: A multidisciplinary approach. Cambridge: Cambridge University Press.

Fama, M. E., Lemonds, E., & Levinson, G. (2022). The Subjective Experience of Word-Finding Difficulties in People With Aphasia: A Thematic Analysis of Interview Data. *American Journal of Speech-Language Pathology*, *31*(1), 3–11. https://doi.org/10.1044/2021_ajslp-20-00265

Flowerdew, J., & Wan, A. (2006). Genre analysis of tax computation letters: How and why tax accountants write the way they do. *English for Specific Purposes*, *25*(2), 133-153. doi.org/10.1016/j.esp.2005.03.005

Fuentes, A. C. (2006). A corpus-based focus on ESP teaching. *Teaching English with Technology 6*(4). [http://www.iatefl.org.pl/call/j_esp26.htm]

Gimenez, J. C. (2006). Embedded business emails: Meeting new demands in international business communication. *English for Specific Purposes*, *25*(2), 154–172. https://doi.org/10.1016/j.esp.2005.04.005

Graves, K. (2000). *Designing Language Courses: A Guide for Teachers*. Boston: Heinle & Heinle.

Guest, G. (2012). *Applied thematic analysis*. Thousand Oaks, CA: Sage

Hanel, S., & Cortes, V. (2010). Identifying moves and elements of persuasion in collection letters. *Revista de Lenguas Para Fines Específicos*, *1127*(April), 83–108.

Ibrahim, H. H. (2020). Needs Analysis as a Prerequisite for Designing an ESP Course for Medical Students. *Open Journal of Modern Linguistics*, *10*(02), 83–103. https://doi.org/10.4236/ojml.2020.102006

Jucker, A. & Dürscheid, C. (2012). The linguistics of keyboard-to-screen communication. A new terminological framework. *Linguistik Online. 56*. 10.5167/uzh-67310.

Liao, L., & Nesi, H. (2017). An empirical study of business request emails in the context of Business English as a Lingua Franca. CALR online Linguistic Journal. Issue 8. https://www.researchgate.net/deref/http%3A%2F%2Fweb.aou.edu.lb%2Fonline-journals%2Fcalr-8th-issue

Long, M. (2005). *Second Language Needs Analysis.* Cambridge: Cambridge University Press.

Ministry of Education Malaysia (MoE). (2015). *Malaysia Education Blueprint 2015- 2025 (Higher Education).* Putrajaya, Malaysia: Kementerian Pendidikan Malaysia.

Mehrpour, S., & Mehrzad, M. (2013). A Comparative Genre Analysis of English Business Emails Written by Iranians and Native English Speakers. *Theory and Practice in Language Studies, 3*(12). https://doi.org/10.4304/tpls.3.12.2250-2261

Munby, J. (1981). *Communicative Syllabus Design.* Cambridge University Press.

Macalister, J., & Nation, I. (2019). *Language Curriculum Design (ESL & Applied Linguistics Professional Series)* (2nd ed.). Routledge.

Park, M. Y., Dillon, T., W., & Mitchell, K. L. (1998). Korean Business Letters: Strategies for Effective Complaints in Cross-Cultural Communication. *Journal of Business Communication, 35*(3), 328–345. https://doi.org/10.1177/002194369803500302

Richards, J. C. (2001). *Curriculum Development in Language Teaching*. Cambridge: Cambridge University Press.

Rubab, I., Khan, M., & Khan, F. (2019). Academic English Language for Social Sciences Learners: A Case Study of Bahauddin Zakariya University, Multan. *Pakistan Social Sciences Review June 2019, 3*(1). 180-193.

Samsudin, Z. (2015, February). *Comparing the Process Approach with the Product Approach in Teaching Academic Writing to First-year Undergraduates*. Proceedings of the International Seminar on Language Teaching (ISeLT) 2015, Bangi, Malaysia.

Santos, D. V. (2002). Genre analysis of business letters of negotiation. *English for Specific Purposes, 21*(2), 167–199. https://doi.org/10.1016/s0889-4906(00)00028-4

Shauki, N. B. I., & Singh, M. K. A. S. (2018). Analysing Generical Moves in Pedagogical Sales Reply Emails. *Journal of Entrepreneurship and Business, 6*(2), 41–59. https://doi.org/10.17687/jeb.0602.05

Slutsky, J. M., & Sardegna, V. G. (2018). Business writing strategies and guidelines for preparing effective memorandums. *Journal for Excellence in Business Education, 5*(1),1-13. Retrieved from http://www.jebejournal.org/index.php/jebe/article/view/80

Swales, J. M. (1990). *The concept of discourse community*. Cambridge University Press. https://doi.org/10.4000/asp.4774

Thepseenu, B. (2020). Needs Analysis for ESP Course Development: Thai Civil Engineering Students' Perspectives. *Asian Journal of Education and Training*, 6(3), 433–442. https://doi.org/10.20448/journal.522.2020.63.433.442

Vergaro, C. (2004). Discourse strategies of Italian and English sales promotion letters. *Englishfor Specific Purposes, 23*(2), 181–207. https://doi.org/10.1016/S0889-4906(03)00003-6

Workineh, T. (2018). English Language Needs Analysis of Business Students. *Nawa Journalof Language and Communication. 9*(1).

# Application Of 4C Elements In Online Project-based Learning To Assist Students' Communication Skills And Problem Solving Skills For Biology Subjects

Ehqa Dhabita Mohd Nasir*[a], Denis Andrew[b]
[ab]Fakulti Psikologi dan Pendidikan, Universiti Malaysia Sabah,
Kota Kinabalu, Malaysia
*Corresponding Author: ehqadhabita@yahoo.com

## Abstract

The success of communication skills and problem solving skills through online Project-Based Learning (PBL) can be achieved when students are able to express opinions, discuss with others to find solutions, interact, dialogue, argue based on evidence and solve a problem based on the real world. In recognition of the importance of online Project-Based Learning strategies in influencing students' communication and problem-solving skills, this paper aims to synthesize the existing relevant literature to establish a theoretical foundation of project-based learning that highlights the application of 4C elements namely communication, collaboration , creativity and critical, which focuses its influence on students' communication skills and problem-solving skills. The study design was conducted qualitatively using purposive sampling method. Interview data, observations and documents were analyzed using the snowball method. Researchers selected the first case that met all the specified criteria to obtain concise data. The analysis was conducted on six respondents. In conclusion, project-based learning fulfills the key features of effective interventions for 21st century learning because project-based learning (PBL) is an educational model that prioritizes projects in teaching and learning (PdP) which is also an instructional method that allows students to build skills and acquire knowledge through projects, cooperative learning and 'hands on' techniques. Through the implementation of the project, students can build knowledge and skills through the inquiry process. The integration of project-based learning strategies makes this instructional method adaptable to students of varying backgrounds, ages and levels of education.

***Keywords*:** Communication, Collaboration, Creative, Critucal, Project-Based Learning, Problem Solving

## Introduction

PBL uses a dynamic approach so that problems and challenges in the real world can be explored by students. (Moursund 1999; Gultekin 2005; Blumenfeld et al. 1991; The George Lucas Foundation, 2012). According to Stephanie (2010), PBL is an approach that can enhance students' 21st century skills, where these skills are critical to producing a balanced human capital in terms of spiritual and physical. However, the effectiveness of PBL cannot be implemented effectively if the elements of the PBL approach are not disclosed to students during the learning sessions. Pupils were found to be unable to apply the concepts and processes of science learned in school to their daily living practices outside of school hours when teachers relied solely on textbook content (Nordine, 2007). PBL is the right choice that teachers should take as a teaching practice in the classroom as suggested by Barak and Dori (2005). Through PBL students' knowledge and skills can be built through an inquiry process to solve any problems that revolve around real life as stated by The Buck Institute for Education, BIE (2005).

21st century learning applies the concept of 4C, namely communication, collaborative, critical thinking, creativity and also 6C with the addition of 2 elements of the application of noble values and ethics according to the Malaysian context (Pendidik2u.my, 2018). These 4C skills are an important element to ensure high quality PBL construction. A study conducted by Masyuniza and Zamri (2013) found that the six components of 21st century skills studied (communication, digital age literacy, inventive thinking, effective communication, high productivity production as well as spiritual values and norms) are still at a moderate level. Therefore, these elements need to be developed and nurtured among teachers and students to ensure the achievement of high standards. Teachers are an important element because they are the implementing agents and facilitators who need to prepare themselves in ensuring the effectiveness of a learning.

Based on the Astro awani website (https://www.astroawani.com/berita), dated 9 April 2020, in line with the Movement Control Order (PKP) implemented by the Malaysian government to curb the spread of COVID-19, an online learning method is a necessity. All schools in Malaysia have no other choice but to use online teaching and learning methods. This is important to ensure that learning topics can be presented effectively. However, not all students are able to implement online learning systematically because they are unable to adapt to learning in the new norms. There are students who do not have internet access or technology to participate in digital learning. This gap can be seen across countries and between domestic income brackets. For example, although 95% of students in Switzerland, Norway and Austria have computers to use for their school work, only 34% in Indonesia, according to data from the Organization for Economic Co-operation Development, OECD. In the United States, there is a significant gap between those from special and underprivileged backgrounds, while nearly all 15-year-olds from special backgrounds say they have a computer to use, nearly 25% of them from underprivileged backgrounds no. While some schools and governments have provided digital equipment to students in need, such as in New South Wales, Australia, many are still concerned that the epidemic will widen the digital divide. Therefore, teachers need to diversify teaching methods to suit learning in the new norms. Teachers can use the various platforms available to ensure that the learning and teaching process can be implemented effectively. Teachers can also apply PBL in online learning.

In the face of this pandemic season, all students and teachers will implement online learning. This is to ensure that all students are not left behind in following the learning sessions and the teacher can finish the teaching topic. However, various concerns arise when wanting to implement this online teaching and learning session. This is because not all students have personal smartphones, some do not have enough internet data, some do not have direct internet access and some are unable to adapt to learning in the new norms. In addition, teachers who want to implement PBL are also worried about how to implement PBL online and most of them use the trial and error method. Not all students have the opportunity to be involved in PBL activities conducted online. Therefore, it is not surprising that there are a few students who choose to act as observers only (Siti Aloyah 2002). Whereas when all students are involved in carrying out project work hands -on learning will be more effective (Blumenfeld et al. 1991). The development of technology especially the evolution of the internet has challenged the concepts and theories of traditional education, especially the concept of classroom and teaching and learning methods (Hunt, 2004; Resnick and Wirth, 1996.) Gunasekaran (2013) has conducted a study on blended learning that is about research and application . According to him, the existence of broadband technology will further improve the quality of online learning by using various applications. Learning will be more interactive than traditional learning.

In general, the purpose of this study was to identify how the application of 4C elements in project -based learning can help students' ability to communicate effectively and problem -solving skills in the form of KBAT for online biology subjects. According to Azalya (2003), to face the challenges of globalization, Malaysians need to be equipped with various basic skills in education and strong training and have a variety of general skills including the ability to communicate, master

multiple languages, critical thinking and innovative. Based on the problem statement described in the previous section, this study aims to examine in more depth how the application of 4C elements in project- based learning can help students, especially in terms of communication skills and problem solving skills in the form of HOTS for Biology subjects online.

## Literature Review

### Pupils' Communication Skills While Implementing Project Based Learning (PBL) For Biology Subjects

One of the scientific skills is communication. According to Rogers and Kincaid (in Cangara, 1998, p. 19) communication is a process in which two or more people form or exchange information with each other, which will lead to the emergence of deep mutual understanding. Based on the researchers' observations on the teaching and learning process of Biology found that teachers tend to explain the learning materials and provide explanations without using media. In biology learning, teachers usually function as informants and students as recipients of information. This causes students' communication skills to become passive and the teaching process to become a process of memorizing concepts or procedures, but at the same time Biology process skills and students' achievement are at a low level (Rose Amnah 2004). This has become even more troubling since the world was hit by the Covid-19 epidemic, teachers and students need to drastically change the methods of online learning and teaching. Pupils will continue to be observers and recipients of information during the online learning sessions implemented. If this continues, the learning sessions will become increasingly boring and students' communication skills will become passive as students will increasingly lose focus on the subject of Biology. The findings also show that the factors that cause students to lose focus are from boring learning and teaching sessions. According to Reinhartz and Beach, 1998; Wiles and Bondi, (1998) stated that concentration during a learning session is very important because a student's concentration is able to help in improving their mental intelligence. This in turn helps them to adapt, achieve success in life and always be ready to be in society in the increasingly challenging future. According to Amir Hasan (2009), in a learning environment, each student has different psychology and abilities from each other. Therefore, the planned teaching should be appropriate and arranged according to the level and environment of the students. In addition, it should be supported by the use of appropriate teaching aids to stimulate students' communication skills to the maximum level. An important element in the curriculum learning system today is the selection of appropriate teaching methods that involve students actively in learning, whether mentally, physically or socially. Teachers need to emphasize on understanding concepts, problem solving skills and provide teaching aids that are appropriate and able to attract students to follow the teaching and learning process (Depdiknas 2006; Rose Amnah et al. 2004).

Communication skills are an ability to establish interactions or relationships through the medium of intermediaries or vice versa with others. Good interaction between teacher and student can create a positive relationship in the classroom. The quality of social development and teaching in an organization is determined by the social relationship mechanisms built into it such as effective use of language, interaction processes, open communication and verbal skills (Rahim, 2011). However, when implementing PBL online, the nature of communication changes. The language used by students and teachers is different, work processes are different, and the relationship between teacher and student is also different. New communication strategies and techniques must be used when implementing PBL online. The teacher acts as a facilitator and guide to develop the learning experience, not as a mere informant and instructor.

When implementing PBL online, teachers should provide opportunities for students to submit their ideas and imaginations and encourage them to participate in discussion sessions about an idea presented (Lehesvuori et al., 2011). Speaking power can stimulate and motivate students to

think as well as enhance students 'learning and understanding through dialogue methods (Alexander, 2006). According to Alexander (2006), dialogical teaching can improve students 'reasoning skills and comprehension. During dialogic teaching, teachers will take into account students' ideas and students are encouraged to participate in discussions about the ideas presented (Lehesvuori et al., 2011). This phenomenon will trigger a culture of thinking among students and prevent students from simply memorizing the facts and concepts learned.

According to Kearney and Bandley (1990) in Nurazmallail Marni, Ahmad Kilani Mohamed, and Kamarul Azmi Jasmi (2004), stated that teamwork can improve and smooth the communication process in an organization. There are many advantages of teamwork, among them are that team members can improve their understanding of organizational goals, more effective problem solving, encouragement to be creative, increased motivation and morale, opportunities to identify and develop better leadership and communication (Zaidatol, 1990). The results of a study by Mohd Fadzli Ali, Normah Salleh and Juhazren Junaidi (2007), found that group work skills also improve communication skills through group discussion. This opinion is supported by Akindele (2012) in Mohd Akmal Masud (2013), who states that students are aware of teamwork, they can improve communication with classmates, communicate with friends of different races, and can strengthen trust between group members. However, Mills & Treagust (2003) and Siti Fatimah et al. (2006) argue that PBL can be carried out individually or in groups. In this case, students are given the freedom to choose to implement PBL individually or in groups. Therefore, there is a dominance of work in students who implement PBL individually. Therefore, teachers play an important role as mentors who can control the course of the teaching and learning process in the classroom for students to build knowledge through teaching activities that can improve students' communication skills. Tal et al. (2006) stressed that the implementation of PBL allows students to enhance their learning experience outside the classroom through meaningful questions relevant to the surrounding community. Daily life -based learning is also able to encourage students to learn actively. This is because students have the opportunity to generate their ideas, imaginations and experiences during the learning session. Therefore, students will interact with each other and ask questions to each other.

However, there are still students who implement Biology learning methods that are more focused on the conventional method of teacher -centered learning (Henderson et al., 2000). Not surprisingly, therefore, there are still students who are unable to apply what they have learned to daily life. This is because teachers rely solely on the content of textbooks (Nordine, 2007). When students only focus on the content of the textbook alone, students do not have the opportunity to interact, let alone dialogue. Whereas, through the implementation of ordinary practicals done in the laboratory can not build students' understanding (Pyatt and Sims, 2007), let alone online learning. Learning will become increasingly passive. The failure of students to build their own understanding is due to the learning methods practiced are more focused on teachers as channeling information while students are not actively seeking their own learning resources and tied to textbooks (Martinez, 2003; Middlebrooks & Slupski, 2002). Through conventional learning methods such as this, not all students have the opportunity to be involved in the activities carried out and some even choose to act as observers only (Siti Aloyah 2002). Whereas when all students are involved in carrying out project work hands-on learning will be more effective (Blumenfeld et al. 1991). This statement is supported by the opinion of Drew and Ottewill (1998) who found that students who fail in lessons are also influenced by the inadequacy of the learning strategies they use. Therefore, teachers are responsible in diversifying learning approaches and ensuring a conducive learning environment.

**Pupils' Problem Solving Skills While Implementing Project Based Learning (PBL) For Biology Subjects**

Biology learning can be used to develop students 'high -level thinking skills such as critical thinking. Critical thinking is a complex thought process consisting of interpretation, analysis, conclusion, evaluation, explanation and self- organization (Facione, 2011). Critical thinking is referred to as high- level thinking that encompasses the top three abilities in Bloom's Taxonomy namely the ability to analyze, synthesize, and evaluate (Bookhart, 2010; Moore & Stanley, 2010). The development of critical thinking skills can be done with open -ended questions or different questions. Open -ended questions are questions that expect many possible correct answers (Collete & Chiappetta, 1994; Subali, 2013). Nevertheless, there are studies that state that Biology subjects do not challenge the mind because the focus of learning is more in the form of memorization (B. Barron, 2000). The report of the Planning and Research Division found that overall students only used memorization techniques in the subject of Biology and as a result students did not answer questions in the form of problem solving (Ministry of Education Malaysia, 2010). Therefore, it is not surprising that students are not able to answer questions in the form of analysis and correlation. This is because learning by "deep learning" does not occur among students during the learning session because learning occurs passively and is only teacher-centered. This is even more worrying if this traditional learning continues to happen during the online learning that is happening nowadays. If this situation persists, then students' problem- solving skills cannot develop because passive learning cannot help the development of students' critical and creative skills. Pupils will continue to be listeners to the information presented by the teacher while the teacher acts as an informant. One of the learning models that develops students' critical and creative thinking skills for the subject of Biology is project- based learning. PBL not only provides students with knowledge but also enhances their problem -solving skills, critical and creative skills, future learning, communication skills, teamwork, adaptation to change, and self -assessment (Khoiri et al., 2013). In PBL, real world problems are used to push students through the problem (Farhan & Retnawati, 2014). During the problem solving process, there will be an exchange of information between students and other students so that the problem can be resolved. Students have the opportunity to continue to seek information, exchange knowledge, share experiences and collaborate to achieve a common goal. Through PBL, students 'in -depth knowledge and creative skills can be developed through an inquiry process to solve any problems related to real life as stated by The Buck Institute for Education, BIE (2005). One of the widely supported features of PBL is that PBL is one of the meaningful question- based learning that is learning that encourages students to think deeply and stimulates their curiosity about a problem or issue related to the real world (Blumenfeld et al., 1991 ; Yamzon, 1999; Doppelt, 2000; Thomas, 2000; Schneider et al., 2002; Turner & Grizzaffi, 2003; Chin & Chia, 2006; Lehman et al., 2006; Tal et al., 2006; Wu & Krajcik, 2006; Harriman, 2007; Brodi, 2008; Chan Lin, 2008; Halil, 2008; Lopez & Lacueva, 2008; Nation, 2008; Yalcin et al., 2009; Bell, 2010; Kamaruzaman & Khairul, 2010; Papanikalou & Boubouka, 2010; Kaldi et al., 2011; Roessingh & Chambers, 2011).

The process of teaching and learning Science requires innovative and creative approaches, methods and techniques of student- centered teaching and learning and active learning among students. Creativity development aims to provide students with a variety of skills and knowledge to face the challenges of the world of work (Kind & Kind, 2007). In fact, the development of students' creativity in school has not yet reached the optimum level. This is because, the lack of attention to the development of creativity is due to the notion that creativity cannot be learned and measured. Trilling & Fadel (2009) state that creativity can be learned through a learning environment that supports questions, patience, openness to new ideas, high trust and learning from mistakes and failures. Creativity can be developed with constant practice. One of the most effective ways to develop creativity is by learning through projects to find ways out of real -world problems. Project-Based Learning (PBL) is the right choice that teachers should take as a teaching practice as

suggested by Barak and Dori (2005). Lou et al. (2011) in the subject of Science, Technology, Engineering and Mathematics (STEM) which showed that the implementation of PBL in this subject has had a positive effect on students' attitudes and knowledge and also helped in improving students' creativity skills on their project work and in terms of the methods they use to present the results of their project. However, students and teachers face problems to implement PBL in this pandemic season because teachers and students are not able to face each other as in previous learning. In addition, one- way learning during this pandemic season also causes students not to have the opportunity to develop their creativity skills. If this continues, students will have trouble answering problem-solving-shaped questions because they are not exposed to real-world-related learning that exposes them to scientific measures and skills. Therefore, technology -assisted learning is a necessity for students and teachers in facing education in the pandemic season. Learning will be more interesting and effective if PBL is implemented by using various interactive technologies today such as google meet, zoom and more. This also supports the government's intention to integrate schools in Malaysia will also be achieved by making PBL as one of the learning methods in accordance with the current circulation in addition to other practices such as problem-based learning, computer-assisted learning and 21st century learning (Educational Technology Division 2010). Through a variety of technologies, teachers and students can implement online learning more systematically. The diversity of technological facilities allows students and teachers to carry out discussions about findings, ideas and questions by way of decision sharing, constructive questions and problem solving (Churach & Fisher, 2001).

## Methodology/ Methods

This study was conducted based on research questions; How can the application of 4C elements in online Project -Based Learning help students' communication skills and problem-solving skills for Biology subjects? To answer this question, a qualitative study was conducted. This study also examines in depth how project -based learning can help students implement online learning, issues or challenges in implementing project -based learning online, the effectiveness of communication skills and problem solving skills and evaluation of the implementation of PBL online.

### Research Paradigm

Qualitative research is descriptive in nature i.e. the researcher is interested in the process, meaning, and understanding gained through words or observations. The process of qualitative research is inductive in nature in which researchers build abstracts, concepts, hypotheses, and theories based on a study. Qualitative research helps researchers make in -depth research through direct observation of the natural environment (Creswell, 2012: 17).

### Research design

A case study is an appropriate research design to use if the research process is about a process (Cannon 2001) because it can provide an overview or pattern for understanding the process. To explain the importance of researching processes in case studies, Sander (1981) explains that case studies help us understand the processes involved in an event, project and program and explore the features of the context that will shed light on an issue or object.

### Study Determination

A school is an educational institution that provides learning and teaching facilities to students and teachers. Education in Malaysia is supervised by the Ministry of Education. Public secondary education in Malaysia is known as Sekolah Menengah Kebangsaan (SMK). Sekolah

Menengah Kebangsaan uses Malay as the main medium of instruction because Malay is the National language of Malaysia, while English is a compulsory subject in all schools. Since 2003, Science and Mathematics have been taught in English, but in 2009, the government decided to return to using Malay starting in 2012.

**Study location**

This study was conducted in a school in Kota Kinabalu, Sabah because this school is one of the schools that have implemented project -based learning starting in 2016. In addition, there are many facilities, especially 21st century learning facilities readily available at this school. The school has a demographic that suits the surrounding area. Thus, it encompasses a population comprising of various categories such as race and socioeconomic status. Selsin, the school was also selected based on good internet facilities such as Wi-Fi connection, as well as LAN connection. This facility is seen as an opportunity to support student needs and learning.

**Principal Investigator**

Although the researcher has an educational background related to Biology education at the level of Bachelor of Science Education (Biology/Chemistry) and Master of Science Education (Biology), the researcher believes that the application of 4C elements in PBL can expose students to active learning experience online, if PBL strategy designed according to the needs of the student. He also believes that technology should be combined with the integration of other learning strategies to influence systematic learning outcomes. For example, the implementation of PBL needs to be applied 4C elements to encourage students to learn actively, especially while implementing online learning during this pandemic season. Researchers are also interested in understanding how teachers devise online learning strategies to produce positive learning among students using technology. The researcher also serves as one of the judges for the implementation of project- based learning at the Kota Kinabalu district level. This allows the researcher to work with the highest implementers of the State Education Department (JPN) for the implementation of PBL. In addition, as one of the teachers responsible for the implementation of PBL in the schools studied, it further facilitated the respondents to continue to consult the researcher on issues related to the implementation of PBL.

There are two main roles in this study: a) Teacher who teaches Biology subject and b) Researcher. Teachers only have the role of teaching Biology subjects, providing PBL work as well as evaluating PBL work which is part of this study (Assignment 1 and Assignment 2). In the subject of Biology, the teacher's role is to evaluate the students' PBL work based on the scoring rubric provided, analyse the results of the semester 1 examination and the students' SPM test as well as the students' PBD mastery level.

**Biology Subject Description**

Biology is a scientific study of life. Biology studies the structure, function, growth, origin, evolution and distribution of living things. This field focuses on the classification and description of organisms, the functions of organisms, the ways and reasons why species exist, as well as their interactions with each other and the environment. Biology subjects are based on four main principles, namely cell theory, evolution, genetics and homeostasis. The biology curriculum is organized according to several themes. Each theme contains several Learning Areas (BPs), each BP has several Learning Objectives (OPs) and each OP has one or more Learning Outcomes (LS). In total, there are 5 learning themes, 28 learning areas, 489 objectives and learning outcomes in all for the Biology syllabus form 4 and form 5. As stated in the Biology Syllabus Form 4 and Form 5, teaching and learning strategies in biology curriculum prioritize learning thinking. Thoughtful learning is a process of acquisition and mastery of skills and knowledge that can develop a student's

mind to an optimal level. Thoughtful learning is able to expose students to various learning approaches such as inquiry, constructivism, contextual learning and mastery learning.

In the Biology curriculum, it is suggested that apart from teacher -guided experiments, students are given the opportunity to design experiments, i.e. they themselves design the relevant experimental methods, measurable data and how to analyze data as well as how to present their experimental results. Among the activities proposed are discussions, simulations, projects, visits and the use of natural resources as well as the use of technology. One of the proposed activities is project implementation. A project is an activity carried out by an individual or a group of students to achieve a specific goal. Projects take a long time as well as spanning formal learning time to complete. Project results can be produced in the form of reports, artifacts or others and they need to be presented to teachers and other students. Project work encourages the development of problem -solving skills, time management skills and self-learning.

**ISP PBL Online Model**

In this study, students are expected to conduct project -based learning that incorporates 4C elements during its online implementation. Students will carry out 3 phases of PBL. The first phase, students are divided into several groups. Each group consists of students who have differences in terms of abilities, inclinations, knowledge and experience of existing students as stated in the STAD learning Model. Next, students will be exposed to the learning objectives for the field of learning as the steps recommended in the ASSURE model. Students will also be exposed to issues related to the area of learning. Afterwards, the teacher will act as a facilitator and question the students using a set of meaningful questions created based on reference to the learning objectives and questioning techniques of 5W1H. Pupils are guided to discuss and encouraged to prepare a mind map during the discussion.

In the second phase, students are encouraged to discuss and make partnerships in groups to build products. Students will share information, dialogue and use technology. The teacher acts as a facilitator to guide the students to achieve goals and agreement in the group. Next, the third phase, students will present the results of their products. Pupils are encouraged to prepare a mind map. Students will be guided to dialogue and argue about the pros, cons and improvements of the products they produce. The presentation session was conducted using a set of questions created using the 5W1H questioning technique.

**ISP Model**

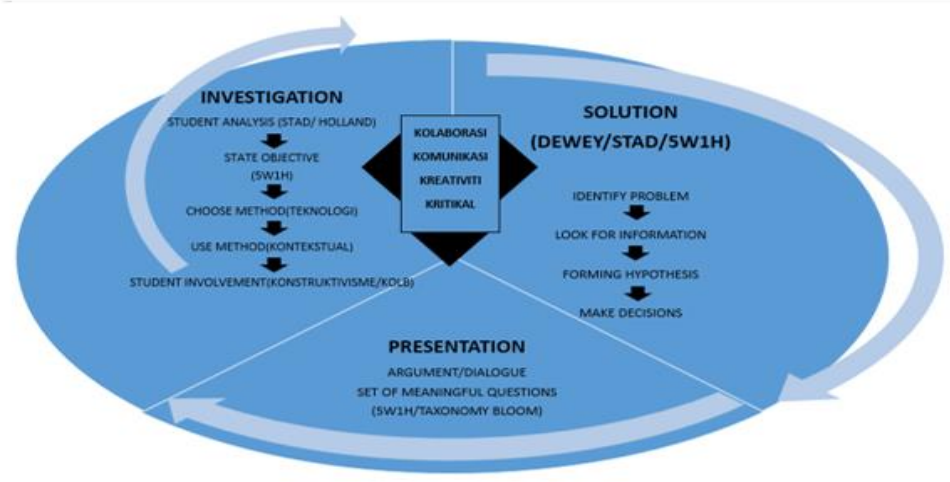



**Figure 3: ISP model**

**Sample Selection**

Once a case is selected, purposive sampling is performed. The initial case for this study was an upper secondary student who took a pure science stream and took Biology as an additional subject in the Sijil Pelajaran Malaysia (SPM) examination at a school in Kota Kinabalu, Sabah. There were 3 female students and 3 male students who were 17 years old. Using this method, all respondents were selected based on identified criteria; all students are positive towards the use of technology, such as computers and the internet, all individuals have their own gadgets and internet, have experience conducting project-based learning and have achieved level 3 in Classroom Assessment (PBD). Pupils had no option to withdraw from completing two projects in data collection and analysis for this study. Nevertheless, students can still choose whether they want to engage in a focused group to be interviewed.

All these respondents were selected as a unit because one of the research questions was to look at the application of elements of collaboration, communication, creative and critical thinking in online project- based learning. For this study, diversity was determined through observations of respondents' activities while implementing project -based learning online. Therefore, the unit of analysis for this study is the online project- based learning approach and the application of 4C elements in PBL. Their experiences and perceptions of PBL were obtained through interviews, observation and analysis of academic achievement documents and classroom assessment (PBD). The figure below shows the demographics of all the respondents. A total of 6 respondents were involved in this study, namely 3 female respondents and 3 male respondents aged 17 years. They were the same group of students for the past five years, only from different classes. Codes were given to each respondent because the study used a variety of sources from each individual. Individual codes are very important when analyzing data because this information is used to see similarities or comparisons among respondents.

**Data Sources Based on Research Questions**

| No | Research Question | Data Source |
|---|---|---|
| 1 | How can the application of 4C elements in online PBL help students' communication skills for Biology subjects? | 1. Observations on student activities implementing PBL online, comments, conversations, student discussion activities, student presentations, student responses, enjoyment, understanding and influence on student attitudes)<br>2. Focus group interviews<br>3. Document analysis (Level of mastery of PBD learning semester 1 and semester 2, Project marks (PBP) semester 1 and semester 2, academic achievement of semester 1 students and SPM test) |
| 2 | How can the application of 4C elements in online PBL help students' problem solving skills for Biology subjects? | 1. Observations on student activities implementing PBL online, comments, conversations, student discussion activities, student presentations, student responses, active student involvement in discussions, use of technology, craftsmanship, creativity, self- reliance, realistic, investigative, courage)<br>2. Focus group interviews<br>3. Document analysis (Level of mastery of PBD learning semester 1 and semester 2, project marks for semester 1 and semester 2, academic achievement of semester 1 students and SPM test) |

**Study Procedures**

In the first stage, the researcher conducted a study to identify the problems faced by the students in terms of communication skills and online problem solving skills for the subject of Biology. The three methods of data collection used at this stage are to interview 6 informants, make observations based on the constructs set in the study on the six informants and make document analysis on academic achievement in semester 1, project marks (PBL) in semester 1 and evaluation level of learning (PBD) in semester 1 for these six informants (further explanation is found in appendix H). Next, the researcher will make triangulation for all the data collected. The research was conducted for 8 consecutive weeks. The implementation of the study at this stage did not involve the role of teachers because this study only focused on data related to problem identifiers

In the second stage, the research focuses on the research question, or the preliminary theory being tested. Researchers conducted a study at this stage to see how the application of 4C elements in online PBL can help students' communication skills and problem-solving skills for Biology subjects. The study was conducted for three consecutive weeks. The three methods of data collection used at this stage are to interview 6 informants, make observations based on the constructs set in the study on the six informants and make document analysis on essay marks, project marks (PBL) and learning level (PBD) for the sixth -these six informants (further explanation is found in appendix I). Next, the researcher will make triangulations for all the data collected. The following is the Study Procedure Diagram (Second Stage).

In the third stage, the research focuses on theories or findings that have been refined. The researcher will draw conclusions and determine patterns using cross- case techniques. In addition, the researcher will also focus on the comparison of PBL implementation strategies, theory and then intervene on this theory. The study was conducted for eight consecutive weeks. The three methods of data collection used at this stage are to interview 6 informants, make observations based on the constructs set in the study on the six informants and make document analysis on academic achievement on the SPM test, project marks (PBL) in semester 2 and level learning in classroom assessment (PBD) for these six informants (further explanation is available in appendix J). Next, the researcher will make triangulation for all the data collected. At this stage, teachers will not be involved because the study only focuses on the findings for the implementation of this research. The following is the Study Procedure Diagram (Third Stage).

## Data Analysis

**Interview transcripts, observation notes for PBL activities, comments, responses and conversations during discussions in telegram groups and google meet.**

All data sources were analyzed using thematic analysis. Thematic analysis was used to categorize the data and form an appropriate theme to answer the research questions. This analysis begins by analyzing the data, constructing code and then presenting the data in the form of tables, maps or diagrams to facilitate the reader to examine the findings obtained.

For the aspect of communication skills, the researcher focuses on the elements of effective communication as stated by Jaafar Muhammad (Petaling Jaya: Leeds Publication, 2004) and Hisham Al-Thalib (Kuala Lumpur: Nurin Enterprise, 1992). Among the elements focused are communication, influence on attitude, enjoyment and understanding. Whereas according to Abdullah and Ainon (2000), effective communication has five characteristics namely understanding, enjoyment, influence on attitudes, improved relationships, and the presence of follow -up actions. According to Nusaabaum, 2007, these communication skills include the skills of writing, reading, arguing, listening, ethics in communicating, and the use of technology. In the current era of globalization, communication skills have become an essential element that is highly emphasized to be mastered by everyone.

Thinking Skills (HLTS), the researcher focuses on the elements of problem solving as stated by the Ministry of Education Malaysia (MOE), 2013. According to the MOE, HOTS is the ability to apply knowledge, skills, and values in making reasoning and reflection to solve problems, make decisions, innovate, and try to create something. Curriculum Development Division (2013), states that, the concept of assessment is the ability to apply knowledge, skills and values in reasoning and reflection to solve problems, make decisions, innovate and be able to create something. Whereas psychologists state that an individual is learning something when he is trying to solve a problem. This is because in the process of problem solving the individual will seek conclusions, apply problems in daily life, learn the law of problem solving and create some techniques or suggestions for problem solving. This process makes an individual more mature (Anderson 1993).

**Classroom Assessment (PBD) and Student Academic Achievement**

Classroom Assessment (PBD) and academic achievement are documents analyzed by researchers. Classroom Assessment (PBD) focuses on analysis for the review of notebooks, exercise books and projects produced by students. This review analysis is done in stages based on 3 main domains, namely the domain of knowledge, the domain of scientific investigation and the domain of scientific attitude and pure values. The level of proficiency in students for each component in this excel template is recorded for the purpose of reporting the progress of student learning for a certain period, namely the middle and end of the year. Assessment is done all the time and the level of proficiency in students is monitored on an ongoing basis. This level of proficiency is recorded in a record book, or other place of record and reported twice a year, ie in the middle of the year and at the end of the year.

The Classroom Assessment (PBD) assessment rubric for this student has been prepared by the Ministry of Education Malaysia. This matter is stated in the e-book Guide to the Implementation of Classroom Assessment 2nd Edition, 2019 obtained through the official portal of the Ministry of Education Malaysia. This 2nd Edition Classroom Assessment Implementation Guidebook was published by the Ministry of Education Malaysia Curriculum Development Division, in 2019. The following table shows the PBL scoring rubric for students.

**Student Academic Achievement**

Researchers also obtained information and data related to students' academic achievement in the summative examination and SPM trial examination for the subject of Biology in the form of documents. Among them are analysis of marks for examination questions, analysis of test specification tables and headcount of student results. The defined document is in the form of a written text (Cortazzi, 2002). Silverman (2000) has stated that document analysis is a written storage material such as books, magazines and newspapers. While the analysis of unwritten documents is like video, audio and film recordings. Additionally Suseela (2001) has stated that document data are available from a variety of sources. Therefore, the researcher will obtain document data related to students 'problem -solving and communication skills through records of students' academic results in the subject of Biology. The record of this document is important to assist researchers in strengthening support for the study conducted later. In addition, the researcher also compared the academic results of students for the Biology subject examination in 2021 through the headcount document in the google drive of a school in Kota Kinabalu. A continuous analysis of the improvement of students for the subject of Biology is made from the results of the summative examination until the trial examination of SPM 2021 (further explanation in appendix K).

## Results and Discussion

### 1. Analysis of Observations on Respondents' Activities While Implementing PBL Online

| Problem Solving Criteria | Identify Problem | Defined Problem | Create Strategy Statistics | Create Strategy | Product Effectiveness |
|---|---|---|---|---|---|
| Fara | Yes | Yes | Yes | Yes | Yes |
| Des | Yes | Yes | Yes | Yes | Yes |
| Col | Yes | Yes | Yes | Yes | Yes |
| NG | Yes | Yes | Yes | Yes | Yes |
| Adam | Yes | Yes | Yes | Yes | Yes |
| Fun | Yes | Yes | Yes | Yes | Yes |

The figure above shows that all respondents were able to identify problems and define problems when implementing PBL online. In addition, they can also make statistics on the implementation strategy of PBL and implement the strategy. Next be able to produce creative and functional work. In addition, they also showed an understanding of the projects they were implementing through the responses given during the online PBP implementation. The six respondents interacted with each other, dialogued, asked about issues related to daily life and discussed while performing problem-solving processes. Pupils are able to be actively involved in the learning activities they participate in. It is clear here that through exposure to the problem-solving process during learning sessions, students are able to actively engage in the activities in which they participate.

**PBL Draft Analysis**

| Name | Draft |
|---|---|
| Fara | Yes |
| Des | Yes |
| Col | Yes |
| NG | Yes |
| Fun | Yes |
| Adam | Yes |

The figure above shows that all respondents prepared a draft of PBL work before implementing PBL online. As defined in the Malay dictionary, a draft is a writing or drawing prepared roughly at the initial stage or beginning of the implementation of a work. This shows that all respondents make preparations or planning while implementing PBL face to face.

### 2. Interview Analyse

The following are the statements made by the respondents related to the 3P model. Among the things that drive communication, collaboration, creative and critical skills are the speaking opportunities provided by teachers. In addition, project -based learning is best done in groups as it encourages communication, collaboration, creativity and critical skills among group members. Open and focused questioning techniques are also able to encourage students to collaborate with each other. This in turn encourages students to express opinions, ideas, make connections and explain something based on evidence.

*"...what is the factor ... that helps you to communicate actively?..."*

[T1_TC_1]

*"... when ... given the opportunity to share opinions or ideas, I can go through the results of the information search that I do..."*

[T1_DS_1]

*"... When I am given the opportunity ... I will feel appreciated because... it seems, all the information I am looking for, I can share with other friends through the opportunity to give an opinion... hmm, and I feel more confident to do PBL in groups..."*

[T1_CL_1]

*"...I will interact with my group members through direct question and answer... we can work with each other and give each other's opinions..."*

[T1_FR-1]

*"...open-ended questions and answers conducted by teachers, allowing us to express our opinions with each other's explanations..."*

[T1_AD_1]

*"... Okay ... for you, through open question and answer... you can give your opinion during PBL... right?..."*

[T3_TC_1]

*"...when the teacher told us to implement a project that was not related to the textbook..."*

[T3_FR_1]

*"...on the other hand, express my opinions and talk more in groups when implementing a new project, especially issues related to daily life... because it's not boring, it even encourages me to interact more actively to get information ... hmmm... talk more actively..."*

[T3_AD_1]

In addition, PBL issues that are not related to the content of the textbook are also able to encourage students to apply the 4C elements in learning sessions. This is because, through issues related to real world problems, they have the opportunity to conduct the research process more closely. They can also understand a biological concept in more detail. This in turn encourages students to innovate through the implementation of PBL. It is clear here that the implementation of PBL is also able to encourage students to apply their imagination and creativity.

*"...what are the factors that motivate you to conduct question and answer sessions while implementing PBL?..."*

[T1_TC_1]

*"...hmmmm… I have a lot of question and answer with other group members because this issue is very interesting and not unrelated to textbooks… through this issue, only then did I know apparently the concepts I learned all this time have something to do with my daily life…"*

[T1_FR_1]

*"...for you, right… hmmm… what is the difference between pdp that we have made so far with the implementation of PBL?..."*

[T2_TC_1]

*" tcer ... bfore this, I just listened and focused on what the teacher in front of the class said ... I just kept quiet and focused… that time, I don't know what I've learned so far has anything to do with with daily life. But, through PBL… I can clearly see the relevance of a concept to my daily life… because I ask a lot of questions and share information with other group members…"*

[T2_DS_1]

*"...PBL provide the opportunity for me to implement the project. So, to find the solution… I ask a lot of questions and share information and experiences with other group members… I get more information… the more I learn from these questions and answers, the more questions arise in my head about this concept..."*

[T2_FR_1]

*"...encourage me to interact more… because sy is a quiet and shy person… when my opinion is disputed, I will try to explain the info more clearly based on the evidence I have so that they can receive the info I am looking for…"*

[T2_AD_1]

*"...how about specific question given during PBL? is that okay?..."*

[T3_TC_1]

*"...focused questions help me to focus more on the investigation I am doing… therefore, I can understand the meaning of a concept in more depth... For example right… the concept of mitosis occurs in plant cloning… through the information search I did, I was excited to make a serum innovation that uses clove flower extract… because the serum concept uses the concept of cell division…"*

[T3_AD_1]

*"...questions asked by the teacher while he was monitoring us making PBL in groups helped us to stay on track… we were able to implement PBL effectively because our investigation focused on the results of the teacher's guidance… n were able to eat again…"*

[T3_AD_1]

*"...what makes you eager to implement PBL? ..."*

[T3_TC_1]

*"... an interesting issue but related to our lives ..."*

[T1_FD_1]

*"... when we discuss a new and life -related issue… at least we know this thing is useful and it works… then we can apply it in our daily routine…"*

[T1_FD_2]

*"... example kan tcer… in the textbook state about the concept of cell division… so, when we make PBL… we use the issue of making serum… the function of this serum is actually to promote younger cells… when we know plant extracts that can be used in making serum , we can also make our own serum… more eager to make products that can benefit ourselves… "*

[T2_CC_1]

*"... because if you study to use a textbook… for pbl also use the same kind… kind of good don't bother for a project… better just copy the textbook…"*

[T3_AD_1]

*"... for sy okay tcer… because kan… focused questions help me to focus more on the investigation that I do… therefore, I can understand bah a concept in more depth ..."*

[T9_AD_1]

*"... I agree with adamlah… unfocused questions will make me focus more in the process of finding information…"*

[T9_FD_2]

*"... me too tcer… I prefer if PBL uses open -ended but focused questions because I can find out something new in more detail and thoroughly…"*

[T9_CC_1]

*"... when we were guided… he really helped me and my friends to find information in a focused way than before, I only implement passive learning… so an observer ..."*

[T10_CC_1]

In addition, the role of the teacher as a facilitator is also able to ensure that the implementation of a learning can be implemented systematically and effectively.

*"... tcer time to be a facilitator… tcer can guide us… then we have a guide to make pbl…"*

[T11_NG_1]

*"... when tcer acts as a facilitator… we can stay on track… we can implement PBL effectively because our investigation focuses on the results of teacher guidance ..."*

[T11_AD_1]

*"... best again tcer just facilitator… because tcer guides us how to solve the problem… instead of… just teach in front… if teaching in front is very boring and passive ..."*

[T11_FD_1]

*"... I prefer the teacher to function as a facilitator rather than the teacher just giving an explanation in front of the class ..."*

[T11_CC_1]

*"... it's very interesting and encourages me to think of more new things that have to do with the biological concepts I'm learning ..."*

[T13_NG_1]

Even so, during the execution of group work, task specifications need to be implemented. This is important to prevent group members from taking advantage of the abilities of other group members. In addition, it can also prevent the domination of work by certain individuals.

*"...so in group work… if there is no task specification… does anyone take advantage? ..."*

[T2_TC_1]

*"… yes ... tcer… Even before this, I just sat and waited for other friends to complete group projects, then, some didn't do it right… because I don't feel like there is back up too… so, when the teacher for us the task specifications in detail, I feel more responsible and I know bah… focus of the project that I need to complete in groups…"*

[T2_DS_1]

*"...hmmm… Teamwork trains us to talk to each other, share information, and make decisions together…"*

[T2_FR_2]

Responses from participants showed that they were more motivated to resolve an issue in PBL that was related to real life and not tied to the content of the textbook. Issues that revolve around real life expose students to problem-solving processes. Therefore, students can understand a concept and the relationship of the concept of biology with real life clearly. Students will appreciate knowledge more when they can understand the benefits of that knowledge to them. Therefore, teachers need to be more creative in the selection of issues or problems while using project -based learning methods. This is important to ensure that a biological concept is widely and deeply exposed. If the teacher only relies on the content of the textbook alone, students will feel bored and continue to be passive from engaging in learning activities carried out.

*"... high curiosity encourages us to ask more questions, sharing knowledge and experience ..."*

[T4_DS_2]

*"... Example kan tcer… when we share information… I can further develop the idea that I am… through the sharing of knowledge and experience… our discussions are so more detailed… and broad…"*

[T5_NG_2]

*"... I just listened and focused on what the teacher in front of the class said ... I just kept quiet and focused… that time, I didn't know what the function and relevance of the concepts I learned was to my daily life…. I've been bored for a long time… but when I do PBL online… I do pbl guided… I know what I need to focus on… we can discuss… we collaborate… and I'm excited to create a new product ... "*

[T6_DS_2]

*"... I'm a tcer… Pbl online encourages me to interact more and have a dialogue… because we both discussed compare from before… I just became an observer and just did what was instructed…"*

[T6_CC_1]

In addition, online PBL can also facilitate the discussion process among group members. Students are not only able to share information and ideas, but students are more motivated to collaborate in producing quality and functional products. Pupils are able to discuss systematically through question and answer and dialogue sessions among group members. Discussions become more systematic when the discussion is guided by the teacher. Indeed, the role of the teacher as a facilitator is very important to ensure that the discussion that takes place can be conducted in a focused manner through questioning sessions. Student -centered learning provides opportunities for students to build a variety of knowledge and skills.

*"... pbl best… but I'm also worried if we do it right… but other members make sambal lewa… then… our marks are affected ..."*

[T7_DS_1]

*"... if the scoring system is done externally… individually and in groups, I feel more confident to implement PBL in groups… because I no longer have to worry about the performance of other group members that will affect my marks…"*

[T8_CC_1]

*"... Before this, I was willing to offer myself to complete the project on my own even if I did PBL in a group… because I was worried that… hahah… other group members could not do their best and could affect my marks…"*

[T8_FD_2]

*"... separate marks motivate me and the other group members to be more alert… and we are still diligent in producing the best project… we communicate a lot because we want to produce the best project ..."*

[T8_DS_2]

One of the aspects that need to be considered when implementing PBL online is the student scoring system. Preferably the scoring system is implemented individually and in groups. This is important to ensure continued commitment from each member of the group. They will continue to collaborate, communicate, discuss, dialogue and exchange views to produce projects that work best. This also encourages students to be actively involved in the learning activities in which they participate. They will be more motivated to implement project -based learning.

### 3. Document Analysis

**Examination Marks**

**Analysis of SPM Trial Examination Marks**

| Name | Paper 1 | Paper 2 | SPM Trial Test Results |
|---|---|---|---|
| Fara | 35 | 65 | 71 (A-) |
| NG | 33 | 67 | 72 (A-) |
| Adam | 37 | 72 | 78 (A-) |
| Des | 30 | 54 | 60 (B) |
| Col | 35 | 72 | 76 (A-) |
| Cel | 38 | 76 | 81 (A) |

**Comparison of Semester 1 Examination Marks and SPM Test**

| Name | Semester One Result | SPM Trial Result | Comparison |
|---|---|---|---|
| Fara | 44 | 71 | +27 |
| NG | 59 | 72 | +13 |
| Adam | 51 | 78 | +27 |
| Des | 43 | 60 | +17 |
| Cel | 60 | 76 | +16 |
| Col | 55 | 81 | +26 |

Based on the figure above, all respondents showed a significant increase in marks in the semester 1 examination and the SPM trial examination. All respondents got A- and A grades, while another respondent got a B grade. This shows that all respondents can achieve the optimum level in the SPM trial semester examination. All respondents have been able to get used to answering questions in the form of easy, medium and KBAT in the SPM trial examination. This is because the percentage of preparation of questions in the form of KBAT for this examination question is 40%, the percentage of preparation of simple questions is 20%, while the percentage of preparation of medium questions is 40%. In addition, all respondents indicated that they have mastered at least 50% in the learning syllabus in semester 2 for the subject of Biology. This is because respondents can understand the content of learning that they learn and there is an improvement in students' problem - solving skills.

**Pupils' Learning Levels in Classroom Assessment (PBD) and Project Marks of Semester 2 Respondents**

**Level of Learning (PBD) and Project Marks of Respondents Semester Two**

| Name | Semester Two Level | PBL Project Mark |
|---|---|---|
| Fara | 6 | 92 |
| Ng | 5 | 96 |
| Adam | 5 | 92 |
| Des | 5 | 90 |
| Cel | 6 | 96 |
| Col | 5 | 90 |

The figure above shows that all respondents were able to achieve levels five and six in classroom assessment (PBD) in semester 2 for the subject of Biology. Respondents who achieved level five of learning in PBD showed respondents were able to formulate how concepts are used to address a particular problem or issue, formulate the effects of a problem, and always use scientific language to communicate with them. well and document all sources of information used. While level six shows students who can formulate how concepts are used to address a particular problem or issue, discuss, and analyze concepts to solve a particular problem, use scientific language consistently to communicate clearly and accurately, document information sources and be role models to other students.

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## Contribution

Ehqa Dhabita and Denis Lajium conceived of the presented idea. Ehqa Dhabita developed the theory and performed the computations. Denis Lajium encouraged Ehqa Dhabita to investigate a 21st Century Learning and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

Ehqa Dhabita wrote the manuscript with support from her supervisor, education officers from Jabatan Pendidikan Negeri Sabah and colleagues from Smk Lok Yuk Likas fabricated the research sample. Denis Lajium helped supervise the studies conceived the original idea.

Ehqa Dhabita took the lead in writing the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript. Ehqa Dhabita and Denis Lajium designed the model and the computational framework and analysed the data. They carried out the implementation.

Ehqa Dhabita and Denis Lajium wrote the manuscript with input from all authors. They conceived the study and were in charge of overall direction and planning. All authors discussed the results and commented on the manuscript. Ehqa Dhabita and Denis Lajium. contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

## Conclusion

In developing balanced and prosperous students who are nurtured with the Six Aspirations of Students, teachers and administrators need to be creative to use the resources available, or that can be obtained through the cooperation of various parties to optimize the teaching and learning process. Pupils who come to school these days are no longer like 'empty barrels' that need to be filled with knowledge. Pupils in the 21st century go to school armed with knowledge gained from various sources from outside the classroom.

It is recommended that students be aware of and use the various forms of support provided by peers, teachers, schools or existing technology available to them. teachers should also promote a constructivist learning environment by taking into account three main principles namely pedagogical, social and technological aspects. Teachers must ensure that the rules and strategies implemented can be clearly defined. Therefore, to improve the quality of communication, necessary facilities such as better internet connection should be provided, or improved to ensure that online support can be fully utilized by students.

## References


Jeremy L. HSU, Stanley M. LO, Brian K. SATO. (2021). Defining Understanding: Perspectives from Biology Instructors & Biology Education Researchers. *The American Biology Teacher*, No. 6.

Ismail, Anita, Muda @Ismail, Farah Laili, Sulaiman, Adibah, Mohd Nizah, Mohd Azmir, Abdul Latiff, Latifah, Sulaiman, Mashitah, Mat Yaacob, Siti Norbaya, Kandil, Hisham Mohammad Taky Eldin, (2020). Pembentukan Pemikiran Kreatif dan Kritis: Hubungannya Dalam Menyelesaikan Masalah. *Sains Insani*, 5(1).

Mohammad Hazim Amir Nordin. (2020). The Culture of Learning Continuum : Promoting Internal Values In Higher Education. *Jurnal of Studies In Higher Education.*

Norhasyimah Hamzah, Siti Nur Kamariah Rubani, Arihasnida Ariffin, Normah Zakaria & Fazrulhelmi Ahmad. (2020). Kaedah Pembelajaran Abad Ke-21 (PAK-21) Secara Atas Talian Dalam Subjek Psikologi Pendidikan. *(Buku Kurikulum dan Instruksi Siri 11, Universiti Tun Hussein Onn Malaysia)*. Bab 4,27-36. Diambil semuladarihttps://fptv.uthm.edu.my/images/journal_book_chapter/full_book_chapter_Siri_11_latest.pdf Muhammad Sabri Sahrir, Nurulhuda Osman, Ilyani Syiham Muhammad. (2020). Aplikasi 'Konsep 4C' Pembelajaran Abad Ke-21 Dalam Kalangan Guru Pelajar Sarjana Mod Pengajian Pendidikan Bahasa Arab Cuti Sekolah UIAM. *e-Jurnal Bahasa dan Linguistik.* Diambil semula dari e-Jurnal Bahasa dan Linguistik (e-JBL) (kuis.edu.my)

W. Sumarni and S. Kadarwati. (2020). Ethno-Stem Project-Based Learning: Its Impact To Critical And Creative Thinking Skills. *Jurnal Pendidikan IPA Indonesia*, 11-21.

Ulfi Indriyani. (2020). Upaya Meningkatkan Keterampilan Komunikasi Siswa Dalam Pembelajaran Sejarah Melalui Strategi Giving Question Getting Answer. *Jurnal Sejarah dan Pendidikan Sejarah*, 9 (1). 2020. 85-94.

Nor Khayati Basir, Mohd Isa Hamzah, Khadijah Abdul Razak. (2020). Sikap dalam Pendekatan Pembelajaran Berasaskan Projek Terhadap Pencapaian Pelajar Politeknik di Negeri Perak. *ResearchGate.* Diambil semula dari https://www.researchgate.net/publication/345150558_Sikap_dalam_Pendekatan_Pembelajaran_Berasaskan_Projek_Terhadap_Pencapaian_Pelajar_Politeknik_di_Negeri_Perak

Joseph, Suresh Kumar, Alimon, Hashimah, Yusoff, Amri. (2019). Learning Biology through Digital Games (DG) in Form Four Classrooms in Malaysia. *Journal of Science and Mathematics Education in Southeast Asia*, 42.

Wong Weng Siong. (2018). Pembelajaran Berasaskan Permainan dalam Pendidikan STEM dan Penguasaan Kemahiran Abad Ke-21. *Politeknik & Kolej Komuniti Journal of Social Sciences and Humanities*, Vol. 3, 2018

Nargis, Armelia, Lisa, (2018). Optimizing EFL learners' communicative competence through short movie project. *Asian EFL Journal*, 20(5).

Nindiya Eka Safitri. (2018). Meningkatkan Teamwork Skills Melalui Layanan Bimbingan Klasikal Berbasis Cooperative Learning. *Tajdidukasi*, Volume VIII, No. 1.

Kamisah, Osman, Siti Mariam, Zazam, (2017). Pengetahuan dan kemahiran guru

Sains sekolah rendah terhadap pemupukan Kemahiran Berfikir Aras Tinggi ( Kbat ) dalam pembelajaran. *ResearchGate.*

Halim, Mohamad Nizam Arshad dan Abdul, (2017). Menjana kemahiran berfikir aras tinggi (KBAT) dalam penyelesaian masalah matematik tambahan. *Universiti Teknologi Malaysia.*

Akhtar H, Abdul Ghani Azmi I, (2017). Komunikasi kepimpinan berkesan. *Jurnal syariah*, 25(3).

Amir, Aris, Ahmad Rozelan, Yunus, (2016). Komunikasi Berkesan. *ResearchGate.*

Fazilah Binti Razali, Othman Bin Talib, Azraai Bin Othman. (2016). Aplikasi Kemahiran Proses Sains Dalam Pembelajaran Berasaskan Masalah Untuk Mata Pelajaran Biologi. *Jurnalkurikulum & Pengajaran Asia Pasifik*, Bil 4, Isu 3

Maimunah Binti Nasir. (2016). Pembelajaran Berasaskan Masalah Dan Amalan Pembelajaran Arah Kendiri Ke Arah Perubahan Kefahaman Murid Tingkatan Enam Dalam Konsep Genetik. *(Tesis Doktor Falsafah, Universiti Sains Malaysia)*. Diambil semula dari http://eprints.usm.my/31557/1/MAIMUNAH_BINTI_NASIR_24.pdf

Nor Ezah Binti Ariffin, Nurulwahida Binti Hj. Azid @ Aziz. (2016). Persepsi Murid Tahun Lima Terhadap Penggunaan Kaedah Model Bar Dalam Penyelesaian Masalah Matematik Berayat Tajuk pecahan. *International Seminar on Generating Knowledge Through Research*, 1 (2016), 287-304

Sumarni W. (2015). The Strenghths and Weaknesess of the Implementation of Project Based Learning: A Review. *International Journal of Science and Research (IJSR),* 4(3).

Aziza Kavlu. (2015). Implementation of Project-Based Learning (PBL) in EFL (English as a Foreign Language) classrooms in Fezalar Educational Institutions (Iraq). *5th International Research Conference on Education*, ISSN 2298-0180.

Fazliza Binti Che Mat. (2015). Kesan Pengajaran Dialogik Terhadap Kemahiran Menaakul Saintifik, Kemahiran Berhujah dan Pencapaian Sains Dalam Kalangan Murid Sekolah Rendah. *(Tesis Doktor Falsafah, Universiti Sains Malaysia).* Diambil semula dari http://eprints.usm.my/31391/1/FAZLIZA.pdf

KPM, (2015). Kemahiran Berfikir Aras Tinggi (KBAT) dan Perlaksanaan KBAT di Sekolah. *Buletin Anjakan*.

Zakaria, Suhaimi, Othman, Aris, Baharuddin, Mohammed, Hasnah, Zaid, Norasykin Mohd, Abdullah, Zaleha, (2014). Penerapan kemahiran berfikir aras tinggi melalui model stesen rotasi pelbagai mod. *Konvensyen Antarabangsa Jiwa Pendidik.*

Mohd Azli Yeop, (2013). Kesan Pendekatan Pembelajaran Berasaskan Pzzrojek Berteraskan. *Jurnal Pendidikan Bitara UPSI.*

Brown C,TEXAS A. (2012). The implementation of project-based learning. *National Forum of Educational Administration & Supervision Journal* 26-26, 30(1).

Rian Vebrianto, Kamisah Osman. (2012). Keberkesanan Penggunaan Pelbagai Media Pengajaran dalam Meningkatkan Kemahiran Proses Sains dalam Kalangan Pelajar. *Jurnal Pendidikan Malaysia*, 37(1)(2012), 1-11

Hafiza Binti MD Nasir. (2012). Keberkesanan Pembelejaran Aktif Terhadap Pencapaian

Pelajar Perempuan Dalam Biologi. *Fakulti Pendidikan Teknik dan Vokasional*.

Halizah Binti Awang. (2010). Kesan Pembelajaran Berasaskan Masalah Terhadap Penguasaan Kemahiran Generik Dan Pencapaian Akademik Pelajar Di Politeknik Malaysia. *Tesis Doktor Falsafah.*

Khairulhelmi Katip, Bazitah Abu Bakar, Florence Fletcher Malia. (2005). Tinjauan Perlaksanaan Pembelajaran Berkumpulan Di Kalangan Pelajar Institusi Pengajian Tinggi Swasta (IPTS) Di Johor Bahru. *Jurnal Pendidikan*, 10(2005),1-7

# My Role as A Teaching and Learning Facilitator: A Value of Reflection from Personal Perspective

Subashini Annamalai,
School of Multimedia Technology and Communication, Universiti Utara Malaysia, Kedah, Malaysia
Corresponding Author: subashini@uum.edu.my

## Abstract

Reflection means etymologically to bend back, to mirror, and to think. This paper describes my personal reflection of my role being a teaching and learning facilitator in a higher educational institution**.** The focus of this article are my teaching philosophy and my personal reflection in terms of starting the class, teaching strategies and lessons that I've learner. This paper is based on narrative writing which does not includes any referencing from outside source.

*Keywords:* Reflection, Personal, Teaching, Learning, Multimedia*,* Philosophy

## Introduction

Educators are currently using reflections more frequently. The value of this practice in shaping a teacher's classroom strategy is evident to many. In order to help teachers to become more aware of their teaching technique and enhance their classroom practices, journaling, classroom observations, and community of practices are frequently used as examples of effective reflective practices. When studies have revealed that not many instructors regularly reflect on their practice, this is true even though they are aware of its advantages.

This paper describes my reflective practice as one of the teaching and learning facilitators in School of Multimedia Technology and Communication, Universiti Utara Malaysia, who teaches Multimedia System Foundation course using theoretical and hands-on methodology. This reflective writing will introduce the classroom practices and the strategies that I have used in my classroom.

## My Teaching Philosophy

My teaching philosophy is based on a proposition known as "Teaching is Learning". My goals are to create a learning atmosphere in the classroom where students are encouraged to voice their own opinions and take part in their education, both in the physical world and online. Although I emphasize that each student in the class is responsible for their own learning, I will also offer clarifications and advice on the readings and other course materials. In addition to being intellectually challenged by the discussion of the course contents, I want my students to enjoy the interactions in my classroom. And I want my students to think of me as a teacher who cares about them as people, values their contributions to class discussions, and also someone who inspires them to learn and develop at the conclusion of each session I manage. This has been my guiding principle for classroom performance and it sums up my teaching philosophy.

I began my career as a lecturer by mimicking my teachers and mindlessly copying their methods. However, the breaking point was that I felt that I was not been able to connect with them emotionally. I always wonder how they see me and did I inspire them in some way or I am just another teacher for them. As I have grown to better understand these contexts and the emotional processes of teaching and learning, it has evolved into my own style of instruction. I now see that teaching is not only about teaching, but to touch them on the core level and learning is process not only for them but for me too. I have learned throughout the years that teaching is the process through which we provide the circumstances and opportunities that aid students in acquiring

knowledge that is relevant to their individual needs and emotional state. In order for them to reach their full potential and become distinct people with varied cognitive and emotional development, learning styles, and potential, they need be given the proper aid, guidance and love in line with their varying talents and learning requirements. My goal was to create a learning atmosphere in the classroom where students are encouraged to voice their own opinions and take part in their education, in addition of offering clarifications, advice and discussion of the course contents.

My teaching philosophy was inspired by the movie 'To Sir, With Love' (1967) that has both traditional and radical roots. This inspires me to make myself not so much of an expert in my field, but also a partner in learning. The ultimate kind of charity, according to a passage in Indian scriptures, is bestowed onto a person via knowledge and education. This is exactly what I want to provide for my students. Although I lack the resources to support charities, I do have knowledge that I can impart to my pupils. In this 16 years of being in the teaching profession, I have realized that all life experiences teach us something that can contribute to the success of others' life.

My aim is to set myself as an example to my students and a facilitator for their future outlook because my teaching philosophy has relied on this quote, "Students don't remember what you try to teach them. They remember what you are."

## My Teaching Reflection

My students for this course comes from a diverse background, such as multimedia, business and entrepreneurship, communication, law and governance. This enables students to bring a range of ideas about the course topic to my classroom. I want my students to see my classroom as a place for discussion where they may express their opinions on the material and add to the learning process.

### Getting to Know the Students

I give each student a personal information sheet to fill out on the first day of class. I utilize the information to get to know my students better. I make an effort to address every student by name and get to know a little bit about them during the course of the semester. I will wish them and give them gifts for their birthdays, ask them when they are absent for any classes, or sometimes, just give a treat for them randomly. When I do this, they feel valued and enjoy the experience of participating in my class.

### Teaching Method and Strategies

I have a duty as a facilitator to assist my pupils in learning how to learn. I want to motivate my students to pursue independent learning. I encourage them to utilize resources besides the required readings and lectures. For instance, I give students tasks that call for using online, social media, and library resources. Two of the main assignments requires them to use Canva and entertainment medium, namely, TikTok and Instagram. By doing this, I intend to demonstrate to my students how many resources are readily available for them to use in order to learn about practically any subject they are studying. I would rather assist students in becoming active creators of knowledge and ideas than serving as the sole source of information in the classroom.

My expectation is that the students must also come prepared to class and take personal responsibility for their learning process. I incorporate active learning strategies into class discussions to promote student engagement. I pose questions to the class and use their responses to lay the groundwork for the concepts that we will cover in class. In addition, I make an effort to direct class questions to different students each time. I want to teach my students that they are in charge of their own learning by adopting active learning strategies. I want to broaden the students' current knowledge and skills, get them to take a critical look at the world around them, and help them perceive themselves as intellectually capable.

I've made it a point to always keep two things in mind when I'm teaching: first, that while

covering the material is important, it's more crucial to teach students skills than things; and second, that students learn skills most effectively through an interactive teaching approach that invites their participation and pushes their limits. Undoubtedly, all students need a foundation in their subject areas, and lecture courses have their role, whether in exposing students to the idea of theory, research, and experimentation from the real world or in equipping them with basic multimedia skills.

It takes deliberate action on the part of the lecturer to foster meaningful learning in the classroom. This may be carried out by comprehending and putting into practice the methodology that improves our abilities as instructors. There are two stages that I use for meaningful teaching, together with corresponding pedagogical practices beyond lecturing: 1) I will always tell my students why they need to learn this. In a way, I am helping my students to find a motivation for learning and awaken their insight. 2) When guiding the students to "learn about" something, I will teach from the knowledge known to them (prior knowledge) to the unknown knowledge using metaphors, analogies and experiences. I place greater significance on acquiring concepts and principles than on absorbing information or facts.

As a facilitator in the higher educational institution, I am using various teaching strategies which is suitable to be implemented in my classrooms that bring together students with distinct abilities and personalities. I have noticed that some students learn faster than others. This has helped me realize that in order to satisfy the unique requirements of each student in my class, I must develop efficient teaching tactics and put them into practice. There is no "one size fits all" approach to teaching, hence it is impossible to develop successful teaching methods that are effective for all students. Therefore, I used a range of effective teaching strategies that can help my students to efficiently improve their learning abilities, as follows: -

1. Visualization of Information
   A fantastic way to comprehend or synthesise knowledge that has been given in class is through visualisation. Students retain what they learn for a longer duration of time when they absorb material visually. This method aids delayed learners in the classroom in clearly, simply, and methodically visualising the current topic. In order to assist the students to learn the material through visual memory, I will utilise visual tools including graphic organisers, flow charts, Venn diagrams, and idea maps.

*Figure 1*. Creating visualization via drawing.

2. Student-Led Classrooms

   Student-led classes have evolved into a novel method for me and the students, to communicate and conduct class discussions. By encouraging the students to switch roles and become facilitators for the day not only aids in their self-confidence but also offers the class a fresh viewpoint. This method of instruction benefits other pupils as well, who gain knowledge from the distinctive viewpoints of their classmates.


*Figure 2.* Student-led activity

3. Implementing Technology in the Classroom

   My use of technology in the classroom helps me actively engage the students. Since the students use laptops, mobiles and tablets in the classroom, I occasionally incorporate interactive online games like Prodigy, Kahoot, and quizzes to help them learn more quickly and communicate with each other. These educational games provide as a platform for students to hone their skills and knowledge by including them in a game module where they must solve problems and compete against their classmates. On top of that, some educational games also can become formative assessment for each topic and in a way, I can track my student's progress and engagement with the learning content. I will also use interactive whiteboards (IWB) to display websites, images, and videos. IWBs are excellent tools for engaging entire classrooms in an interactive lesson. In addition, interactive tools like Prezi, Powtoon and Microsoft PowerPoint make it easy for me and the students to create multimedia presentations and share the work to the class.

4. Inquiry-Based Instruction

   An efficient teaching technique that motivates students to think realistically and develops autonomous learners is to encourage them to ask thought-provoking questions. Students participate in the learning process by posing questions and working together to find solutions to the difficulties. It promotes collaboration among students and aids in their improved retention of new information.


*Figure 3.* Inquiry based classsroom

5. Demonstration Method
   I'll employ the demonstration technique in interactive digital classrooms as a visual way to examine facts, concepts, and procedures. Instead than just telling students what they need to know, demonstration enables them to see me fully engaged as a learner and a model. In this method of teaching, I will perform the hands-on activities and simultaneously explains what I'm doing. To keep the pupils' interest and focus, I will also pose pertinent questions. The students are required to pay close attention since they must complete all of the hands-on exercises precisely and generate an output.

It might be difficult to provide practical answers for the entire class because each person is different. However, addressing each student's learning style and encouraging them to learn more may be accomplished by utilizing a variety of teaching techniques. The best course of action for me at times is to try out a mix of techniques that will aid kids in learning more quickly.

**Personal Reflection**

To date, it has been 17 years of teaching and yet I feel that I'm not competent enough. My teaching process started from secondary school, to community college, then to polytechnic and finally, at present at the university. Here, I've been teaching various courses, but the 'Multimedia System foundation course' is something close to my heart. The primary topics covered in this course are the fundamental ideas, components, designs, technologies, and application areas of multimedia. Additionally, it introduces multimedia system technologies, such as platform, programming tools, and hardware categories. To make the process of creating and selling multimedia systems easier, students will be given emphasis on fundamental design concepts, development techniques, and application distribution. In addition, emphasis is also placed on multimedia concepts like career, legislation, and humanizing effects.

Most of the lesson was lesson was interesting which started with a related video as an induction set to attract students' attention, and that I was able to invoke discussions with the students to relate to their prior knowledge. I really admired that students' effort to always be ready to answer lecturers' questions at any time. And I feel that doing group activities is a good strategy to encourage the students to give commitment and communicate in the classroom.

The key that contributed to a good teaching and learning session is to prepare well before the

lesson starts. Because of this, even when the lesson was held during lunch hour, the students showed their interest and commitment to involve in all the learning activities. The tasks given to the students are achievable in the specified timeframe, and that I was able to relate the learning content to 'real life' context and scenario. For example, although my induction set was not animated, it does arouse students' curiosity and motivation to learn.

I have conducted the class activities according to the lesson plan. And I felt that, blending a variety of teaching methods such as lecture, video, question and answer session, student activity and discussion, the classroom session was more engaging and interactive. This mixture of teaching and learning activities could cultivate students' interest to learn and this is why they were motivated to lean thinking the lesson.

The classroom activity not only enhances students' interaction, but also helped me to analyze my students understanding of the content. In short, I feel satisfied with the results and I will definitely continue similar activity in another class with the hope to get more attention and involvement from students.

The students' curiosity and prior knowledge was intrigued when I showed some real life examples that are very close to their heart such as YouTube and Frozen animated movie. When I presented the information and described the learning contents, the students are able to understand, which subsequently increased their confidence and courage to interact with lecturers. They started to ask questions in order to understand the learning content better, thus reducing the gap between the lecturer and the student. I personally feel that I managed to fulfill the goal of generating competent first-class human capital through the results-based learning (OBE) and SCL methods in the classroom today.

Though the student activity, the students are able to portray teamwork and leadership by helping each other to work on the task given to them. This encourages constructivist learning because students consisting of varying degrees of performance, learning rate, and cognitive style can provide peer-to-peer teaching and learning.

Sometimes, I do feel that although the lecture went very well and that I was able to achieve the learning objectives as per planned, there was too much of information and activities that were given to the students during this lesson. Personally, I opined that sometimes, I have to take things slow in order to keep the students' interest intact. Lessons with too much information were indeed a good experience and got me thinking ahead of great activities that I really want my students to participate in. However, as this has become a challenge, it has also brought some issues to my attention that I must take into account when conducting this type of lesson in the future.

I also learned that my effort to adopt a flip classroom method which turned out to be an excellent strategy to get the student to get involved in the teaching and learning session and also engage them physically, mentally and emotionally. I saw the students participated happily in the classroom activity and it was an admirable teaching session. When this happens, I always feel happy as the students are very active and they remembered a lot from the last lesson. They all showed signs of being eager to learn. The flip class lecture went quite well overall. The class became animated once we started the student activity and they started taking part. What had initially been structured, ended in laughs and conversations at the end. I could actually feel that I was enabling positive learning among my students.

From this experience I learned that I need to create a more open teaching style. I adopted the flip classroom technique for facilitating my lesson today and it turned out to be very engaging for the students. I was reminded that I need to skip the explanations and get directly into the practice exercises. They were more effective than reading the PowerPoint slides and verbally explaining the concepts. I also realized more than ever the importance of being flexible. Changes may be necessary in the best of lesson plans.

Sometimes, due to the posture of the class, I feel that I'm using a lot of energy when I explain the lesson. I personally feel that I'm using my natural high pitch voice distorts the learning process a

little. To address this issue, I feel that I may have to vary my tones by using a microphone to gently tackling the students' feeling and motivation.

I've always believed that every student is a unique learner with a variety of learning styles. Since I feel compromised and obligated to address my students' needs when I teach, I prefer to incorporate games and other scaffolding techniques. Additionally, I am usually really motivated after each session since my students approach me and provide me with insightful and encouraging feedback, and it appears that they enjoyed the course. The majority of the students in my class reported feeling inspired, entertained, and encouraged. As a result, I believe that these remarks will motivate me to make my students' learning experiences valuable and meaningful.

## Conclusion

Overall, since I feel that instruction should be student-centered and responsive to students' personal and cognitive needs, I believe that the teaching activities in the class and the dynamics within them represent my teaching philosophy. A teaching and learning facilitator, in my opinion, has to offer motivating and relevant experience activities that will inspire the students to learn. In order to adapt my teaching methods to the requirements and personalities of my students, I attempt to learn from every opportunity I have to teach a class. As a result, each teaching opportunity is a special learning opportunity that should be retained and practiced.

# OSIViG: Student Reflections on a Mobile App to Learn the OSI Model

Harryizman Harun*[a], Subashini Annamalai[b], Siti Mahfuzah Sarif[c]
[abc]Department of Multimedia Technology, Universiti Utara Malaysia,
Sintok, Kedah, Malaysia
*Corresponding Author: harry@uum.edu.my

## Abstract

Multimedia System Networking (STIV3023) is a course requiring students to understand both the traditional and multimedia aspects of network communication. The second course-learning outcome (CLO) emphasises the networking transmission facilities; hence they need to understand the Open Systems Interconnection (OSI) model. The OSI model is essential in any networking course, whether traditional or multimedia. However, based on the teaching experience in Multimedia System Networking (STIV3023) classroom, it is found that the students always face difficulty in understanding even the basic logic data flow in the OSI model. Therefore, a mobile app is developed using an analogy as a visual guide to educate the OSI model to the students. Such a mobile app is not known to exist thus far. This study inquires about the students' experience using the Open Systems Interconnection Visual Guide (OSIViG) app, the OSIViG app's value in assisting the learning of the OSI model, and the use of the analogy to represent the OSI model. The data were collected via participant-generated documents from student reflections on Google Forms. The thematic qualitative text analysis (TQTA) was used to analyse the student reflections in Atlas.ti ecosystem to warrant rigour and trustworthiness. The findings revealed that the students' experiences are majorly positive. So are the value of the OSIViG app and the analogy itself. The acceptance of the students toward the OSIViG app outweighs the rejection. Such findings implied that the use of the analogy as the visual guide does contribute toward assisting students in understanding a complex topic like the OSI model. They also shed a brighter light for future similar studies on how analogy and technology assist students in learning other intricate network topics.

*Keywords:* Analogy, Mobile App, OSIViG, OSI Model, Student Reflection, Visual Guide

## Introduction

According to Medicine (2019), the OSI model is essential in a network as it provides a standard for different systems or devices to communicate as a universal language for networking. It means systems or devices developed by two or more companies can communicate via a network without problems. More importantly, the OSI model aids in troubleshooting network problems. Additionally, the OSI model is beneficial in network design because it extends modularity, flexibility, ease of use, and standardisation of protocols (Daya, 2013).

However, based on the teaching experience in Multimedia System Networking (STIV3023) classroom, it is found that the students always face difficulty in understanding even the basic logic data flow in the OSI model. The basic logic data flow is crucial in achieving the second CLO for the students to explain the networking transmission facilities.

Since the OSI model is incorporated into the course's syllabus, the students must understand its data flow. In the 2018/2019 semester, 23 students sat for the final examination, and only two managed to understand the OSI model and correctly answered a respective question. In addition, in the session 2019/2020 semester, only nine students answered a question related to the OSI model correctly out of 33 students. Such results were obtained from the traditional method of teaching assisted by Microsoft Powerpoint slides. This notion is supported by Imam et al. (2021), that

underlines the OSI model layers and its logical flow is intricate and problematic to be understood by the students. Therefore, a mobile app coined OSIViG is designed and developed to solve the problem. The OSIViG app employs an analogy (postal system) as a visual guide to assist the student's understanding of the OSI model.

**Objectives**

The current study has three objectives. The first objective is to discover the students' experience using the OSIViG app. The second objective is to identify whether the OSIViG app could assist the students in learning the OSI model. The third and last objective is to understand the ability of the postal system analogy as the visual guide representing the OSI model from the student's perspective.

**Research Questions**

Three research questions are posed to mobilise the present study. The research questions are as follows.

1. What are the students' experiences using the OSIViG app?
2. What are the students' opinions regarding the OSIViG app's assistance learning the OSI model?
3. How do the students perceive the postal system analogy representation of the OSI model as the visual guide?

**Theoretical Framework**

The current study is grounded in a theoretical framework illustrated in Figure 1 to understand how the analogy can be used in education (Gick & Holyoak, 1980, 1983; Gray & Holyoak, 2021). Theoretically, there are multiple components to analogous problem-solving. Key elements of the two analogues can be mapped to generate correspondences between the various elements once the source analogue is accessed.

Crucially, these correspondences are predominately based on matches between relations causally and functionally relevant to the dynamic changes occurring within each analogue. It is possible to infer a novel solution to the target problem from information provided only by the source once an appropriate mapping has been established. Ultimately, by forming a more abstract relational schema that captures the similarities between the source and target, it is possible to learn something new after exploring the analogy.

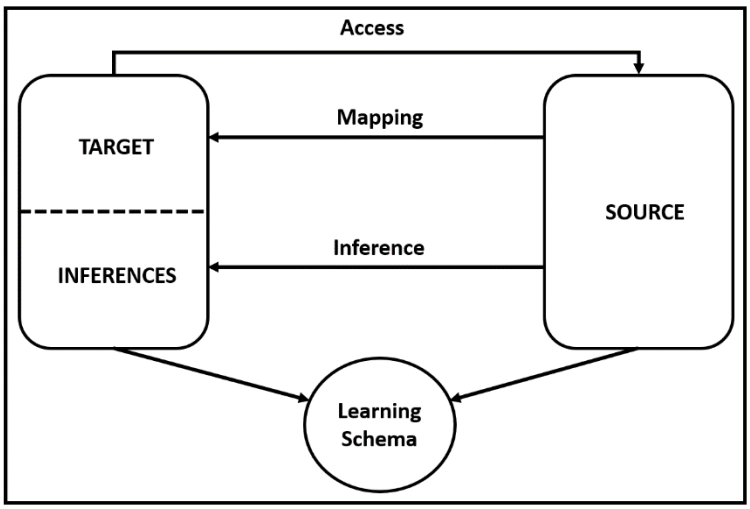


*Figure 1*. The Theoretical Framework of Analogy in Education (Gick & Holyoak, 1980, 1983; Gray & Holyoak, 2021)

In the context of the present study, the target and source are the OSI model and the postal system, respectively. First, the students access the source, which is the postal system animation. Then, the critical elements of the target and source are mapped to generate correspondence. These correspondences are based on matches between relations of the OSI model and postal system animation that is in some sense causal. The flow of the postal system animation as the source reflects the functionality of the OSI model's seven layers. The similar goals of the OSI Model and postal system animation flow provide reasons for the students' choices of actions; in each situation, states or actions in the postal system animation enable or prevent subsequent actions, which cause state changes in the OSI model. Once the mapping is established between postal system animation and the OSI model, the students could infer a solution to an understanding of the complex OSI model from the comprehension based on the information provided by the postal system animation. In the end, the cohesion between the postal system and the OSI model may not just create understanding but also triggers learning among the students at the higher level of abstract relational representation.

## Literature Review

The current study reviews how analogy assists in making abstract concepts tangible. An analogy demonstrates the similarities between two things with the ultimate intention of illustrating the comparison. However, the analogy's goal is not just to illustrate; it also serves as an explanation (Blume, 2021). Using the analogy in its physical and visual forms to educate formally is an alternative way of teaching. It helps to alleviate students' confusion on specific topics by relating them to ordinary things in life. Even though cognitive and curricular adjustments are inevitable, the analogy is a tool that aids the students in thinking critically and transcends memorisation for lasting deeper learning (Wormeli, 2009). From the cognitive-linguistic lens, the analogy is the comprehension of one conceptual sphere via another conceptual field. It can be divided into conceptual and linguistic, but the review converges on the former since the current study does not involve studying languages. The conceptual analogy is built on two conceptual fields: source and target. The source is the analogical expression, and the target is the field that needs to be understood via the source domain. Moreover, various mediums can represent the analogy as visuals (Kovecses, 2010).

Additionally, another lens expounds the conceptual analogy to understand an abstract experience through a concrete one. Such a view treats the analogy as process and product. The thought process to understand the abstract experience is the process facet and the consequential conceptual pattern via the concrete experience is the product facet. It is noted that the conceptual analogy occurs in gestures, visual representations, and visual arts, to name a few (El Refaie, 2017). Another takes on the analogy sees it as a phenomenon in language, thought, and communication that transpires throughout modalities where an abstract entity is elaborated in respect of a more tangible entity. It is said that gestures, signs and visuals are the potential signals in the marking analogy (Di Biase-Dyson & Egg, 2020).

The reviews disclose that the analogy helps understand a difficult concept by representing the concept via a more solid concept. Furthermore, the representation of the analogy visually also helps to enhance understanding of the intricate concept represented. In the context of the current study, the OSI model data flow concepts are known to be problematic to be understood by the students. Therefore, it is appropriate to utilise the visual analogy to represent the intricate concepts via concrete representation to assist the students' comprehension of the OSI model.

Furthermore, six previous related studies are reviewed to reveal the gap in the current study. The first study attempted to understand the OSI model via interactive educational media (IEM) in the primary network learning process (Imam et al., 2021). The IEM was an animation developed using

Macromedia Flash 8. The animation explained the OSI layers as an introduction to network fundamentals.

The second study improved students' OSI model learning capabilities by using an action game invented as Packet Warrior (PW) (Uiphanit et al., 2019). PW was designed and developed to ensure the students learn and understand the concept of each OSI model layer and its logic data flow with a fun element.

The third study aided students' understanding of the OSI model via educational computer games and social media (Çakır & Tan, 2017). A game coined Osi Network Game (OSiNeG) was developed and parked online on Facebook, and the students received it well.

The fourth study involved creating an interactive animation called program linear controlled (KPL) animation to help teach the OSI model (Hassan & Ali, 2017). Due to the complicated and abstract contents, the study employed multimedia elements and interactivity to augment the students' understanding of the OSI model. It seemed the traditional pedagogy was less effective, considering the scoring for the particular course was below expectation.

The use of animated media in the fifth study was aimed at helping the students better comprehend networking concepts, such as the OSI model (Ab Rahman et al., 2015). Based on the study, the OSI model was the toughest to teach because of its intricacy in explaining the data flow logic with its eclectic technical jargon. Therefore, the animated media was used to help render the teaching and learning process of the OSI model less daunting.

The sixth study overcame the technicality and boredom in learning the OSI model and other networking topics through a visual educational tool branded Packet Tracer (PT) (Zhang et al., 2012). PT offered network visualisation, simulation and collaboration to assist the students in understanding network theoretical and practical skills, including the OSI model.

Based on the review above, it can be seen that all previous studies did not employ the analogy to assist students' understanding of the OSI model in the classroom. At large, visualisation and multimedia elements were used but not in the form of analogy. In the local context, the fourth and fifth studies only used animation to represent the OSI model in a more accessible form but never the analogy. This fact leaves a gap for the current study by proposing OSIViG, an interactive visual guide using the postal system analogy. It is the mobile app to better support the students in the STIV3023 classroom to understand the OSI model's basic logical flow.

## Methodology

This section explicates the units employed, sampling technique, data collection, data analysis and the computer-assisted qualitative data analysis software (CAQDAS) utilised in the current study.

Three units were established to segment, analyse, and understand the student reflections: analysis, coding, and context (Schreier, 2012, 2013). The unit of analysis was the student reflections individually. Parts of the student reflections that were interpreted to answer the research questions propounded constituted the unit of coding. Finally, the context unit was the surrounding information in the student reflections needed to understand what a given coding unit meant.

The sampling technique employed to select the participants involved was purposive (Emmel, 2013). It was a fitting sampling technique because the participants were purposefully selected due to their unique ability to answer the study's research questions (Ravitch & Carl, 2021). The criterion of the participant selection was based on the fact that they were students enrolled in the Multimedia System Networking (STIV3023) course. Age, race, gender, and nationality were not counted as criteria for sampling.

Once the participants were selected, data were collected as participant-generated documents (Creswell & Poth, 2018; Ravitch & Carl, 2021). The data were the participants' responses in the form of student reflections. They were provided with the OSIViG app and instructed to utilise it to study

the OSI model. A test was conducted, and they were asked to reflect post-test. The test result is not discussed as it transcends the article's scope. The student reflections were designed based on the research questions and structured to guide the participants' attention in reflecting, considering the nature of the participants as students. Google Forms was exploited as a tool to collect the participants' reflections (Batubara, 2016). The reflections submitted to the Google Forms were set editable to ease the researcher to probe and prompt their responses.

Data analysis commenced after the data collection was concluded. First, thematic qualitative text analysis (TQTA) was employed to analyse the student reflections (Kuckartz, 2014). Then, Atlas.ti was engaged as a tool to execute TQTA to increase data auditability and reinforce the overall rigour and trustworthiness of this study's findings (Clarke et al., 2021). It consists of seven analysis phases as elucidated in the succeeding subsections (Atlas.ti terminologies (italicised) are used as necessary henceforth).

***First Phase.*** In this phase, the student reflections were exported from Google Forms into Atlas.ti as *documents*. Each *document* was named RF and numbered accordingly. The initial work with the *documents* began to emphasise essential passages and compose *memos*. The *documents* were carefully read, and a selection of significant text passages was observed and highlighted. *Memos* were also created to record things that were struck as particularly interesting or relevant and any ideas that may occur regarding the analysis.

***Second Phase.*** The second phase denoted the development of main topical categories as *codes* in the *code manager*. The actual content of the *documents* acted as analysis categories. The main topics were derived directly from the research question and fashioned as *codes*. It was apt since the student reflections were designed based on the research questions that impacted how the data was collected. New, unexpected topics might have been unearthed through carefully reading the *documents*. Anything that seemed relevant or peculiar at first was recorded. The categories were developed empirically and based directly on the data (inductive).

***Third Phase.*** In the third phase, the available data were coded using the *codes*. The first coding process was conveniently designed in a sequential approach. The *documents* were analysed section-by-section and line-by-line from beginning to end to assign text *quotations* to categories. The topics addressed in the given text *quotations* were determined and assigned to the appropriate category. *Quotations* that did not contain information on the pre-determined topics were irrelevant to the research question and remained uncoded. The entire data set was coded during the first coding process. The research questions determined the size of the individual coding units (the text segments to be coded).

***Fourth and Fifth Phase.*** All the *quotations* identified and assigned to the main categories were carefully analysed as a preparation to generate *subcodes*. As the bridging phase between the first and the second coding process, *subcodes* were created for each *code* formed in phase two. Raw *subcodes* were formed initially, and more abstract *subcodes* were eventually entailed. Prototypical examples were formulated in the *comment* for each *subcode* based on the *quotations* coded in phase three to ground them close to the data. The prototypical examples aimed to safeguard and maintain a consistency of the study's understanding of the *subcodes* throughout the entire analysis. For completeness and in case wildcard *quotations* were discovered, all *codes* included an extra *subcode* entitled 'Residual Subcategory'.

***Sixth Phase.*** In the second coding process, all the data were coded using the elaborate category system containing *codes* and *subcodes*. This phase required the study to analyse the data all over again systematically. The *quotations* within each *code* were coded again and assigned to the recently defined *subcodes*—the prototypical examples in the *comment* aided in determining the coding of the right *subcodes* to *quotations*.

***Seventh Phase.*** This study presented the findings via a few approaches: graphical representations, visualisations, and tables. The graphical representations and visualisations were accomplished using the *network* and its relations to represent the findings graphically. The tables

were achieved via the *code-document table*. Ultimately, category-based analysis of the *codes* and *subcodes* were represented as assumptions and interpretations of the study to answer the research questions and achieve the objectives.

## Analysis and Findings

Twenty students from Universiti Utara Malaysia (UUM) who enrolled in Multimedia System Networking (STIV3023) course participated in the present study. Ten students are registered for Bachelor of Science (Hons.) (Multimedia). The rest are the students minoring in multimedia. The minoring programmes are Bachelor of Business Administration with Honours, Bachelor of Banking with Honours, Bachelor of International Business Management with Honours, Bachelor of Tourism Management with Honours, and Bachelor of Muamalat Administration with Honours.

They were instructed to use the OSIViG app to learn the OSI model. Then, they were required to reflect on the OSIViG app regarding their learning experiences, the helpfulness of the app, and the postal system analogy on Google Forms. The reflections were structured and designed based on the research questions; thus, it had three overarching questions to guide the students in reflecting. The questions were as follows:

- What is your experience using the OSIViG app? Please elaborate on your answer.
- Do you find using the OSIViG app to learn OSI Model topic helpful? Please elaborate on your answer.
- What do you think of the postal system analogy used in the OSIViG app to represent the OSI layers' functions? Please elaborate on your answer.

The researcher was present during the OSIViG app usage, but no interference occurred. It was to warrant a new experience of the OSViG app usage in learning the OSI model. They were allowed to interact among them concerning the OSIViG app usage, but from the researcher's observation, very minimal interaction occurred. Their focus was well spent on the mobile app itself. However, some probes and prompts were given during the reflection. It ensured the students' responses in the reflection were more in-depth and contained the answers to the research questions. The reflections were responded to in a mix of English and Malay, but it was not an issue since the researcher is proficient in both languages. The twenty completed reflections were exported from Google Forms to Atlas.ti for analysis.

Three *codes* were obtained as the main topic categories once the twenty *documents* were analysed: *(1) Experience using the app, (2) App's helpfulness to learn, and (3) Analogy representation of the knowledge*. However, these were not a one-time process. The research questions guided the process of identifying the *codes*, but the naming was iterative. Consequently, the first coding process resulted in 23 *quotations* coded to the first *code*, 20 to the second, and 24 to the third (as in Table 1).

The *quotations* coded to the three *codes* were analysed again, leading to the fabrication of *subcodes*. Each *code* gave birth to three *subcodes,* including the Residual subcategory *subcode,* as illustrated in Figure 2. The first *code* contained *Positive experience using the app* and *Negative experience using the app subcodes*. The second code comprised *App is helpful to learn* and *App is not helpful to learn subcodes*. The third *code* encompassed *Analogy represents the knowledge,* and *Analogy does not represent the knowledge subcodes*. The underlying themes guided the process of ascertaining the *subcodes*, but the designation was also recursive.

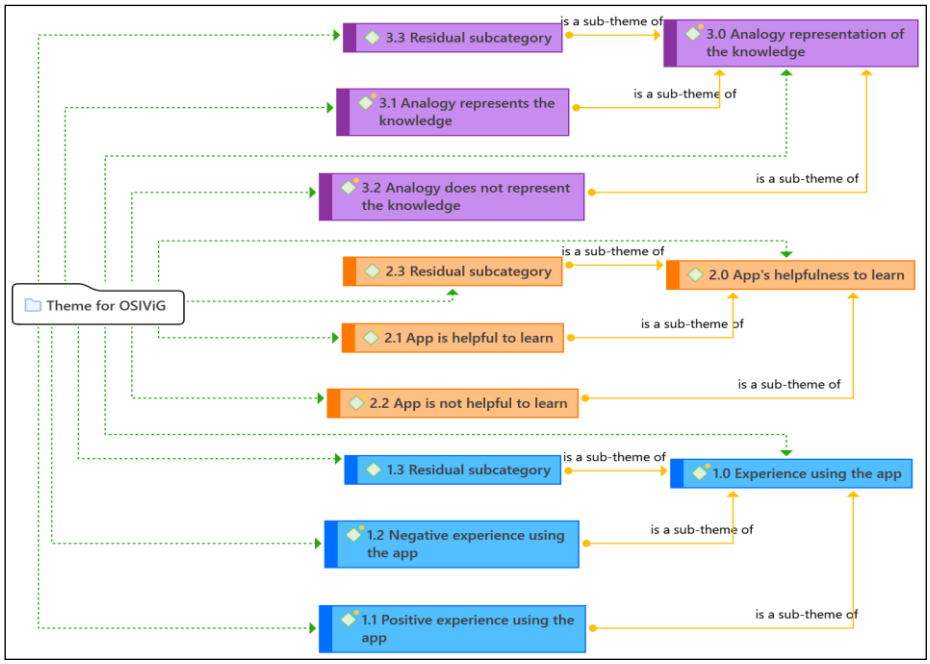


*Figure 2*. The New Category System

The second coding process was initiated using the new category system, resulting in the *quotations* being divided into the newly created *subcodes* based on the appropriate themes. The *Positive experience using the app subcodes* contained 20 *quotations,* while the *Negative experience using the app subcode* only eight *quotations*. The *App is helpful to learn subcode* comprised 19 *subcodes* as opposed to one *quotation* in the *App is not helpful to learn subcode.* Finally, the *Analogy represents the knowledge subcode* encompassed 18 *quotations,* and the *Analogy does not represent the knowledge subcode* six *quotations.* The Residual Subcategory *subcode* did not hold any *quotations*. The findings of the second coding process are shown in Table 2.

## Discussion

The discussion of the findings is presented and arranged according to the research questions. Such a way provided clarity in answering the inquiries of this study.

The first research question explores the students' experiences using the OSIViG app. Judging from the findings, it is apparent that there was a division between positive and negative experiences. It is worth noting that some students delivered positive and negative responses regarding their experiences using the OSIViG app. Therefore, the experiences were not cleanly divided due to the indecisiveness of the conscious mind (Duman et al., 2022). From the positive aspect, the students found the OSIViG app was easy to use due to its simplicity in the interface and navigation. The contents, such as the animation and graphics, were also interesting and easy to understand.

Nevertheless, there were also negative responses from the students. Some of them did find the experience of using the OSIViG app confusing and awkward. Others also thought it was too simple and the contents did not meet the expectation of the app. One isolated response also noted that a part of the interface was distracting and prohibiting from learning the contents. Even though the students' experiences were scattered into positive and negative, the 20 *quotations* representing the positive experience outweigh the eight negative ones. Agreeing to Sointu et al. (2022), the readiness of students to use ICT is substantial and highly associated with positive experiences. Bakir and Alsaadani (2022) support it, stating that educational technologies may have encouraged students to take responsibility for their knowledge production, leading to a positive learning experience. Marks and Thomas (2022) affirm that even students that experience negatively might become positive upon

improving the educational technology used. Thus, in answering the first research question, it can be construed that overall, the students' experiences using the OSIViG app are positive.

The second research question aims to discover the students' opinions about the OSIViG app's assistance learning the OSI model. The findings evidence that the majority of the students agreed that the OSIViG app was indeed helpful in assisting their learning of the OSI model. The responses were linked to their experience in using the app. The 19 *quotations* signified the OSIViG app as helpful because the use of multimedia elements such as audio, graphic, and especially animation facilitated diversifying their learning. In addition, the OSI model information contained in the mobile app was simple yet detailed enough to foster learning. The singular *quotation* that claimed the OSIViG app was not helpful could also be linked to the third research question. The student did not find the app was assistive in learning because he could not connect the postal system analogy animation to the actual working flow of the OSI model. Kareem et al. (2022) assert that using technology improves students learning and is an excellent way to keep a student engaged in a classroom session. Jeong (2022) emphasises that using mobile applications in the classroom could increase learner motivation and make learning more sustainable and enjoyable than traditional teaching approaches. Therefore, in answering the second research question, most students found that the OSIViG app assists in learning the OSI model.

Table 1

*The First Coding Findings*

| | **RF 1 Gr =7** | **RF 2 Gr =6** | **RF 3 Gr =5** | **RF 4 Gr =5** | **RF 5 Gr =6** | **RF 6 Gr =7** | **RF 7 Gr =7** | **RF 8 Gr =5** | **RF 9 Gr =7** | **RF 10 Gr =6** | **RF 11 Gr =8** | **RF 12 Gr =8** | **RF 13 Gr =6** | **RF 14 Gr =5** | **RF 15 Gr =8** | **RF 16 Gr =7** | **RF 17 Gr =8** | **RF 18 Gr =7** | **RF 19 Gr= 10** | **RF 20 Gr =6** | **Totals** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **● 1.0 Experience using the app Gr=23** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 23 |
| **● 2.0 App's helpfulness to learn Gr=20** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 20 |
| **● 3.0 Analogy representation of the knowledge Gr=23** | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 24 |
| **Totals** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 5 | 4 | 67 |

Table 2
*The Second Coding Findings*

| | **RF 1 Gr =7** | **RF 2 Gr =6** | **RF 3 Gr =5** | **RF 4 Gr =5** | **RF 5 Gr =6** | **RF 6 Gr =7** | **RF 7 Gr =7** | **RF 8 Gr =5** | **RF 9 Gr =7** | **RF 10 Gr =6** | **RF 11 Gr =8** | **RF 12 Gr =8** | **RF 13 Gr =6** | **RF 14 Gr =5** | **RF 15 Gr =8** | **RF 16 Gr =7** | **RF 17 Gr =8** | **RF 18 Gr =7** | **RF19 Gr= 10** | **RF 20 Gr =6** | **Totals** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **● 1.1 Positive experience using the app Gr=20** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 20 |
| **● 1.2 Negative experience using the app Gr=8** | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 8 |
| **● 1.3 Residual subcategory Gr=0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **● 2.1 App is helpful to learn Gr=19** | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 19 |
| **● 2.2 App is not helpful to learn Gr=1** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **● 3.1 Analogy represents the knowledge Gr=18** | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 18 |
| **● 3.2 Analogy does not represent the knowledge Gr=5** | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 6 |
| **● 3.3 Residual subcategory Gr=0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Totals** | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 3 | 5 | 4 | 72 |

The third research question seeks to ascertain the students' thoughts on the postal system analogy representation of the OSI model as a visual guide. It is clear from the findings that most of them perceived that the postal system analogy did represent the OSI model. The 28 *quotations* denoted that the postal system was at large fittingly employed. Currently, in the endemic phase of the Covid19, many are involved in online shopping, which requires postal system usage. Thus, using the real-life parallel made the flow of the postage system relatable to the OSI model. The analogy was also said to represent the essential flow of the OSI model and rendered the topic epitomised easy to understand and memorable. Some said the analogy expanded in imparting comprehension upon repeated usage of the OSIViG app.

In contrast, the six *quotations* argued the downside of the analogy. It was said too general and did not represent the flow of the OSI model; thus, some additional explanation from the lecturer might be helpful. Hence it became a causal factor of confusion in understanding the OSI model. Some suggested using a better analogy or the actual flow animation of the OSI model. Nonetheless, this adverse perception of the analogy was marginal compared to the constructive one. Kähkönen and Hölttä-Otto (2022) advocate that analogy is beneficial in various curriculum modifications and it helps broaden existing thought. This notion is also supported by Mengistu et al. (2022) that using simulated analogies improved students' conceptual understanding. Conclusively, Sriboonruang et al. (2022) uphold that analogy can be a powerful and engaging tool for enhancing classroom learning and teaching. Hence, most students perceived the postal system analogy as representing the OSI model in answering the third research question.

In summary, the present study exhibits the integration of analogy and technology that assisted the students learned the intricate OSI model. It is often challenging to teach students about computer networks (Hamzah et al., 2021). Therefore, the findings demonstrate that analogy and technology help students learn the complex topics of computer networks. Furthermore, it paves the way for other studies to utilise the same tools employed in this study to aid students in learning other complex network topics.

**Limitations and Challenges**

This study is not liberated from limitations. Primarily, the limitation is in the form of the OSIViG app itself. Due to time and financial constraints, the mobile app was designed and developed simple and rapidly. Consequently, some flaws are mendable given time and financial flexibility. First, the functionality and learning resources can be upgraded and added. The animation representing the postal system analogy still has room for improvement to be made smoother. In addition, the usability, user interface, and contents can also be enhanced, the analogy particularly. Secondly, although the student reflections mostly pointed to the mobile app as beneficial, this study wonders about the response genuineness. Since the researcher was also the lecturer of the course, the present study worries the responses resonated with two related matters: the act of pleasing the lecturer and fear for their carry marks, hence the pleasing. A precautious measure was taken before the reflections began, in any case. The students were adamantly reminded to be candid in reflecting, and any forms of responses would never affect the course's carry marks.

Besides the limitations, the current study also encountered some challenges in its implementation. Mainly it was in the form of the students' hesitation to participate in the study. Somehow, they preferred traditional classroom learning over a mobile app like OSIViG. Only with encouragement from the lecturer that they were willing to try and experience the mobile app's potential. The second challenge is linked to the limitation. The time and financial constraints did hinder the mobile app from being at its fullest potential. Lastly, finding the most appropriate analogy to represent the OSI model was not effortless.

This study cycled through several early concepts before landing on the postal system.

## Conclusion and Recommendation

The present study commencement is rooted in the intricacy of the students in the Multimedia System Networking (STIV3023) course to understand the OSI model. Consequently, three research questions are formed. The findings disclosed that the students' experiences using the OSIViG app are generally positive; it answers the first research question and achieves the first objective. In addition, most students found the OSIViG app is indeed assistive in learning the OSI model, hence answering and achieving the second research question and objective. Definitively, as the visual guide capitalising on analogy, the OSIViG app is deemed chiefly by the students to represent the OSI model, which answers the third research question and achieves the last objective.

This study exposes that analogy and technology do aid the students in understanding the complicated concepts of computer networks. Additionally, it contributes by opening the door for additional studies to apply the same tools used in this study to assist students in learning other complicated network topics.

As future works recommendations, the OSIViG app can be improved for a better learning experience. The usability and user interface must be enhanced and polished toward improved functionality. In addition, the contents, such as the animation that gives life to the analogy for visual guidance, still have room for enhancement. The present OSIViG app uses a short and limited animation. Perhaps if augmented in the future with a more complex and smoother animation, the analogy as the visual guide will deliver a better experience to the students. To conclude, since the OSI model has always been compared to the Transmission Control Protocol/Internet Protocol (TCP/IP) model, the latter is a good candidate for future enhancement to the analogy.

## References

Ab Rahman, R., Hassan, A., Hashimm, H., & Zan, M. M. M. (2015). On the use of animated media in communicating the abstract concepts of computer networking: A preliminary survey. 2015 IEEE 7th International Conference on Engineering Education (ICEED),

Batubara, H. H. (2016). Penggunaan google form sebagai alat penilaian kinerja dosen di Prodi PGMI Uniska Muhammad Arsyad Al Banjari. *Al-Bidayah: jurnal pendidikan dasar Islam, 8*(1).

Blume, J. (2021). *What is analogy? Definition and examples of analogy in literature*. https://www.masterclass.com/articles/what-is-analogy#quiz-0

Çakır, R., & Tan, S. S. (2017). Development of educational applications on the social network of Facebook and its effects on students' academic achievement. *Educational Sciences: Theory & Practice, 17*(5), 1525–1546. https://doi.org/10.12738/estp.2017.5.0273

Clarke, S. O., Coates, W. C., & Jordan, J. (2021). A practical guide for conducting qualitative research in medical education: Part 3—Using software for qualitative analysis. *AEM education and training, 5*(4), e10644.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage publications.

Daya, B. (2013). *Network security: History, importance, and future*. ZDNET. Retrieved 12 March, 2021 from https://www.techrepublic.com/resource-library/whitepapers/network-security-history-importance-and-future/

Di Biase-Dyson, C., & Egg, M. (2020). Drawing attention to metaphor: An introduction to the debate. In C. D. Biase-Dyson & M. Egg (Eds.), *Drawing attention to metaphor: Case studies across time periods, cultures and modalities* (Vol. 5).

Duman, I., Ehmann, I. S., Gonsalves, A. R., Gultekin, Z., Van den Berckt, J., & van Leeuwen, C. (2022). The no-report paradigm: A revolution in consciousness research? *Frontiers in Human Neuroscience*, 267.

El Refaie, E. (2017). *The Routledge handbook of metaphor and language* (E. Semino & Z. Demjén, Eds. 1st ed.). Routledge.

Emmel, N. (2013). *Sampling and choosing cases in qualitative research: A realist approach*. Sage.

Gick, M. L., & Holyoak, K. J. (1980). Analogical problem solving. *Cognitive psychology, 12*(3), 306-355.

Gick, M. L., & Holyoak, K. J. (1983). Schema induction and analogical transfer. *Cognitive psychology, 15*(1), 1-38.

Gray, M. E., & Holyoak, K. J. (2021). Teaching by analogy: From theory to practice. *Mind, Brain, and Education, 15*(3), 250-263.

Hamzah, M. L., Rizal, F., & Simatupang, W. (2021). Development of augmented reality application for learning computer network device. *International Journal of Interactive Mobile Technologies, 15*(12), 47-64.

Hassan, A., & Ali, A. Z. M. (2017). Pembangunan dan ujian kebolehgunaan animasi bersegmen Kawalan Pengguna Linear (KPL) untuk program pengajian Diploma Sistem Rangkaian di Politeknik Malaysia. *JuKu: Jurnal Kurikulum & Pengajaran Asia Pasifik, 3*(2), 1-13.

Imam, C., Siregar, M. F., & Nasution, A. (2021). Implementation of OSI layer based on interactive education media. *Jurnal Mantik, 4*(4), 2545-2551.

Jeong, K.-O. (2022). Facilitating sustainable self-directed learning experience with the use of mobile-assisted language learning. *Sustainability, 14*(5), 1-13. https://doi.org/https://doi.org/10.3390/su14052894

Kähkönen, E., & Hölttä-Otto, K. (2022). From crossing chromosomes to crossing curricula–a biomimetic analogy for cross-disciplinary engineering curriculum planning. *European Journal of Engineering Education, 47*(3), 516-534.

Kareem, J., Thomas, R. S., & Nandini, V. (2022). A conceptual model of teaching efficacy and beliefs, teaching outcome expectancy, student technology use, student engagement, and 21st-century learning attitudes: A STEM education study. *Interdisciplinary Journal of Environmental and Science Education, 18*(4), 1-11.

Kovecses, Z. (2010). *Metaphor: A practical introduction* (2nd ed.). Oxford University Press.

Kuckartz, U. (2014). *Qualitative text analysis: A guide to methods, practice and using software*. Sage.

Marks, B., & Thomas, J. (2022). Adoption of virtual reality technology in higher education: An evaluation of five teaching semesters in a purpose-designed

laboratory. *Education and information technologies, 27*(1), 1287-1305.

Medicine, J. (2019). *Networking for beginners: The complete guide to computer network basics, wireless technology and network security*. Independently published.

Mengistu, A., Assefa, S., & Gebeyehu, D. (2022). Improving high school students' conceptual understanding of electricity and magnetism using scaffold analogy instructions. *Momentum: Physics Education Journal, 6*(1), 29-38.

Ravitch, S. M., & Carl, N. M. (2021). *Qualitative research: Bridging the conceptual, theoretical, and methodological* (2nd ed.). Sage Publications.

Schreier, M. (2012). *Qualitative content analysis in practice* (1st ed.). Sage Publications.

Schreier, M. (2013). Qualitative content analysis. In F. Uwe (Ed.), *The SAGE handbook of qualitative data analysis* (pp. 171-183). SAGE Publications Ltd.

Sointu, E., Hyypiä, M., Lambert, M. C., Hirsto, L., Saarelainen, M., & Valtonen, T. (2022). Preliminary evidence of key factors in successful flipping: predicting positive student experiences in flipped classrooms. *Higher Education*, 1-18. https://doi.org/https://doi.org/10.1007/s10734-022-00848-2

Sriboonruang, O., Suwannoi, P., & Treagust, D. F. (2022). Teaching chemistry effectively with analogy in Thai year 10 and 12 classrooms. *International Journal of Science Educators and Teachers, 1*(1), 22-31.

Uiphanit, T., Bhattarakosol, P., Suanpong, K., & Iamsupasit, S. (2019). Packet warriors: An academic mobile action game for promoting OSI model concepts to learners. *International Journal of Interactive Mobile Technologies 13*(6), 41-50. https://doi.org/doi.org/10.3991/ijim.v13i06.10469

Wormeli, R. (2009). *Metaphors & analogies: Power tools for teaching any subject*. Stenhouse Publishers.

Zhang, Y., Liang, R., & Ma, H. (2012). Teaching innovation in computer network course for undergraduate students with packet tracer. *IERI Procedia, 2*, 504-510. https://doi.org/10.1016/j.ieri.2012.06.124

# Blended Learning Environment with Labster as a Web-based Virtual Laboratory in Chemistry Class

Nur Adeelah Che Ahmad Tantowi*[a], Rozana Samah[b]
[ab]Department of Economics and Agribusiness, Universiti Utara Malaysia,
Sintok, Kedah, Malaysia
*Corresponding Author: adeelah.che@uum.edu.my

## Abstract

Virtual laboratory is increasingly popular in the technology-enhanced learning setting. The virtual environment provides students with simulations and infographics related to real laboratory experiments. The purpose of this study is to explore the impact of virtual laboratory has on students' cognitive, affective, and psychomotor learning in Chemistry class. Students participated in several virtual laboratories as well as physical laboratories for blended learning experience. Data were collected using a questionnaire and we used Bloom's Taxonomy to illustrate the learning that occurred. In this study, students expressed positive feedbacks on virtual laboratory related to cognitive, affective and psychomotor learning. These outcomes highlighted that virtual laboratory, when implemented properly, can provide better learning experience for students.

*Keywords:* Virtual Laboratory, Chemistry, Cognitive, Affective, Psychomotor

## Introduction

Incorporation of technology in education is vital to keep up with the global challenges. It is a must for educators to be innovative using the technology to enhance learning for the 21st century students. Technology-enhanced learning has the opportunity to increase student's motivations, engagement, and academic achievement (Dunn & Kennedy, 2019). Students have to be provided and facilitated in a different pedagogical approach to correspond with the explosion of Education 4.0.

Laboratory experiences are required for students in higher education in order to acquire technical competencies, applying practical knowledge to new concepts about the processes involved. In Chemistry education, laboratory-based learning has been regarded as an integral component for over a century. According to Bretz (2019), the laboratory setting is a place where students can begin to make meaningful connections to the materials they learn in class. Further, the laboratory helps students to engage in scientific enquiry and decision-making, while also learning the skills required to interact effectively in the class. However, due to pandemic COVID-19, laboratories faced many constraints where educational institutions worldwide being physically closed, resulting in increasing urgency to enhance online education.

Therefore, there is needed to incorporate technology into the traditional or physical laboratory settings. Several past studies demonstrated the usage of video-assisted teaching (Stull, Gainer, & Hegarty, 2018) and computerized 3D simulations (Rayan & Rayan, 2017). Further, digital instructional materials for use in the Chemistry laboratory started as soon as computers were introduced into classrooms (Cavin, Cavin, & Lagowski, 1978; Herman & Dilts, 1978).

Commercially-available virtual laboratories offer highly interactive spaces where students can engage with digital objects and tools, as well as make observations and

perform experiments. According to Brinson (2015), learning outcomes are equal or better using virtual or remote, versus traditional laboratories across all learning outcome categories. The use of interactive simulations has been shown to develop learners' attitudes, train them for hands-on labs, and enhance conceptual skills (Bortnik et. al, 2017; Budai & Kuczmann, 2018). In addition, the virtual laboratories contribute to the cost savings and to the solving of time or space restrictions associated with physical laboratories.

In Chemistry education, the psychomotor domain is the essence of the laboratory. Therefore, students must consciously incorporate both the cognitive and affective domains into the laboratory works for effective learning to occur. Cognitive, affective and psychomotor domains are described in Bloom's Taxonomy in hierarchical order that correspond with different levels of learning (Hoque, 2016). Briefly, cognitive domain consists of Remember, followed by Understand, Apply, Analyze, Evaluate and Create. Affective domain starts with Receiving, followed by Responding, Valuing, Organizing, and Characterizing. Meanwhile, Psychomotor domain comprised of Perception, followed by Set, Guided Response, Mechanism, Complex Overt Response, Adaptation and Origination.

In this study, blended learning, which is the combination of traditional face-to-face teaching and virtual learning was introduced. Our objective is to explore the impact of virtual laboratory in blended learning setting to improve students' learning in Chemistry class. In this study, Labster was used as virtual laboratory and its impact on students' cognitive, affective, and psychomotor learning was determined.

## Literature Review

Most of science courses such as Chemistry usually required students to attend laboratory sessions in order to enhance their understanding and practical skills. This is due to the course syllabus that consists of reaction mechanisms, synthesis strategies and applications. In addition, traditional laboratories allow students to use the instruments and experimental work, and learn on how to manage the uncertainties while doing the experiments. Thus, this physical laboratory is interesting and motivating for the students.

In line with that, the virtual laboratory has become one of the most widely used learning tools for science courses. Virtual laboratory and traditional laboratory are combined to enhancing student understanding and knowledge. Virtual laboratory allows the students to explore an unobservable phenomenon and it also simplify the information obtained in experiments through simulated models, allowing students to acquire concepts more easily (Chiu et al., 2015; De Jong et al., 2013; Pyatt & Sims, 2012; Trundle & Bell, 2010; West & Veenstra, 2012). Virtual simulations, according to Dengel and Maegdefrau (2019), lead to a sense of immersion, which helps users to feel immersed in the experience and thus increases students' attention and engagement. Blended learning (combination of traditional and virtual approach) is significant and have positive impact on science process skills and student's academic achievement (Poon, 2013).

One of the educational virtual laboratories is Labster, which integrates a virtual/augmented reality and gamification. In order to facilitate and improve the learning experience, Labster has introduced a simulation space, storytelling, theory notes and quizzes. According to Bonde et al. (2014) and Dyrberg et al. (2017), Labster was found significantly to increase the learning outcomes, motivation levels and improve the laboratory preparation for science students. Thus, Labster can be used as educational virtual laboratories for Chemistry classroom, especially to complement classroom lectures and traditional laboratories, by improving students' cognitive, affective, and psychomotor

learning.

## Methodology

### Research design

This study employed action research to identify the impact of virtual laboratory following interventions of three subsequent virtual laboratory strategy to improve students' cognitive, affective and psychomotor learning in a Chemistry class. According to Lozano and colleagues (2017), educators must address the delivery stage by incorporating various pedagogical strategy to development competence for sustainability development in higher education, including gamification in learning. The new setting will help students to improve their learning and increase understanding in the class. Action research design in higher education investigates two main areas including academic teaching practice and students' engagement (Gibbs et al., 2017). Therefore, to measure the outcome of the intervention's implementation, overall reflection has been done by the instructor and also by the students through a survey form.

### Study populations

Universiti Utara Malaysia (UUM) offers a single introductory chemistry course (BECA1023) for its students majoring in Agribusiness Management at the Universiti Utara Malaysia. The course learning outcome are; 1) explain the basics of chemistry such as mass, density, chemical equilibrium, acids and bases as well as basic organic chemical functional groups, 2) relate the theory of atomic structure and types of chemical bonds with matter properties of the elements in the periodic table and 3) organise experiment related to chemical science effectively. The course runs for a full semester for 14 weeks. For the purposes of this study, during the second semester of 2021/2022, students (n=25) participated in 3 topics of physical laboratory and 3 topics of integrated laboratory (physical and virtual). The laboratory schedule for both physical and integrated laboratories was provided in Table 1.

Table 1.
*Topics for physical and integrated laboratories.*

| Lab no. | Week | Topics | Mode of lab |
|---|---|---|---|
| 1 | 3-4 | Measurements | Physical laboratory |
| 2 | 5-6 | Density | Physical laboratory |
| 3 | 7-8 | Solutions | Physical laboratory |
| 4 | 9-10 | Acids and bases | Integrated laboratory |
| 5 | 11-12 | Redox reactions | Integrated laboratory |
| 6 | 13-14 | Thermochemistry | Integrated laboratory |

### Laboratory descriptions

The students followed lectures in the topic of measurement, atomic structure, electron structure and periodic table, chemical bonding, reactions, redox reaction, acid and base, kinetic theory of gases and thermochemistry and organic chemistry and biochemistry. Students were required to complete a series of laboratories related to certain topics as mentioned previously, in a group of four or five in a traditional laboratory setting. The integrated virtual laboratory approach was done as a post-lab activity the week after the physical laboratory in a computer lab.

**Labster**

Labster (labster.com) was chosen as the virtual laboratory platform because of its relevance to the introductory Chemistry topics. The laboratory simulations were designed to address practical skills that are typically acquired in physical laboratory (Figure 1). Figure 1a showed a situation in a virtual simulation of Acids and Bases topic, where a student was measuring the pH of a chemical. The simulation allowed the student to carry out experimental measurements, collect and analyze data (Figure 1b). The student had to answer multiple choice questions throughout the simulation (Figure 1c). Related theory tabs (Figure 1d) were available to provide further support.

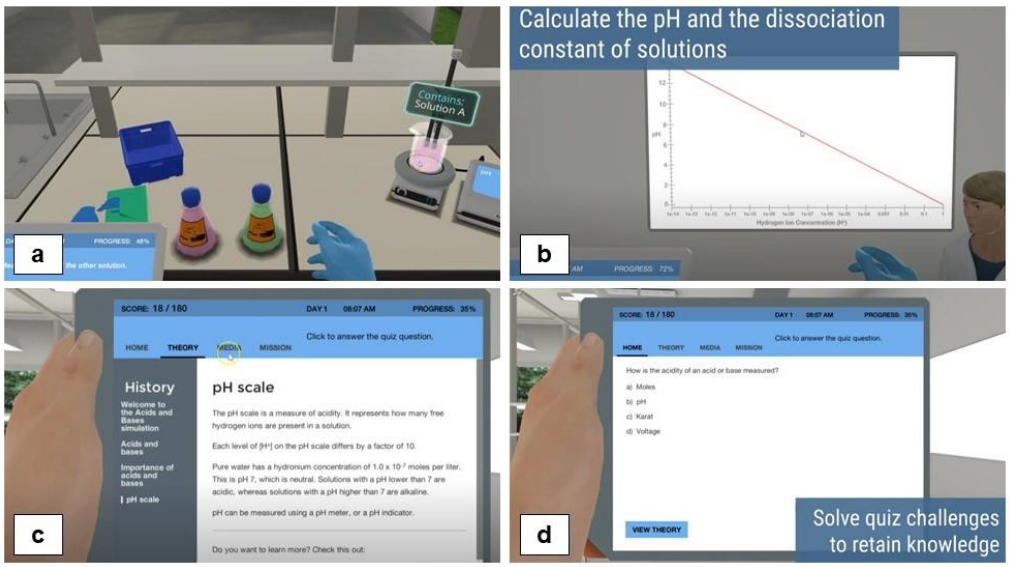


*Figure 1.* Screenshots of typical virtual laboratory simulation. a) Experimental simulation, b) data analysis, c) multiple-choice questions and d) a theory tab (Adapted from Labster Youtube Channel, 2018).

**Data collection**

At the end of the semester, students were asked to complete a questionnaire consisted of multiple-choice statements related to cognitive, affective and psychomotor learning on using virtual laboratory (Table 2). An open-ended question, 'Does virtual laboratory enhance your learning? Why?' was included in the questionnaire. These multiple-choice statements were chosen because students may select any learning domains that were related to them and the open-ended question may enable individuals to clarify views that was not listed in the multiple-choice statements.

Table 2.
*Multiple choice statements related to cognitive, affective and psychomotor learning domains on virtual laboratory activity*

| No | Statement |
|---|---|
| 1 | Virtual laboratory helped me to remember what I learned in class. |
| 2 | Virtual laboratory helped me to better understand concept. |
| 3 | Virtual laboratory engaged me to participate in the experiment. |
| 4 | Virtual laboratory was enjoyable. |
| 5 | Virtual laboratory helped me to explain experimental changes. |

**Data analysis**

Only data from consented students were reported. Using qualitative methods of analysis, data were coded by identifying themes on students' learning using virtual laboratory. Bloom's Taxonomy domains of learning including cognitive, affective and psychomotor were used to provide a guideline for the analysis. Instructor's feedback on students' virtual laboratory activity was included as part of the data.

## Results

In this study, a commercial web-based virtual laboratory was used to explore its impact on cognitive, affective and psychomotor learning in Chemistry class. The first three laboratory topics consisted of physical laboratories in a traditional setting, while the latter three topics comprised of physical with virtual laboratories to provide students with experience undergoing blended laboratory setting. In response to questionnaire on virtual laboratory, the students highlighted statements that were relevant to them on cognitive, affective and psychomotor learning. We also drew on direct quotes from the students from the open-ended question as evidence of research findings.

**Cognitive Domain**

The cognitive domain is focused on intellectual skills such as critical thinking and problem solving. Cognitive aspects of using virtual laboratory were evaluated through statements 1 and 2 in Table 2. 40% of the students agreed that virtual laboratory helped them to remember what they learned in class and 76% of the students agreed that virtual laboratory helped them to better understand concept. Comments reflected on cognitive domain included:

*"Virtual laboratory provides test questions after the experiment."* (2 respondents)
*"Virtual laboratory helped me to learn."* (10 respondents)
*"I could refer to notes and theories on the theory tab."* (5 respondents)

**Affective Domain**

The affective domain focuses on the attitudes, values and interests of learners. In general, the students seemed to provide positive attitude towards the virtual laboratory through statement 3 and 4. The questionnaire statements showed a reasonably high response by the students with 76% of the students agreed that virtual laboratory was enjoyable and 72% agreed that virtual laboratory engaged them to participate in the virtual experiment. Students' comments on values of virtual laboratory included the following:

*"Virtual laboratory is a platform for me to imagine as I lack of imagination."* (1 respondent)
*"Interactive and fun."* (1 respondent)
*"I can do virtual laboratory flexibly as I can open it anywhere."* (1 respondent)

**Psychomotor Domain**

The psychomotor domain encompasses the ability of learners to physically perform movement and skills. Given that computer web-based virtual laboratory requires movement with the use of a mouse and keyboard control, students also gain in practical skills. Based on statement 5 of the questionnaire, 68% of the students claimed that virtual laboratory helped them to explain experimental changes. Some comments on practical skills gained on learning using virtual laboratory are:

*"It is easier and safer to do experiment that I cannot do in real laboratory with virtual laboratory."* (1 respondent)
*"I can understand experimental changes with virtual laboratory."* (1 respondent)

**Instructor's Feedback**

The instructor involved in the virtual laboratory activity acted as observer. The students completed the virtual laboratory activity between 30 minutes and 1 hour. The instructor noted that the students appeared to be engaged and focused in the experiment using the virtual laboratory. The students control the movement of the avatar to do the virtual experiment using a mouse or a keypad. The learning content and the structure of multiple-choice questions inside the simulation allow for immediate feedback for students to learn. A couple of students seemed doubt with the virtual experiment but still completed the activity. There were negative comments from students from the questionnaire that said: "*I could not connect with the virtual activity*" (1 respondent) and "*Virtual laboratory is not interesting*" (2 respondents).

## Discussion

The students' responses in the questionnaire and instructor's feedback on Labster virtual laboratory experience allowed for analysis based on perspective of Bloom's Taxonomy domains of learning that include cognitive, affective and psychomotor. This study has shown that virtual laboratory has positive impacts towards students' learning via improving cognitive, affective and psychomotor domains. Labster as a web-based virtual laboratory simulation provided a platform for students to participate and engage in virtual experiments.

Here, Chemistry students reported to have positive impact with Labster virtual laboratory on their cognitive learning including Remember, Understand and Apply during virtual experiment and answering inside application test questions. Their learning was also promoted with interactive Labster interface that increased students' motivation and engagement, thus developing affective domain including Receiving, Responding and Valuing. Further, students also reported on improvement of experimental understanding, even only with virtual simulation controlled using a computer mouse or a keypad, which was related to Perception, Set and Guided Response of psychomotor domain in Bloom's Taxonomy. It is noteworthy that the combination of all cognitive, affective and psychomotor domains at least on a lower hierarchy enhanced students' learning (Galloway & Bretz, 2015). The higher-level learning domains were, however, limited with virtual laboratory.

As previous studies indicated, virtual laboratory can support learning in a blended setting with physical laboratory in Chemistry class (Enneking et al., 2019; Winkelmann et al., 2020). Other science classes such as Physics and Engineering also have showed beneficial impacts of blended virtual with physical laboratories (Caño de las Heras et al., 2021; Hurtado-Bermúdez & Romero-Abrio, 2020). Blended learning approach have significant and positive impact on students' learning outcome and science process skills when compared with traditional approach (Chui-Man Lo et al., 2021).

**Limitations**

There are limitations to this study that future work may address. One limitation is that virtual laboratory was only conducted for certain topics in introductory Chemistry course, in this case, Redox Reaction, Acids and Bases, and Thermochemistry. Other topics may vary with the results in other Chemistry class. Further, students participated in this study

majoring in a social science study, Agribusiness Management program, may be differ from pure science students. Labster, a web-based virtual laboratory used in this study, is one commercial product that is available among others. Therefore, additional research on different web-based virtual laboratory may be needed.

**Recommendations**

The recognition of the positive impact of virtual laboratory on cognitive, affective and psychomotor learning can provide educators to draw out some practical considerations for the enhancement of teaching and learning. Virtual laboratory can support traditional laboratory in a blended setting to incorporate technology-enhanced learning. Further, virtual laboratory can be used in other ways such as a tool for revision or for certain experiment that is impractical for institution's laboratory. The use of virtual laboratory to replace traditional laboratory, however, need further assessment. Based on our findings, there were students who could not connect or lack of interest with virtual laboratory. Some students may enjoy truly hands-on activities. Further research in this area could thus explore the support students need to benefit from virtual laboratory.

## Conclusion

This study investigated the impact of virtual laboratory on cognitive, affective and psychomotor learning in Chemistry class. Virtual laboratory simulation blended with traditional laboratory setting has provided an invaluable learning experience for students. Students learn using simulations, in application notes and test questions in virtual environment. With the incorporation of interactive and engaging interface, students have a more positive state of emotion during learning. The feature of immersion or sense of present during experiment contribute to acquisition of practical skills even only with a mouse or a keypad control. Overall, virtual laboratory demonstrated to be an excellent technology-enhanced learning tool because it offers all cognitive, affective and psychomotor domains of learning.

## References

Bonde, M. T., Makransky, G., Wandall, J., Larsen, M. V., Morsing, M., Jarmer, H., & Sommer, M. O. (2014). Improving biotech education through gamified laboratory simulations. *Nature biotechnology*, *32*(7), 694-697.

Bortnik, B., Stozhko, N., Pervukhina, I., Tchernysheva, A., & Belysheva, G. (2017). Effect of virtual analytical chemistry laboratory on enhancing student research skills and practices. *Research in Learning Technology*, *25*.

Bretz, S. L. (2019). Evidence for the importance of laboratory courses. *Journal of Chemical Education*, *96*(2), 193-195.

Brinson, J. R. (2015). Learning outcome achievement in non-traditional (virtual and remote) versus traditional (hands-on) laboratories: A review of the empirical research. *Computers & Education*, *87*, 218-237.

Budai, T., & Kuczmann, M. (2018). Towards a modern, integrated virtual laboratory system. *Acta Polytechnica Hungarica*, *15*(3), 191-204.

Caño de las Heras, S., Kensington-Miller, B., Young, B., Gonzalez, V., Krühne, U., Mansouri, S. S., & Baroutian, S. (2021). Benefits and challenges of a virtual

laboratory in chemical and biochemical engineering: Students' experiences in fermentation. *Journal of Chemical Education*, *98*(3), 866-875.

Cavin, C. S., Cavin, E. D., & Lagowski, J. J. (1978). Study of the efficacy of computer-simulated laboratory experiments. *Journal of Chemical Education*, *55*(9), 602.

Chiu, J. L., Dejaegher, C. J., & Chao, J. (2015). The effects of augmented virtual science laboratories on middle school students' understanding of gas properties. *Computers & Education*, 85, 59–73. https://doi.org/10.1016/j.compedu.2015.02.007

De Jong, T., Linn, M. C., & Zacharia, Z. C. (2013). Physical and virtual laboratories in science and engineering education. *Science*, 340(6130), 305–308. https://doi.org/10.1126/science.1230579

Dengel, A., & Mägdefrau, J. (2019, June). Presence is the key to understanding immersive learning. In *International Conference on Immersive Learning* (pp. 185-198). Springer, Cham.

Dunn, T. J., & Kennedy, M. (2019). Technology enhanced learning in higher education; motivations, engagement and academic achievement. *Computers & Education*, 137, 104-113.

Dyrberg, N. R., Treusch, A. H., & Wiegand, C. (2017). Virtual laboratories in science education: students' motivation and experiences in two tertiary biology courses. *Journal of Biological Education*, *51*(4), 358-374.

Enneking, K. M., Breitenstein, G. R., Coleman, A. F., Reeves, J. H., Wang, Y., & Grove, N. P. (2019). The evaluation of a hybrid, general chemistry laboratory curriculum: Impact on students' cognitive, affective, and psychomotor learning. *Journal of Chemical Education*, *96*(6), 1058-1067.

Galloway, K. R., & Bretz, S. L. (2015). Development of an assessment tool to measure students' meaningful learning in the undergraduate chemistry laboratory. *Journal of Chemical Education*, *92*(7), 1149-1158.

Gibbs, P., Cartney, P., Wilkinson, K., Parkinson, J., Cunningham, S., James-Reynolds, C., ... & Pitt, A. (2017). Literature review on the use of action research in higher education. *Educational Action Research*, *25*(1), 3-22.

Herman, H. B., & Dilts, J. A. (1978). Computer enhancements of general chemistry and quantitative analysis laboratories. *Journal of Chemical Education*, *55*(10), 654.

Hoque, M. E. (2016). Three domains of learning: Cognitive, affective and psychomotor. *The Journal of EFL Education and Research*, *2*(2), 45-52.

Hurtado-Bermúdez, S., & Romero-Abrio, A. (2020). The effects of combining virtual laboratory and advanced technology research laboratory on university students' conceptual understanding of electron microscopy. *Interactive Learning Environments*, 1-16.

Lo, C. M., Han, J., Wong, E. S., & Tang, C. C. (2021). Flexible learning with multicomponent blended learning mode for undergraduate chemistry courses in the pandemic of COVID-19. *Interactive Technology and Smart Education*.

Lozano, R., Merrill, M. Y., Sammalisto, K., Ceulemans, K., & Lozano, F. J. (2017). Connecting competences and pedagogical approaches for sustainable development in higher education: A literature review and framework proposal. *Sustainability*, *9*(10), 1889.

Poon, J. (2013), "Blended learning: an institutional approach for enhancing students' learning experiences", *MERLOT Journal of Online Learning and Teaching*, Vol. 9 No. 2, pp. 271-289

Pyatt, K., & Sims, R. (2012). Virtual and physical experimentation in inquiry-based science labs: Attitudes, performance and access. *Journal of Science Education and Technology*, 21(1), 133–147. https://doi.org/10.1007/s10956-011-9291-6

Rayan, B., & Rayan, A. (2017). Avogadro program for chemistry education: To what extent can molecular visualization and three-dimensional simulations enhance meaningful chemistry learning. *World Journal of Chemical Education*, *5*(4), 136-141.

Stull, A. T., Gainer, M. J., & Hegarty, M. (2018). Learning by enacting: The role of embodiment in chemistry education. *Learning and Instruction*, *55*, 80-92.

Trundle, K. C., & Bell, R. L. (2010). The use of a computer simulation to promote conceptual change: A quasi-experimental study. *Computers & Education*, 54(4), 1078–1088. https://doi.org/10.1016/j.compedu.2009.10.012

Winkelmann, K., Keeney-Kennicutt, W., Fowler, D., Lazo Macik, M., Perez Guarda, P., & Joan Ahlborn, C. (2020). Learning gains and attitudes of students performing chemistry experiments in an immersive virtual world. *Interactive Learning Environments*, *28*(5), 620-634.

Rayan, B., & Rayan, A. (2017). Avogadro program for chemistry education: To what extent can molecular visualization and three-dimensional simulations enhance meaningful chemistry learning. *World Journal of Chemical Education*, *5*(4), 136-141.

Stull, A. T., Gainer, M. J., & Hegarty, M. (2018). Learning by enacting: The role of embodiment in chemistry education. *Learning and Instruction*, *55*, 80-92.

Trundle, K. C., & Bell, R. L. (2010). The use of a computer simulation to promote conceptual change: A quasi-experimental study. *Computers & Education*, 54(4), 1078–1088. https://doi.org/10.1016/j.compedu.2009.10.012

Winkelmann, K., Keeney-Kennicutt, W., Fowler, D., Lazo Macik, M., Perez Guarda, P., & Joan Ahlborn, C. (2020). Learning gains and attitudes of students performing chemistry experiments in an immersive virtual world. *Interactive Learning Environments*, *28*(5), 620-634.

# Empowering Students using Online Collaborative Digital Tools in Learning Java Programming Language

Noradila Nordin
School of Computing, Universiti Utara Malaysia,
06010 Sintok, Kedah, Malaysia
Corresponding Author: nnoradila@uum.edu.my

## Abstract

The transition from conventional face-to-face learning to online-based is no longer a stranger to higher educational institutions since the Covid-19 outbreak. Students and lecturers have adjusted and adapted to online learning as it is the new normal. However, learning Java programming language is still deemed a challenge to the students as it requires comprehension and independent coding competency. It is not any simpler to study this course online than it is in the conventional face-to-face setting. However, the correct selection and use of suitable real-time online digital tools can assist students in achieving optimal learning. In response to this, the purpose of this study is to look into the online collaborative digital tools, mainly Padlet, CodeCollab, Google Drawings, and Jamboard, that are deemed suitable to empower students in learning Java programming language. This study uses a qualitative approach through reflections to help lecturers in improving and enhancing the effectiveness of teaching and learning Java programming language using the digital tools collaboratively with the use of Webex Breakout Session involving 35 students from Universiti Utara Malaysia, conducted within one semester. The findings bring the implication that the various collaborative digital tools are suitable for tackling the different aspects of programming in addition to making the class interactive and more effective. The ability to run and execute programs in real-time, which closely resembles the way conventional lab sessions were performed in conventional face-to-face instruction, makes learning programming languages convenient.

*Keywords:* online-based learning, e-learning, programming, programming language

## Introduction

Learning programming has always been overwhelming for new programmers since many have trouble understanding the fundamental ideas at the beginning, which makes it more challenging to understand and master the more complex ideas that are tightly based on the fundamentals. The consensus is that it takes a novice programmer about 10 years to become an expert. (Cazzola et al., 2016; Wang et al., 2011). Massive Open Online Courses (MOOCs) are becoming increasingly popular among students because of how affordable and accessible they are, especially when compared to taking courses in person (Shen & Lee, 2020). Since many self-taught programmers acquire their knowledge using the internet resources accessible, the transition from face-to-face instruction to online learning is not a relatively new concept, thus MOOC is a way of online self-learning. This is not, however, a simple process. Higher education institutions (HEIs) commonly teach programming courses in a conventional face-to-face environment. For students who are unfamiliar with the subject, switching to an entirely online-based approach might be challenging for them in terms of comprehension and independent coding competencies.

In a typical classroom setting, students can practice writing, coding, and executing their code with the lecturer present to guide and assist with on-the-spot debugging if required. Since classes are now online based, it is challenging to offer students immediate assistance when they need it. This is because students only share a tiny portion of the entire program that is error-free instead of the whole program where the errors are at, to be debugged. In addition, students frequently create and execute their code at odd hours, and it can be difficult and time-consuming to make adjustments back and forth when there are delays in communication. This slows down learning overall since withholding responses would slow down learning the subject matter and developing coding skills.

The use of the appropriate platforms to adapt the conventional face-to-face style to the digital environment and the skill of the lecturers to use technology in the delivery of the class are key factors in the success of online classes. Some students have already pointed out that it is challenging to learn to program, it is not any simpler to study online than it is in the conventional face-to-face setting. However, by making use of the features of online platforms to accommodate the many approaches to learning styles, it offers individualized, interesting, and adaptable learning that can enhance the learning experience. Technological Pedagogical Content Knowledge (TPACK) combines technological expertise with pedagogical content knowledge (Mishra & Koehler, 2009). The learning process should be changed to incorporate the TPACK framework to accommodate collaborative and individualized learning.

The main objective of this study is to investigate the use of online collaborative digital tools in empowering students in learning Java programming language course at Universiti Utara Malaysia. There are three main research questions that this study aims to solve. The first research question is, what are the suitable real-time online collaborative digital tools available for Java programming language? There are various types of real-time online collaborative digital tools available, however, selecting tools specifically for a programming language is not that straightforward as there are criteria of the tools that they need to be fulfilled such as the ability to write code on, compile and run the program. Thus, three main tools were selected to test their suitability in the Java programming language. The second research question is, based on the selected tools, what are the student's preferred collaborative digital tools in learning? The last research question is how effective are the collaborative digital tools in learning Java programming language? The selected tools are investigated and examined from the student's perspective.

## Literature Review

Synchronous learning has the advantage of enabling instant engagement and simplifying the flood of emails to explain something that could have been resolved in five minutes of virtual face-to-face conversation using video conferencing software. It also allows students with a similar question to be answered at the same time. Real-time conversations, virtual face-to-face, or through another medium that happens in real-time, offer a sense of engagement and connection as if in conventional face-to-face classes. It is also the quickest way to communicate and collaborate. A study from Shaw (2012) found that active participation in practicing programming language learning is superior to just watching the information in an online forum. A prior study by Wang et al. (2011) found that it is essential that students practice and receive constructive and corrective feedback in learning programming.

There are many online platforms to learn to program such as MOOC, and online compilers such as Codepad, ideone, CodeBoard, and OnlineGDB (Gallego-Romero et al., 2020; Zinovieva et al., 2021). However, these tools are limited in terms of their ability to

be collaboratively used among users in real. AWS Cloud9 on the other hand, allows collaboration, with a fee to use certain instances. A study by Zinovieva et al. (2021) compared and listed other online platforms and compilers for programming languages.

This study concentrates on using real-time online collaborative tools in learning the Java programming language course to imitate conventional face-to-face classes where several ways and tools have been adopted. Students were put into Webex breakout sessions to ensure collaborative learning takes place where three other tools are used, Padlet, CodeCollab, and Google Drawings. As an assessment, Quizizz is used to test the students' understanding of the topic based on what they have learned in class and during collaborative activities. The crucial criteria in using these online collaborative digital tools are their ability to be updated in real-time. The students' feedback is posted on Jamboard, which is also a real-time collaborative tool.

**Collaborative Learning**

Collaborative learning encourages knowledge sharing, interpersonal motivation, mutual reliance, and dependence on one another, students and lecturers included. It relies on active participation to interact among the students. It is possible to conduct collaborative learning synchronously and asynchronously, as the main purpose of collaborative learning is to increase the student's understanding of a certain subject matter. It enables students to benefit from the knowledge, expertise, and experiences of other group members. Students will also develop a range of abilities, such as fostering collaborative teamwork through participating in collaborative tasks that can be in the form of assignments, projects, or activities.

**Webex Breakout Session**

Webex is one of the videoconferencing applications that is used in Universiti Utara Malaysia. Within Webex, students can be split into smaller groups to create spaces to collaborate on certain tasks and activities. It allows for focused and effective learning as the lecturers can observe and facilitate smaller groups better. The members of the group have the opportunity to communicate and discuss with the other students as if they are in a conventional face-to-face environment. To imitate that, students are encouraged to turn on their webcam, although some students opted not to. They can also share information and screens, chat, annotate and communicate among the group when collaborating on the tasks or activities through the breakout sessions within a smaller group. Lecturers can join the breakout sessions to check on the students and provide guidance where required. The students can then be removed from breakout sessions and return to the main Webex room to present their group idea to the whole class.

**Padlet**

Padlet is a real-time web-based application that allows students to collaborate online by posting text, images, and drawings. videos, audio, and links. Padlet can be thought of as a canvas, bulletin board, or noticeboard where it has several template formats to display the content. In this study, Padlet is used to post the links to other digital tools and answers to some of the activities conducted during the class. While Padlet supports a variety of types of content, direct tools for programming are not available on Padlet. Thus, the reason for using other applications in addition to using Padlet as a supporting application for link and content sharing.

**CodeCollab**

CodeCollab is a real-time web-based application that consists of a collaborative

code editor and compiler. While there are a lot of online code editors and compilers available, not many supports real-time collaboration across multiple systems and devices. CodeCollab is one of the few web-based that is easy to be accessed without the need to create an account to be able to use it. This simplifies the collaborative coding activities amongst the students as they can dive straight into the activities without having to set up an account. Any student or lecturer can modify and correct the code on the same website without having to re-upload or change any local files. This enables mistakes that were found in the code to be corrected while the students can view the same page.

**Google Drawings**

Google Drawings is a real-time web-based diagramming application by Google. It is also available as a desktop application on Google's Chrome operating system. Google Drawings allows users to create content by drawing, adding images from their computer or the Internet, and adding text, shapes, arrows, scribbles, and other elements to the drawing. Additionally, it allows for real-time collaboration with other users, enabling the online creation of flowcharts, diagrams, concept maps, and other types of visualizations. In this study, Google Drawings is used to draw flowcharts that are taught from the second topic until the end of the syllabus. As it is in real-time, through the breakout sessions, the group members can create and modify the flowchart based on the questions provided as a team.

**Jamboard**

Jamboard is a real-time collaborative digital whiteboard that comes in the form of a Jamboard device, web-based or mobile application. Jamboard can collaborate with other users regardless of their method of accessing it. However, in this study, Jamboard is assumed to be accessed using the web browser. Jamboard allows users to write and draw using the mouse, add text, shapes, and notes and insert images to the board. It gives the users the freedom to add content and create several pages of the board on the same link, unlike Google Drawings where it limits to one page per link.

**Assessment - Quizizz**

Quizizz is an online learning platform, supported on any device, computer, and mobile. Quizizz consists of 2 main features which are Lesson, and Quiz. Lesson includes combining interactive slides, instructions, and assessment. Quiz is used to assess the students understanding through the open or close-ended type of questions. In this study, only Quiz is used throughout all the chapters in the course. Both Lesson and Quiz can be either Instructor-paced or Student-paced. In Instructor-paced, students advance through each question together while in the Student-paced, they can progress at their own pace. A leaderboard and live results will be displayed which cultivate competitiveness among the students. In terms of collaboration, Quizizz allows collaboration among the instructors in creating the content on the platform.

## Methodology

The purpose of this study is to explore the student's views on the use of the selected online collaborative digital tools in empowering them in learning Java programming language. To achieve this objective, 35 students who enrolled in the course in the semester 2021/2022 at Universiti Utara Malaysia (UUM) were selected for the data collection to gather their views and perspectives on the tools. A qualitative approach is used in this study where the reflections of all the students were gathered after every topic after all activities using the digital tools, Padlet, CodeCollab, and Jamboard through random group assignments using Webex breakout session to gain in-depth information on

students' perspective regarding their experience in using the digital tools as part of the class activities.

By examining students' reflections following the Gibbs reflective cycle (Gibbs, 1988), it was argued that instructors' teaching techniques should be changed to put more emphasis on reflective learning gained from various situations (Markkanen et al., 2020). The purpose of reflective practice is to help lecturers to improve and enhance the effectiveness of their teaching and learning through continuous training and development. The reflections were collected using Jamboard with some guided questions to scaffold students' thinking. On Jamboard, students were allowed to post anonymously to ensure their reflections, comments and feedback cannot be traced back to the specific student.

**Padlet**

Students were put into groups during Webex breakout sessions and their group number on Webex represents the group number labeled on Padlet. Based on their discussion on Webex, they will post their answers on Padlet to be reviewed and discussed with the other students. This enables information sharing where different ways of writing code and programs can be seen by all.

Figure 1 shows an example of the Padlet activity that was conducted during class. Students were placed into groups for 30 minutes and were asked to post the results of the discussion on the Padlet. Groups that were not sure about the way to answer the activity can either ask for more explanation from the lecturer or learn from the other group's answers. All the answers posted were reviewed with the whole class for a better understanding of the type of acceptable answers for the questions posted.

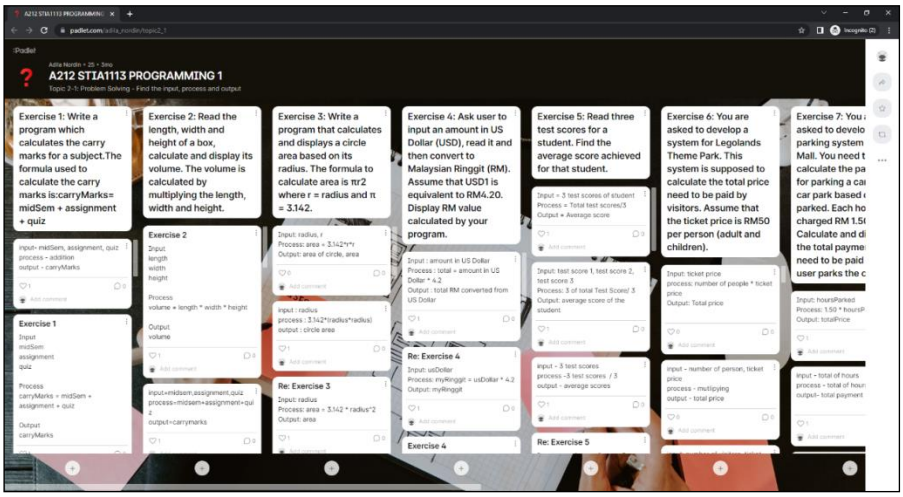


*Figure 1.* Example of Padlet

**CodeCollab**

In addition, the link to the CodeCollab page can also be included within the Padlet. Padlet can serve as the main page with links to other related digital tools that the students should use within their group for the specific activity.

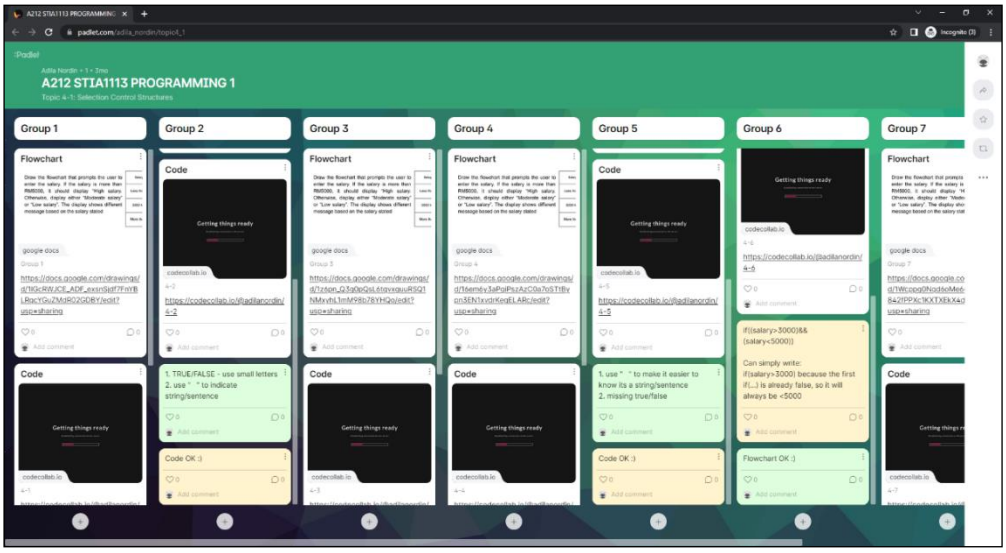


*Figure 2.* Example of Padlet with links to CodeCollab and Google Drawings

Figure 2 shows a Padlet with the link to CodeCollab for the 7 groups created on Webex breakout sessions. Based on the CodeCollab link posted on Padlet, students of the same group can access and write the code in real-time on the website as shown in Figure 3. They can turn on their microphone on Webex or use the chat to communicate with the members of their group. Any changes to the CodeCollab can be viewed by anyone with the link.

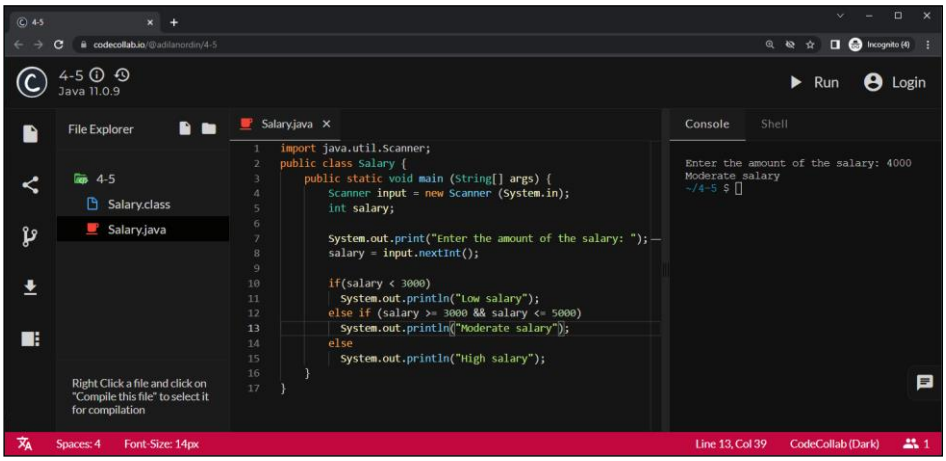


*Figure 3.* Example of CodeCollab

**Google Drawings**

In the Java programming language course, students are also expected to be able to draw the flowchart of the program that they are supposed to write. As this is also done collaboratively, Google Drawings is selected as the suitable tool as Google Drawings has shapes, arrows, and text that are required in creating the flowchart. Furthermore, any updates on Google Drawings are in real-time, thus students can collaborate on the flowchart, and comments from the lecturer can be given promptly. Similar to CodeCollab, the link to the Google Drawings is provided in the Padlet, grouped by the Webex breakout session numbers. Figure 4 shows the use of Google Drawings for the flowchart group activity where feedback and comments from the instructor can be added while reviewing the group's flowchart created.

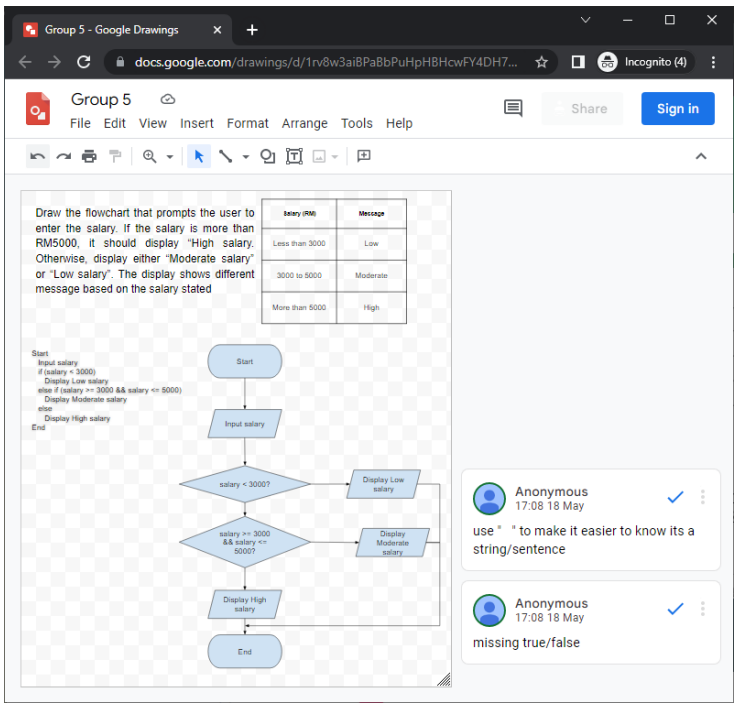


*Figure 4.* Example of Google Drawings to create a flowchart

**Quizizz**

While Quizizz is an individual assessment, it is worth mentioning this digital tool as it is in real-time and encourages students to be competitive in achieving a high score in the assessment as shown in Figure 5. Towards the end of each of the quizzes, all questions are reviewed to ensure all students know the correct answer and how it gets to that answer.


*Figure 5.* Example of Quizizz

## Findings and Discussions

The first research question was on selecting suitable real-time online collaborative digital tools for Java programming language. Several tools were compared in terms of ease of use, shareability, and usability for Java programming language and it was found that there is a limited number of real-time collaborative code editors and compilers available. CodeCollab is the main choice as it does not require the users (students and lecturers) to sign up for an account to use it. The code on CodeCollab is stored and can be accessed for

up to seven days before it is deleted. The code can be stored for an unlimited time if the user registers for an account. In terms of creating flowcharts as part of the programming process, Google Drawings is preferred rather than Jamboard as it is easier to be used due to Google Drawings having quick access to the shapes and arrows required to draw flowcharts. These real-time online collaborative tools were selected before they were used and supplemented into the course to be tested by the students.

Among the 35 respondents on whom this study was tested, 20 (57.15%) are female and 15 (42.86%) are males where 2 (5.71%) are from the second and sixth semesters, and 31 (88.57%) are from the fourth semester. The respondents are also from various fields of study where 10 (28.57%) are enrolled in the School of Quantitative Sciences, 8 (22.86%) in the School of Economics, Finance & Banking, 5 (14.29%) in the School of Business Management, 2 (5.71%) from School of Technology & Logistics Management, Computing, International Studies, Government, and Tourism, Hospitality & Event Management, and 1 (2.86%) from School of Languages, Civilisation & Philosophy and Multimedia Technologies & Communication. This shows that the majority of the respondents do not come from IT-related backgrounds based on the departments of their field of study.

Table 1
*Demographic Distribution*

| Profile Factors | Particulars | f | % |
|---|---|---|---|
| Gender | Male | 15 | 42.86 |
| | Female | 20 | 57.15 |
| Semester | 2 | 2 | 5.71 |
| | 4 | 31 | 88.57 |
| | 6 | 2 | 5.71 |
| Department | School of Languages, Civilisation & Philosophy | 1 | 2.86 |
| | School of Multimedia Technologies & Communication | 1 | 2.86 |
| | School of Technology & Logistics Management | 2 | 5.71 |
| | School of Computing | 2 | 5.71 |
| | School of International Studies | 2 | 5.71 |
| | School of Government | 2 | 5.71 |
| | School of Tourism, Hospitality & Event Management | 2 | 5.71 |
| | School of Business Management | 5 | 14.29 |
| | School of Economics, Finance & Banking | 8 | 22.86 |
| | School of Quantitative Sciences | 10 | 28.57 |

**f* number of respondents

For the second and third research questions which are on the student's preferred collaborative digital tools and the effectiveness of the tools, overall, when they were asked about the use of Padlet, CodeCollab, and Google Drawings, one of the students stated that "*I really like how interactive this class is"*. Another student stated that *"I really like the resources (tools) that you use"*, *"I like the way you teach"*, *"Fun class"* and *"Love the way Dr prepared all these materials and made (them) easily accessible"*.

In terms of collaborative learning, students were asked about their preference for having Webex breakout sessions to solve certain activities or doing them individually. It was found that 35 (100%) agreed that the breakout sessions were useful. One of the students' reasons is "*I learn how to write the pseudocode by looking at friend's answer (which helps me to get a) better understanding"*. Similarly, for the use of CodeCollab and Google Drawings where students can access not only their group answers but other groups as well. This enables them to learn several ways of answering the same questions with slightly different ways of tackling them.

In addition to the use of Google Drawings to draw flowcharts, Jamboard is also used as the platform for getting the students' reflections. It was found that students prefer to ask questions regarding the topic covered on Jamboard instead of using the chat on Webex. Students stated that they *"Love this session"* as questions that they have can be addressed by the lecturer and students. Jamboard can be used as a communication platform as students can write and draw, which gives them the freedom to express themselves.

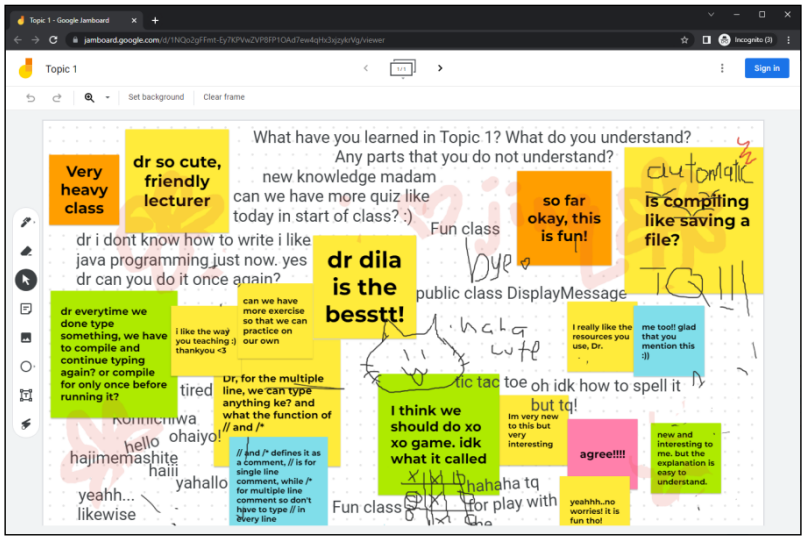


*Figure 6.* Feedback on Jamboard

In terms of using Quizizz as the assessment tool, while it is not a collaborative tool, it is an interactive tool that students enjoy using as it summarised and tested their understanding of the topic. One of the students posted on Jamboard *"Can we have more quiz like today (at the) start of (the) class?"*, *"I think I understand more when we try (to) do exercise and quizizz because the slides are full of words"* and during the last class, *"Can we have a final quizizz?"* which shows revising through the questions are helping the students with their understanding on the topic as the previous comment, that it is easier to understand through questions rather than slides.

**Challenges and Limitations**

Based on the classes within one semester, some challenges and limitations were faced by the students in the use of the digital tools mentioned in this paper. In terms of connectivity, a small number of students stated that they faced problems with their Internet. At UUM, online classes have been conducted for more than one semester. As the Internet constraint is one of the problems faced by students since the previous semester, the university has allowed students to be on campus to ensure a stabler Internet connection. However, it cannot be guaranteed that the Internet on campus to be stable all the time, but it is most of the time.

Another challenge that was raised by the students is in accessing the different tools

at the same time. It is expected that the students would use a laptop or desktop, however, some of the students were using their mobile devices. Thus, switching from one digital tool to another on their mobile devices can be difficult. Furthermore, the small size of the mobile device screen limits the students from accessing all the functions provided within the tools. They have the scroll or reduce the size to be able to view the other parts within the tools.

Other than the Internet and device challenges, there was also a lack of group participation in the activities. As the students were put into random groups each time, it can be difficult for them to work together as they are unfamiliar with the other students. However, the reasons for grouping them randomly are to ensure students can get to know their colleagues as all classes were conducted online and they do not have the opportunity to meet their colleagues under normal circumstances. Another reason is, that as the course has a group project, the students can choose their members after working together within the class activities.

Despite these three challenges, overall, the use of digital tools was deemed to be a success as students enjoyed using them as part of the learning process. It made learning programming language smoother as codes can be written and executed in real-time which closely reflects the way conventional lab sessions during face-to-face were conducted. Students and the lecturer can communicate and share their screens with any problems in programming much easier with the use of digital tools.

## Conclusion

The effectiveness of online learning is largely dependent on the proper selection of digital tools and the ability of the lecturers to employ the tools within the teaching and learning process. Learning Java programming language in general, can be difficult as it requires practice in writing, coding, and executing the program which rarely goes smoothly, especially for novice programmers. By having a lecturer present, they can assist the students in debugging when necessary. However, as classes are being conducted online, it might be difficult to provide students with the help they need promptly. Thus, suitable digital tools are required to aid the teaching and learning process to overcome this. This study selected CodeCollab and Google Drawings as the main tools for writing, running, and executing Java programs in real-time while allowing collaboration to take place. Other digital tools are Padlet and Webex Breakout sessions to aid the students to work collaboratively in addition to the use of Jamboard to collect reflections and Quizizz as an assessment. It can be concluded that the use of these digital tools is deemed to be a success based on the positive feedback received from the students. These digital tools can be adopted into other courses, not just programming-related courses due to their ability to be used collaboratively and any updates are in real-time.

## References

Cazzola, W., & Olivares, D. M. 2016. Gradually learning programming supported by a growable programming language. *IEEE Transactions on Emerging Topics in Computing*, 4(3), 404-415.

Gallego-Romero, J. M., Alario-Hoyos, C., Estévez-Ayres, I., & Delgado Kloos, C. (2020). Analyzing learners' engagement and behavior in MOOCs on programming with the Codeboard IDE. *Educational Technology Research and Development*, *68*(5), 2505-2528.

Gibbs, G. 1988. Learning by doing: A guide to teaching and learning methods. *Further*

*Education Unit*.

Koehler, M., & Mishra, P. 2009. What is technological pedagogical content knowledge (TPACK)?. *Contemporary issues in technology and teacher education*, 9(1), 60-70.

Markkanen, P., Välimäki, M., Anttila, M., & Kuuskorpi, M. 2020. A reflective cycle: Understanding challenging situations in a school setting. *Educational Research*, 62(1), 46-62.

Nordin, N. 2021. The Effectiveness of Online-based Learning in Java Programming Language: Student Perceptions and Performance. *Journal of Technology and Operations Management*, 15(1), 1-24.

Shaw, R. S. 2012. A study of the relationships among learning styles, participation types, and performance in programming language learning supported by online forums. *Computers & Education*, 58(1), 111-120.

Shen, R., & Lee, M. J. 2020. Learners' perspectives on learning programming from interactive computer tutors in a MOOC. In *2020 IEEE symposium on visual languages and human-centric computing (VL/HCC)*, 1-5.

Wang, T., Su, X., Ma, P., Wang, Y., & Wang, K. 2011. Ability-training-oriented automated assessment in introductory programming course. *Computers & Education*, 56(1), 220-226.

Zinovieva, I. S., Artemchuk, V. O., Iatsyshyn, A. V., Popov, O. O., Kovach, V. O., Iatsyshyn, A. V., ... & Radchenko, O. V. 2021. The use of online coding platforms as additional distance tools in programming education. In *Journal of Physics: Conference Series*, 1840(1), 12-29.

# Reflections on Implementing E-Portfolio as a Feedback Tool

Paramjit Kaur*[a], Aspalila Shapii[b], Arumugam Raman[c]
[abc]School of Education, Universiti Utara Malaysia,
College of Arts and Sciences, Sintok, Kedah, Malaysia
*Corresponding Author: paramjit@uum.edu.my

## Abstract

The whole macrocosm of the classroom, the role of the teacher and the student shifted dramatically in a very short time when the world grappled with the pandemic. During these times, web-based or digital tools and platforms proved to be indispensable in remote learning and teaching as face to face classrooms moved to being computer based. One such we-based tool that allows for flexible teaching and assessment is e-portfolio. The very nature of e-portfolio that is flexible allows for teachers and students to design tasks that allows them to control the amount of interactions they require, thus this allows for a higher degree of self-monitoring by students of their own work and allows them to use assessment feedback to continuously improve their work. This paper provides a reflection of the implementation of an assessment which integrates the digital e-portfolio platform as a feedback and assessment tool in a Masters level class. The reflection describes the process of implementing the assessment that uses the e-portfolio and the feedback process involved. The research involved the whole class of six participants over a course of five weeks. Participants wrote three reflective journals and gave peer feedback to all three journals that were published on a digital platform. The paper gives an overview of how the e-portfolio was used to publish the journals and students provided feedback to their peers online using predetermined rubrics within a stipulated time. It was found that the e-portfolio provided a flexible avenue for participants to provide quality peer feedback. The feedback was also beneficial as students were able to use the feedback to improve their subsequent work.

*Keywords:* E-portfolio, Peer Feedback, Formative Assessment, Reflection

## Introduction

With classes being conducted online in the recent times, there have various digital or web based approaches and tools adopted to re-design teaching, learning and assessment. The pandemic enforced that classes be conducted remotely. This has changed the landscape of teaching and learning. The whole macrocosm of the classroom, the role of the teacher and the student shifted dramatically in a very short time. Traditional assessment methods needed to be replaced with more relevant and equitable approaches. Interaction between teachers and students and amongst students themselves changed in unimaginable ways. Digital tools provided such a platform when classes had to be conducted remotely.

During these times, web-based or digital tools and platforms proved to be indispensable in remote learning and teaching as face to face classrooms moved to being computer based. Now, even when the world has nearly returned to pre-pandemic time normalcy, the use of web-based tools and platforms are still being used in educational settings. Web-based tools and platforms are still used as assessment tools as these have been proven to promote learning. Web-based tools are also used to provide feedback. One

such digital platform that can be used for assessment and feedback is the e-portfolio platform. E-portfolios can be integrated into almost any classroom as an assessment tool and also enhances students' skills as content developers. Students can also acquire skills of developing E-portfolios that can be useful for employment and also provides them visibility in terms of sharing their work and ideas with others on social networking sites. This paper provides a reflection of the implementation of an assessment that integrates the digital e-portfolio platform as a feedback and assessment tool in a Masters level class. It is hoped that the sharing of the experiences and processes of adopting the e-portfolio will show how the e-portfolio enhanced and enriched the classroom practices, especially in terms of assessment and feedback.

## Literature Review

### Characteristics of E-portfolio in Teaching and Learning

An e-portfolio is an electronic format for students to record their work, goals, and achievements, reflect on their learning and share their learning and receive feedback and feedforward. E-portfolios allow students to represent information in different formats and, depending on the software, and the information in the e-portfolio is 'mobile' and can exist for a long time on the Internet (Barrot, 2016). E-portfolios can be included in courses as a component of assessment, as a form of summative assessment or formative assessment (Buzzetto-More, 2010). The use and adoption of e-portfolios in a classroom will depend on the course learning outcome(s) and the aim of the assessment, and there is no one-size-fits-all solution to assessment.

Bures et. al (2013) state that e-portfolios can be used as summative assessment where specific artifacts and information are required to be submitted in order to determine whether students have met the intended learning outcomes, and rubrics are often used to assess the quality of students' e-portfolios. E-portfolios for classroom learning have also been used as a means of formative assessment to facilitate students' deep understanding about subject content where students are usually expected to reflect upon their learning experiences (Gikandi et. al, 2011).

### Functions of E-portfolio in Assessment

E-portfolios can be used to support and enhance students' self-monitoring, self-evaluation, and sharing of learning and thus can be integrated as assessment tools in online classes (Yang et al., 2017). E-portfolio platforms are no longer static web pages, as these platforms are now dynamic and interactive and can be used to create and share content as well as be used as a medium of interaction and feedback (Clark & Eynon, 2009). E-portfolios are flexible tools that can retain the benefits of traditional paper-based portfolios as well as offer additional functions to assist teaching and assessment that can be tailored to suit almost any assessment and task (Lorenzo & Ittelson, 2005; Yang et al, 2017). E-portfolios can be integrated into almost any classroom as an assessment tool and also enhances students' skills as content developers. Students can also acquire skills of developing e-portfolios that can be useful for employment and also provides them visibility in terms of sharing their work and ideas with others on social networking sites.

## Methodology

### Design

This study was carried out in two phases. However for the purpose of this paper, only the

first phase of the study will be explained as this phase focused on establishing the procedure as well as the process of integrating the e-portfolio as a feedback and assessment tool. The implementation of the e-portfolio included four strategies based on Yang et. al (2017). These strategies include:

- analysis of students' learning needs and contexts for using e-portfolios (in a Second Language Acquisition course, focusing on an assignment that requires students to carry out a service learning project)
- constructive alignment between learning, teaching, and assessment (the assignment is related to having students conduct a series of short lessons as part of their service learning that enables them to integrate the approaches that they learn in class in creating English lessons for their student(s); they will also reflect on the decisions they make as well as how they integrate second language acquisition learning and teaching approaches in their teaching and how their worldview evolves during the project)
- scaffolding of students' learning progress through task design (detailed rubrics that will include breakdown for marks, and it is hoped that the e-portfolio allows students to review and self-review to create a sense of community within the class, and also to showcase their own projects to others)
- transfer of learning / capacity building and sustained support for students (before students embarked on the assignment, they are briefed on the chosen e-portfolio platform in this research which is Weebly. All the participants in this study had used Weebly before, however they were given information on how to use Weebly and they could contact the researchers at any time if they encountered problems with the platform. This also enabled students to compile their work in a digital platform which they could share and expand on in future)

These four strategies that guided the data collection procedure are shown in Figure 1.

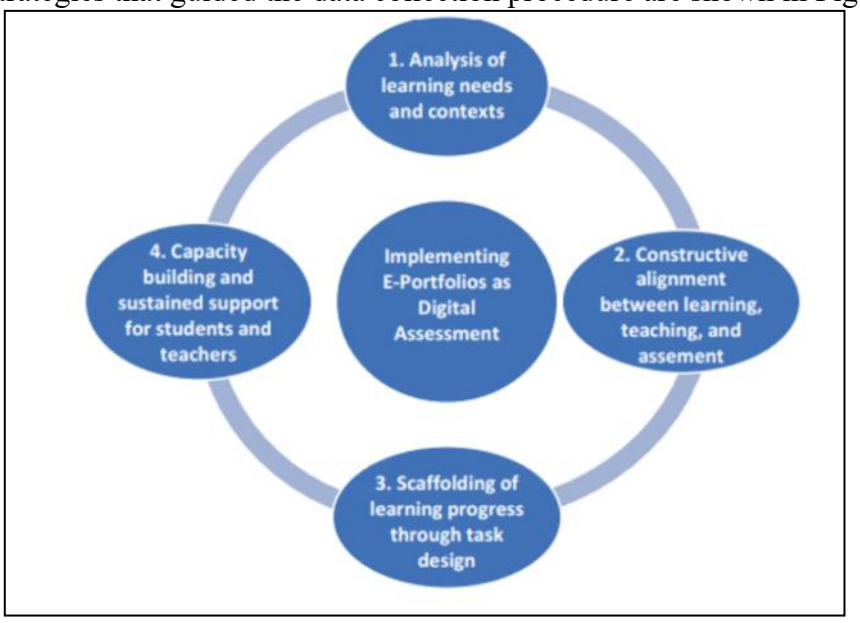


*Figure 1*. E-portfolio implementation as assessment

**Participants**

For the first phase a whole class of a Masters level course was used to implement the e-portfolio as feedback and assessment tool. The Masters class had a total of six students that ranged from fairly new graduate teachers with teaching experience of three years to teachers with experience of 20 years of teaching. The class was conducted online for one

semester and thus the information about the assignment was shared online. The online nature was also one reason why the digital e-portfolio was adopted, i.e. to enable students to share their work and learn from each other given that many teachers may lack resources and techniques to teach given the new situation. Thus, the e-portfolios could be an avenue for these teachers to start creating a platform to share resources and their own experiences. Some of the students chose to carry out their service learning projects face-to-face and some opted to do the project using the online mode. They were given the choice to choose as long as they complied with the Covid guidelines enforced at the moment.

**Assessment**

The e-portfolio was integrated into an assessment that required participants to spend 8 hours (4 sessions) tutoring a student/a group of students who is/are learning English as a second language. The sessions could be carried out in face-to-face sessions, online or mixed mode depending on the participants' situation and objectives. Participants were advised to adhere to the Covid standard operating procedures at all times. After each session, participants were required to write a reflective journal based on pre-determined criteria that were shared with them. This assignment was designed to assess the following learning outcome, i.e. to explain the relationship between second language acquisition research and second language learning and instruction. The assessment that involved the e-portfolio was worth 15% of the total course grade. Out of eight hours, participants wrote three reflective journals; reflection 1 and 2 written after sessions 1 and 2; whereas reflection 3 written after sessions 3 and 4.

During their tutorials, participants needed to apply perspectives and theories they learnt in the Second Language Acquisition course in order to help their tutees learn a certain aspect of the English language. They needed to design their lessons and develop their own materials to help their tutees. After each two-hour session, participants were required to write a reflection of the session. In total there would be three reflections written, as the last two sessions would be written in reflection 3. Each reflective journal would receive feedback from a pre-assigned peer and lecturer. The guidelines for the reflective journals for the sessions are shown in Figure 2.

Your Name: _____

Student Language Level: _____

Submission Date: _____ Journal Number: 1 2 3

(Circle One)

1. A description of your planning and preparation prior to the sessions (your efforts to seek input from the tutee, preparation of materials, etc.).
2. Reflections on the instructional environment (physical, affective, and cognitive).
3. A description of the interactions between yourself and the learner, including the instructional activities that took place. (Collect samples of student work, when possible, and write down examples of "interlanguage" or "learner language" as they occur. These will be required for your Research Project.)
4. An evaluation of the progress of the sessions, including adjustments that may be needed to better meet the needs of the learner.
5. Reflections on how your experiences connect with current classroom readings and discussions, including specific SLA theories. (These will be required for your Research Project.)
6. Reflections on how your experiences will help you develop into a more effective teacher.

*Figure 2*. Guideline for reflective journals

**Feedback Sessions**

A feedback schedule was drawn up and discussed with participants in terms of feasibility as well as to keep them informed of what was required in terms of grading as

well as type of feedback they were required to give and receive. The participants posted links of their websites in Padlet page created by the lecturer. The completed rubrics with feedback from peers and lecturer were posted in the same Padlet page. This Padlet page acted as a repository for the whole e-portfolio and feedback assignment. Each participant was assigned to give feedback to another participant. The lecturer also gave feedback to all the participants. Each participant received feedback from a peer as well as the lecturer.

The feedback rubrics were shared and explained to all the participants before they carried out the feedback sessions. Feedback was given based solely on the rubrics. Participants were encouraged to read other participants' feedback so that they could improve their work. . There were a total of three feedback sessions for the three reflective journals. The participants were urged to use the feedback given to improve subsequent entries. The feedback for the last reflection could be used for the final project assignment.

**E-Portfolio Platform**

Students developed their personal e-portfolio on the Weebly website. Before the start of the assignment, students were asked if they had used Weebly before. All of the students had used it before in their previous courses and had their own Weebly websites. Thus, the students were given a refresher session of the Weebly website via YouTube videos and also were told to contact the lecturer if they encountered any problems while developing and using their websites. Only one participant encountered problems and managed to solve them with some help.

## Reflection on the Implementation of the E-Portfolio as Feedback Tool

**Student Engagement**

There was good engagement with the e-portfolio assessment and feedback sessions. Only one participant had some minor problems with the first e-portfolio where the participant was unable to edit the e-portfolio. The participant did not have problems with the subsequent e-portfolios. All the students participated in the peer feedback sessions, however the submission for the last feedback session had to be adjusted as some participants had problems meeting the deadline. Most had many other assignments from other courses. The new deadline was discussed in class and agreed upon.

The students created many different ways of presenting their reflections on the e-platform. Overall, participants included texts, pictures, and samples of their tutees work for their reflective journals. The e-portfolios that the participants developed were rich with information and remain visible to them even after they completed the course. Gikandi et al (2011) stated that e-portfolios for classroom learning can help facilitate students' deep understanding about subject content when they reflect upon their learning experiences. These e-portfolios are cloud based and therefore can be accesses at any point of time by students. Figure 3 shows some of the e-portfolios that were created.

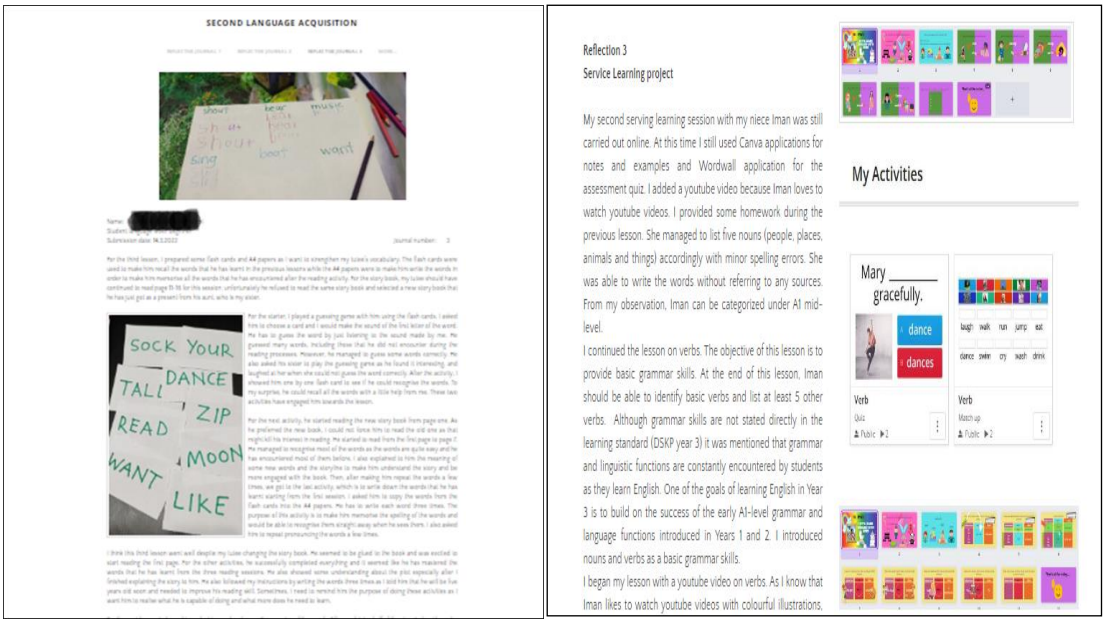


*Figure 3*. Sample e-portfolios

All the participants participated in the feedback sessions and none requested for extensions, except for the adjustment for the last reflection by all the participants. Figure 4 shows the Padlet page with all the three reflective journal links and the feedback given by the six participants and the lecturer.

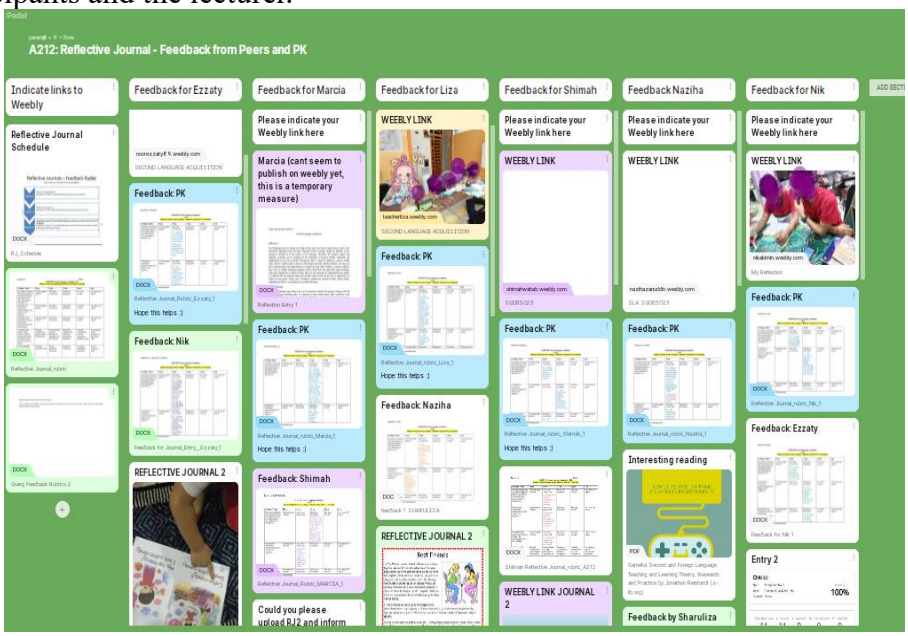


*Figure 4*. Padlet for e-portfolio links and feedback

## Quality of Feedback

All the participants engaged in the feedback exercise and provided appropriate feedback to their assigned partners. The rubrics acted as a guide for them and most of them gave personalised comments based on the reflections. Most gave comments as well and suggested ways the sessions can be conducted. Participants never just ticked a box in the rubrics; all of them wrote comments to help their partners. In terms of grading, participants showed that they provided a range of marks, i.e. they did not merely award the higher end of the grading scale. Li & De Luca (2014) in a synthesis of studies focused on assessment feedback proposed that students learn better when they receive quality

feedback rather than marks alone.

There were critical and thought-provoking comments as well. For example, *"Through your reflection, it is understood that you want your tutees to improve on their writing skills. However, what will you do for your next lesson was not mentioned."; "Correct me if I am wrong, but I did not see 'progress' due to no information on their level at the beginning.";* E-portfolios enable students to connect learning inside the class environment with experiences outside it. As stated by Eynon and Gambino (2017), the creation of e-portfolios can be seen as an integrative learning process where connections are made between diverse experiences inside and outside the class. The use of e-portfolio as a feedback tool allows students to make links between their experiences and the content that they learn.

Most of the participants gave positive and critical feedback to their peers. These comments seemed to show that the feedback was given after some careful thought and that the rubrics may be an effective guide for feedback session. The e-portfolio also enabled participants to look at each other comments as well as the lecturer's comments. Some of the positive and critical comments include *"Well written and I enjoyed reading your blog. Well done!"; "Well written. There are a few errors here and there but I like the friendly tone of her writing.", "The planning and preparation prior to the session seemed okay. The researcher did a great job by making sure that she informed the student and also his mother. It was good that the researcher volunteered to teach a secondary school student English even though she herself is a teacher teaching the primary level."* These comments highlight that participants do not just give general feedback such as 'well done', 'good' etc., but that the feedback is based on the work that is done and they have taken time to read and think about their partner's reflective journals. E-portfolios can be used to support and enhance students' self-monitoring, self-evaluation, and sharing of learning and thus can be integrated as assessment tools in online classes (Yang et al, 2017). Clark and Eynon state that e-portfolio platforms are no longer static web pages, as these platforms are now dynamic and interactive and can be used to create and share content as well as be used as a medium of interaction and feedback.

Some also provided advice on improving the teaching sessions as well as the writing style. For example *"Need some Second Language Learning theories/ models/ approaches to support your writing. Perhaps you can try Krashen - The Power of Reading"; "Seems like you had done the best you could to make your tutees feel at ease with the lesson and thus, encourage them to participate more. Maybe you could include the feedback given by your tutees during the gallery walk."* The feedback from the participants showed that they were not only providing support and advice but they themselves exhibited deep learning as they related what their friends wrote with their own readings and knowledge. This is similar to what was discovered by Flynn (2022) where the participants exhibited deeper learning by choosing a variety of topics and relating it to material covered in the class via their e-portfolio assessment.

## Conclusion and Recommendations

The e-portfolio feedback activity was positively received by students and the e-portfolio was an effective feedback tool. The students were able to demonstrate their knowledge and abilities in developing e-portfolios, providing quality feedback to their peers and use the feedback via the e-portfolios to improve their assignments. A by-product of this assessment was that students developed their computer literacy skills as they created their portfolios. These e-portfolios can be accessed even after they have finished their courses. This is echoed by Ciesielkiewicz (2019) who stated that students are keen to

use e-portfolios after they have completed the assessment, and do not just view them as coursework to be completed for a grade. Students view e-portfolios as valuable and extendable outside of their classrooms.

The level and quality of feedback given by students also proved to be of high quality that enabled them to achieve the course learning outcome, i.e. to explain the relationship between second language acquisition research and second language learning and instruction. The use of the e-portfolios as feedback tool enabled deeper learning beyond what was covered in the classroom as students helped each other gain better insights to their work through the peer review sessions. Students showed the ability to give constructive feedback as well as encourage their peers by highlighting the positive aspects of their peers' e-portfolios. This also created a sense of community within the class. A recommendation would be to investigate the extent to which students felt the e-portfolio activities developed a sense of community in the class as this was not investigated in the current study. It is suggested that in future, as e-portfolios allow an easy method of sharing pages, multiple peer reviews can happen and thus this can be used to understand the sense of community that may emerge among students.

Weebly is a straightforward platform to use in creating e-portfolios. The students required minimal technical support. However, in future studies it is recommended that students be exposed to the use of multimodal media in their writing as well as other platforms. The rubrics could also be enhanced in this regard where marks can be allocated for the use of supporting media like pictures, videos, photos etc. This paper has provided an overview of how a digital e-portfolio platform was integrated in an assignment and used as a feedback and assessment tool in a Masters level class. The research is still ongoing and this was just the first phase of the research, thus there was no actual measurement of student learning. However, there is some evidence that the e-portfolio can be used to replace the traditional assessment method. The e-portfolio also was well received by the students and they were able to provide quality feedback to their peers. The sharing of the experiences and processes of adopting the e-portfolio shows that the e-portfolio enhanced and enriched the classroom practices, especially in terms of assessment and feedback, without disrupting the class. There are also challenges and limitations on the use of the digital e-portfolio which would depend on the type of platform used as well as the level of knowledge of the participants (lecturers and students) about technical aspects of the digital platforms. There would need to be a certain level of knowledge of the different features of the platform in order to adopt the platform. There also needs to be technical assistance in case students and staff face problems.

Luchoomun et al. (2010) state that due to the interactive nature of Web 2.0 technologies, e-portfolios allow for the recurring and interactive feedback, as well as building knowledge through peer learning and interaction. E-portfolio based assessments allow for the frequent feedback through online interactions as opposed to traditional print-based portfolios that are static in nature. Students can ask and receive teachers' and peers' comments and suggestions on how to improve their performance when they share their work in progress and reflections (Yang et al, 2015). The very nature of e-portfolio that is flexible allows for teachers and students to design tasks that allows them to control the amount of interactions they require, thus this allows for a higher degree of self-monitoring by students of their own work and allows them to use assessment feedback to continuously improve their work. This would not be possible with traditional portfolios or methods. However, as noted by Walland & Shaw (2022) there appears to be very little empirical research that show how e-portfolios influence learning outcomes. Thus, in future it is recommended more research is done to examine how e-portfolios can be optimally designed and implemented to enhance the quality of student learning experiences and

learning outcomes.

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## References

Barrot, J. S. (2016) Using Facebook-based e-portfolio in ESL writing classrooms: impact and challenges. *Language, Culture and Curriculum*, 29:3, 286-301, DOI: 10.1080/07908318.2016.1143481

Bures, E. M., Barclay, A., Abrami, P. C., & Meyer, E. J. (2013). The reality of assessing "authentic" electronic portfolios: Can electronic portfolios serve as a form of standardized assessment to measure literacy and self-regulated learning at the elementary level? *Canadian Journal of Learning and Technology*, 39(4), 1.

Buzzetto-More, N., & Alade, A. (2008). The pentagonal e-portfolio model for selecting, adopting, building, and implementing an e-portfolio. *Journal of Information Technology Education*, 7, IIP45–IIP70.

Ciesielkiewicz, M. (2019). The use of e-portfolios in higher education: From the students' perspective. *Issues in Educational Research, 29*(3), 649-667. http://www.iier.org.au/iier29/ciesielkiewicz.pdf

Clark, J. E., & Eynon, B. (2009). E-portfolios at 2.0 – Surveying the field. *Peer Review*, 11(1), 18–23.

Eynon, B., & Gambino, L. M. (2017). *High-impact ePortfolio practice: A catalyst for student, faculty, and institutional learning*. Stylus Publishing, LLC.

Flynn, C.O. (2022). Reflections on an e-portfolio assessment in a first-year physiology Course. *Biomed Eng Education 2*, 61–67. https://doi.org/10.1007/s43683-021-00058-9.

Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education*, 57(4), 2333–2351. doi: 10.1016/j.compedu.2011.06.004

Li, J., & De Luca, R. (2014). Review of assessment feedback. *Studies in Higher Education*, 39(2), 378–393. doi.org/10.1080/03075079.2012.709494

Lorenzo, G., & Ittelson, J. (2005). An overview of e-portfolios. EDUCAUSE learning initiative. Advancing learning through IT innovation. *EDUCAUSE*. Retrieved from https://net.educause.edu/ir/library/pdf/ELI3001.pdf

Luchoomun, D., McLuckie, J., & van Wesel, M. (2010). Collaborative e-learning: E-portfolios for assessment, teaching and learning. *Electronic Journal of e-Learning*, 8(1), 21–30.

Walland, E. & Shaw, S. (2022) E-portfolios in teaching, learning and assessment: tensions in theory and praxis. *Technology, Pedagogy and Education, 31*(3), 363-379, DOI: 10.1080/1475939X.2022.2074087

Yang, M., Tai, M., & Lim, C. P. (2015). The role of e-portfolios in supporting productive learning. *British Journal of Educational Technology*, 47, 1276. doi:10.1111/bjet.12316

Yang M., Wang T., & Lim C.P. (2017) E-Portfolios as Digital Assessment Tools in Higher Education. In: Spector M., Lockee B., Childress M. (eds) *Learning, Design, and Technology*. Springer : Cham. https://doi.org/10.1007/978-3-319-17727-4_83-1

# Design and development of a Malay lexical simplification system for non-native speakers

Phitsanuk Chiranont A/L Sumeth Chiranont[a], Juhaida Abu Bakar*[a], Nor Hazlyna Harun[a], Maslinda Mohd Nadzir[a], Nurul Huda Mohd Saad[b] and Salehah Omar[c]
[a]Data Science Research Lab, School of Computing, Universiti Utara Malaysia, Sintok, Kedah, Malaysia
[b]Academy of Language Studies, Universiti Teknologi MARA, Alor Gajah, Melaka, Malaysia
[c]Department of Information Technology and Communication, Sultan Abdul Halim Mu'adzam Shah Polytechnic, Jitra, Kedah, Malaysia
*Corresponding Author: juhaida.ab@uum.edu.my

## Abstract

This article discusses a developed web-based system specifically to detect complex words in the Malay language, which is named the Malay Complex Word Identification System (MCWIS). The Malay language is the national language of Malaysia. It is used in official events, regulations, and the educational system in this country. Nonetheless, this language has its complexity of grammar. One example is the confusing word structure involving the use of affixes, or in another word, "complex words," which is a real challenge for those who are learning this language. The distributed complex word recognition system does not fully support the Malay language. The objectives of this project are to gather related information regarding the Malay language and develop a complex word identification system specifically that is able to differentiate between complex and non-complex words based on several categories. This project was completed by using Rapid Application Development (RAD). This development model prioritizes rapid prototyping and quick feedback over long-drawn-out development and testing cycles. MCWIS consists of nine functions, which are, Sign Up New Account, Delete Account, Login, Manage Website, Enter Data, Choose Task, Reset Data, Send Review and Feedback, and Logout. MCWIS could assist people who are facing problems in learning or using the Malay language. It will help non-native speakers learn and understand the pattern of Malay complex words. Also, native speakers, especially students, can use it to increase their understanding of grammar in the Malay language. This system is also intended to make this language easier to learn by detecting complex words and filtering them out based on their type.

*Keywords:* complex word, morphology, compound word, pattern, Malay language, non-native speakers

## Introduction

Malaysia is a unique country, where multiple races live together in peace, and each race practices its own culture and language. Bahasa Malaysia, or Malay, is the national language of this country. The Malay language is a part of the Austronesian language family. It is a language spoken throughout the Malay Peninsula, Sumatra, Borneo, and the numerous smaller islands around it (Wurm et al., 2011). All of its citizens learn Malay as it is the national language used in almost all occasions, official or non-official. In Malaysia's educational system, the Malay language is a core language. Although students or non-native people are exposed to the language since their childhood, the complexity of grammar and confusing word structure in particular has caused some problems while

learning this language (Wurm et al., 2011).

The existing lexical simplification system does not fully support the Malay language, known as Complex Word Identification System (CWIS). In the previous research (Finnimore et al., 2019; Yimam et al., 2018; Shardlow, 2014), most of the systems only focus on English, while a few focused-on Spanish and Portuguese. Although the system that focuses on the English language can be used in the Malay language because of its roman writing, it cannot distinguish complex words in the Malay language due to its grammar. This is due to grammar rules referring to morphology, where the words will be slightly altered in order to create a new word or alter their meaning to suit the situation. This circumstance will increase the complexity and difficulty of learning and practising this language. The existing translators may not be able to translate accordingly in terms of grammar, let alone detect these complex words.

Three research questions are identified in developing the Malay lexical simplification system, which are (i) What are the functional and non-functional requirements needed in the lexical simplification system? (ii) What are the ways to visualise and model the user requirements in the Malay lexical simplification system? and (iii) What are ways to evaluate the prototype Malay lexical simplification system? The Malay Complex Word Identification System (MCWIS) is to help non-native speakers learn and understand the Malay language more easily using simpler language. Hence, the objective of the MCWIS is to detect Malay complex words that exist within the input given by the user. The system uses Natural Language Processing (NLP) to detect patterns in complex words. The pattern is based on morphology and compound words. The sub-objectives in this study are, first, to identify the requirements of MCWIS; second, to illustrate and define the context of the MCWIS requirements using a UML model and flowchart; and third, to evaluate the prototype system using standard statistical evaluation.

## Literature Review

The general definition of text simplification (TS) is the reduction of a sentence to one or more simpler sentences (Sulem et al., 2018). Text simplification aims to rephrase difficult texts in simpler, more understandable language (Xu et al, 2015; Yasin et al., 2012). It has been found to be helpful for building reading aids, such as those for people with dyslexia (Rello et al., 2013) or non-native speakers, as well as for tasks like relation extraction and machine translation (Stajner & Popovic', 2016; Niklaus et al., 2016; Siddharthan (2002).

Lexical Simplification (LS) and Syntactic Simplification are two of the subfields of TS (SS). According to Paetzold and Specia (2017), while SS simplifies sentences based on grammatical and structural norms, LS simplifies sentences based on lexicon-based rules (Shardlow, 2014). But as noted by Paetzold and Specia (2017), prior psycholinguistics research demonstrates that substituting audience-friendly words for unfamiliar ones, as LS does, has the potential to significantly improve text readability. Additionally, a simple term employed in a text will aid in clearly explaining the concept to the readers, according to Wright et al. (2003), the information used in this study is from a previous analysis (Bakar et. al, 2016; Jamaludin, 2018). This study will therefore concentrate on this lexical data, which is a lexical simplification.

## Methodology

The methodology of this research consists of four phases. Figure 1 shows all phases involved in developing this research.

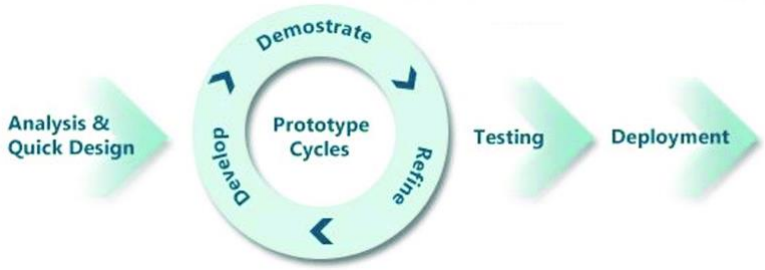


Figure 1: Phases of Developing MCWIS based on Rapid Application Development Methodology

The "analysis and quick design" phase is the first step in developing the system. In this phase, the researchers conducted a meeting to discuss the Malay language grammar, the concept of NLP, and the existing lexical simplification system and its limitations. The identified issues were down and possible solutions will be addressed by the researchers. Goals and expectations were determined before assigning the task and choosing suitable tools. Further research on the current problems in MCWIS must be done before defining the requirements. To avoid miscommunication, the specified functional and non-functional requirements were finalized.

In order to gain a clearer picture and details about what to expect and the purpose of this research, a literature review of previous works based on online journals and reports using the keywords "lexical simplification system" and "Malay" were done. To achieve the objectives, the researchers must gather data about complex and non-complex words, their structures, and grammar rules. For example, the affixes like 'me-', and 'meN-' and their roles in formatting a new word or altering the meaning of the base word (Karim et al., 2008).

The gathered information was analysed to determine how to write codes to apply all of the data into the rules-based system and database in the system before proceeding to the next phase. Next is the prototype cycle. Researchers began to develop the system and code tasks by using Python as the backend and HTML for the interfaces. This phase was done by applying the rules based on as much data as possible and making sure that the system can properly differentiate complex and non-complex words. Later, the development will focus only on testing the prototype system. The potential users (non-native speakers) will be approached to acquire the feedback that is necessary to maintain and develop the system further. The maintenance, where researchers will basically do the coding tasks related to any additional databases and knowledge bases that must be added to improve the effectiveness, accuracy, and reliability of the system. Finally, is the release part, where the final version of the system will be released to the public to be used on a consumer level. At this stage, a complete report about the system will be written by researchers.

**MCWIS design and prototype**

This section explains the phases of methodology for the design and development of a web-based system for MCWIS. The section is divided into two sub-sections; (A) The requirement of the web-based system for MCWIS, and (B) The prototype development of MCWIS; a web-based system created in order to demonstrate the gathered requirement.

**The requirements of MCWIS**

A requirement-gathering process was carried out by analysing the articles, previous research, and existing systems. From the analysed materials, problem statements, requirements, and solutions were identified. In order to gather information, the researchers analysed the system and finalize the possible solutions. Examples of the systems that have

been analysed are *Name Entity Extractor*, *Quillbot*, and *Word Entity Identification System*. Then, the requirements were elicited. The respondents were actively involved during the construction (development) phase, where the interface of the prototype was shown to them to get their feedback and comments. Table 1 lists eight significant requirements (and their priority) produced from the requirements gathering process. The priority is set to M: Mandatory, D: Desired, and O: Optional. Signing up for a new account, deleting an account, logging in, managing the website, entering data, selecting a task, resetting data, and sending reviews and feedback are all part of the requirements.

Table 1
*Functional Requirements Definition*

| Requirement ID | Requirement Description | Priority |
|---|---|---|
| **MCWIS_01** | **Sign Up New Account** | |
| MCWIS_01_01 | User creates an account to use the system | M |
| MCWIS_01_02 | User must key in complete details to sign up for a new account | M |
| **MCWIS_02** | **Delete Account** | |
| MCWIS_02_01 | Admin deletes the unnecessary account | D |
| **MCWIS_03** | **Login** | |
| MCWIS_03_01 | Admin and user login the website by entering the correct user ID and password | M |
| MCWIS_03_02 | Remind admin and user to key in again if user ID or password was wrong | D |
| MCWIS_03_03 | Admin and user log out of the account | D |
| **MCWIS_04** | **Manage Website** | |
| MCWIS_04_01 | Admin adds new rules and words into the library. | M |
| **MCWIS_05** | **Enter Data** | |
| MCWIS_05_01 | User enters the text into the provided text field | M |
| MCWIS_05_02 | System will advise the user to enter the text if the text field is empty | D |
| **MCWIS_06** | **Choose Task** | |
| MCWIS_06_01 | User chooses a category (task) that must be executed (such as all, noun, verb, adjective, and compound words) | M |
| MCWIS_06_02 | User click submit the text and the desired task to be executed | M |
| **MCWIS_07** | **Reset Data** | |
| MCWIS_07_01 | User click reset all data inside the text field | M |

| | | |
|---|---|---|
| **MCWIS_08** | **Send review and feedback** | |
| MCWIS_08_01 | Admin create review and feedback page | M |
| MCWIS_08_02 | User send (and read) review and feedback | M |
| MCWIS_08_03 | User edit review and feedback | D |
| MCWIS_08_04 | User delete review and feedback | D |

**The UML model and flowchart**

The use case is envisioning and modelling the requirements of the web-based system using the appropriate modelling method and tools. In this work, the Unified Modelling Language (UML) is used to visualize and model the requirements. The models used in this work are one behavioural diagram, and a use case diagram (see Figure 2). The diagrams were drawn using draw.io. The communications between the use cases and the actor for a web-based system that will be used in MCWIS. Eight major use cases are Sign Up New Account, Delete Account, Login, Manage Website, Enter Data, Choose Task, Reset Data, and Send Review and Feedback. Hence, the operations involved in the MCWIS web-based system are illustrated in the flow chart in Figure 3.

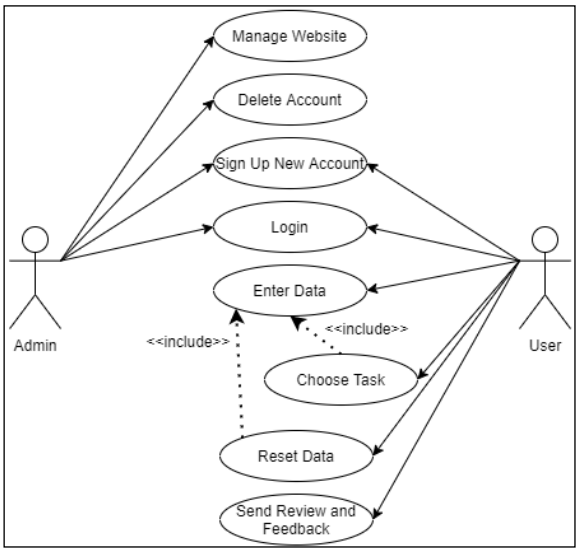


*Figure 2.* MCWIS Use Case Diagram


*Figure 3.* MCWIS Flowchart

**The prototype of MCWIS**

A prototype of a web-based system for MCWIS was developed. It contains the requirements stated in the previous subsection. Software prototyping is a common practice for presenting software requirements to gather additional feedback and suggestions from users based on their interactions with the prototype. PyCharm 2021.2.2 was used as a tool to create the backend system and interface. Further, the cPanel server platform was used to facilitate critical functions like user authentication, and database for data storage.

Figures 4-5 show some selected interfaces of MCWIS.

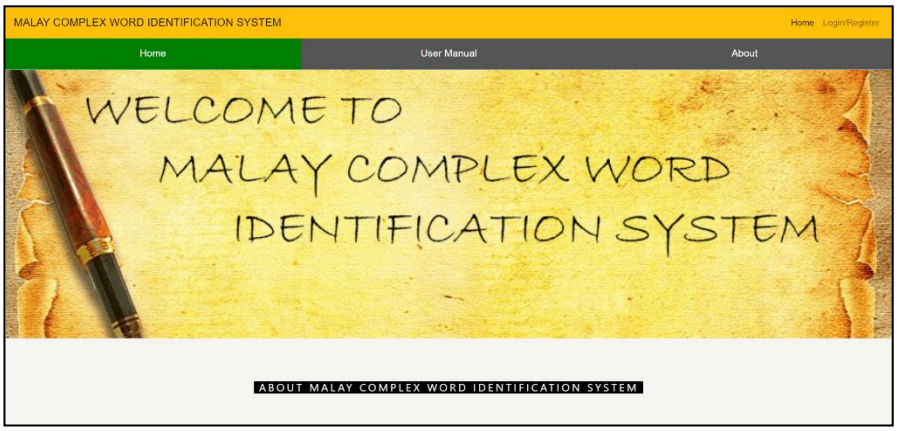


*Figure 4.* MCWIS Main Page

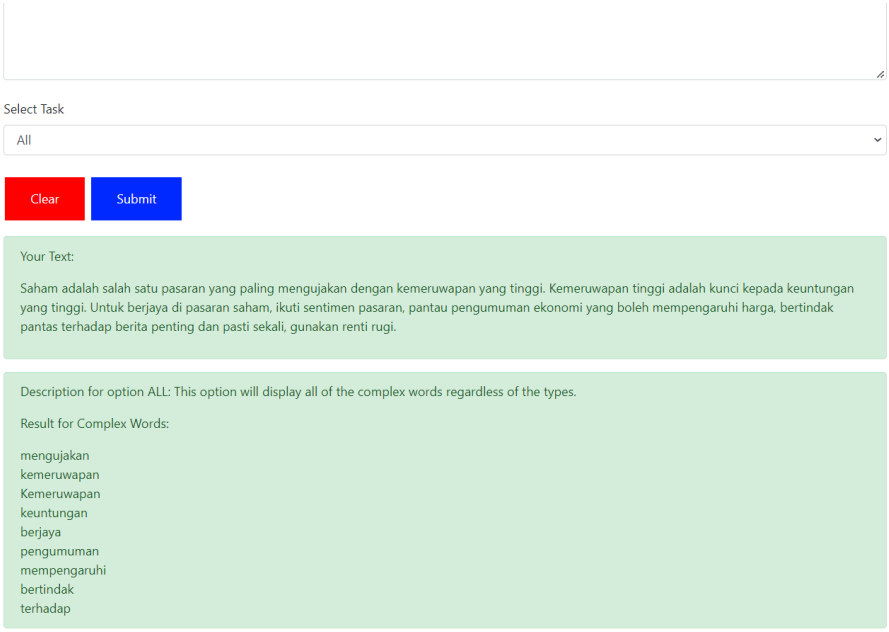


*Figure 5.* Result Page

In Figure 4, the interfaces of the MCWIS are shown. A brief description of this system is also included. The address and contact information for the developer are shown in the MCWIS description. The user guide for newcomers can be found under the second tab on this page. Users can find the necessary information on how to use this system in the third tab. Figure 5 depicts the inserted text, selected task, and results after running this system. The figure shows the results given by this system. It shows the description of the selected task and the detected complex words.

## MCWIS evaluation and results

Two types of evaluation were conducted in this study. The first evaluation was conducted on 30 respondents; the second evaluation was conducted with an expert reviewer. The respondents consisted of 20 non-native speakers and 10 native speakers as control subjects. A simple random sampling was chosen. The respondents were approached randomly in a WhatsApp group, meeting physically and through Google Meet. The instruments used for the evaluation were the MCWIS web-based system and a questionnaire.

The questionnaire had 11 questions divided into four sections. Section A asked about the demographic information of the respondents, while Sections B to D asked the respondents for feedback on the MCWIS web-based system. The respondents performed the following step-by-step procedure for the evaluation: (1) read the description, (2) watched the video for more understanding of this system, (3) interacted with the MCWIS web-based system as stated in the experiment procedure, and (4) answered the questionnaire.

Table 2
*Respondents' Demographic Percentage Distribution*

| Profile Factors | Particulars | f | % |
|---|---|---|---|
| Age | 18-20 years | 0 | 0 |
| | 21-23 years | 28 | 93.3 |
| | 24-26 years | 2 | 6.7 |
| | 27-29 years | 0 | 0 |
| | 30 and above | 0 | 0 |
| Mother tongue | Malay | 10 | 33.33 |
| | English | 3 | 10 |
| | Mandarin | 14 | 46.7 |
| | Tamil | 1 | 3.33 |
| | Thai | 2 | 6.67 |
| Learn Malay language | Yes | 23 | 76.7 |
| | No | 7 | 23.3 |

Based on Table 2, 93.3%, or 28 of 30 respondents, are between 21 and 23 years old, while another 6.7%, or 2 respondents, are between 24 to 26 years old. Next, the table shows that the mother tongue of 46.7% (14) of the respondents, is Mandarin. Meanwhile, the mother tongue of 33.3%, (10) is Malays, which acted as control subjects. Three (10%) respondents speak English, followed by the Thai language with two (6.7%) respondents Tamil as the mother tongue with 1 respondent (3.3%). Meanwhile, 76.7% or 23 respondents stated that they did learn the Malay language, while 23.3% or 7 respondents mentioned that they did not learn the Malay language.

An analysis was conducted on the responses of the respondents from Section B to Section D of the questionnaire. These sections measure the perception of the respondents towards MCWIS' usefulness, accuracy, and bug report. It also measured the overall rating and satisfaction of the respondents towards MCWIS. Table 3 reports the average/mean of the responses.

Table 3
*Usability of MCWIS*

| Perception Factors | Particulars | F | % |
|---|---|---|---|
| Accuracy | Strongly disagree | 0 | 0 |
| | Disagree | 0 | 0 |
| | Neutral | 12 | 40 |
| | Agree | 18 | 60 |
| | Strongly agree | 0 | 0 |
| Total number of complex words detected | All | 11 | 36.7 |
| | Majority | 19 | 63.3 |
| | Minimal | 0 | 0 |
| | Not at all | 0 | 0 |
| Total number of compound words detected | All | 14 | 46.7 |
| | Majority | 15 | 50 |
| | Minimal | 1 | 3.3 |
| | Not at all | 0 | 0 |

Based on Table 3, the result shows that 18 out of 30 respondents answered agree and the percentage is 60% for the question on the accuracy of the system in detecting complex words in the Malay language, while 12 respondents which are 40% answered

neutral.

For the second question, 19 out of 30 respondents answered that the system managed to detect the majority of the complex words within the input text, and the percentage was 63.3%. Meanwhile, 11 respondents, which is 36.7%, said all complex words can be detected by the system.

For the third question, 15 out of 30 respondents answered that the system managed to detect the majority of the compound words within the input text and the percentage was 50%. Meanwhile, 14 respondents, which is 46.7%, answered that all complex words can be detected by the system, and only 1 respondent which represents 3.3% answered that the system managed to detect minimal compound words within the input text.

As for the final question, 12 respondents, which is 40%, reported the improperly displayed result, which could range from '*ses*', '*neg*', '*ian*', and more. Six respondents, which is 20%, reported that some root words are detected as complex words. While 5.7% of the respondents reported about incomplete words, which could range from '*persekutu*', '*peri*', '*longgaran*' and several more. Eleven respondents, which is 29.7%, managed to run this system without any errors. Only one respondent reported repetition of the same word.

An evaluation with an expert domain was also been conducted. Tables 4 and 5 show the summary of MCWIS system evaluation by an expert in the form of a confusion matrix. True Negative (TN) represents the number of correctly detected and excluded non-complex words at 491 words, while False Positive (FP) represents the word that was supposedly detected as non-complex but detected as complex at 12 words. False Negative (FN) represents the complex words but detected as not complex at 62 words, while True Positive (TP) represents the properly detected complex words at 267 words. Overall, MCWIS scored 91.11% in terms of accuracy, 95.7% on precision, and 81.16% on recall.

Table 4
*Expert Review Evaluation*

| N = 832 | Predicted: NO | Predicted: YES |
|---|---|---|
| Actual: NO | TN: 491 | FP: 12 |
| Actual: YES | FN: 62 | TP: 267 |

Table 5
*Accuracy, Precision and Recall*

| Evaluation | % |
|---|---|
| Accuracy (TP+TN) | 91.11 |
| Precision (TP/(TP+FP)) | 95.70 |
| Recall (TP/(TP+FN)) | 81.16 |

## Conclusion

This article described the design and development of a web-based system known as MCWIS. Many aspects of artificial intelligence can be studied. The function of NLP and the downside of machine learning are some of them. The ratings of "four" at 63.3% and "five" at 46.7% concluded that MCWIS made the users satisfied with its usefulness and accuracy. It also indicated that MCWIS meets most of the requirements of users needed.

Based on the acquired feedback, the system is working properly and the majority of the respondents are satisfied with the system. The major critique was of the interface design, which could be improved to make it more appealing. Other suggestions involved the inclusion of words in the vocabulary, thus, enabling to support of more languages, and

fixing all of the identified bugs. The improvement proposed by respondents are such as a more professional interface, support for multiple languages, support mobile version, extended vocabulary, and the overall application is satisfactory, easy to use and quite a complete system.

There are some suggested enhancements in the future., which include increasing the functionality of MCWIS to support more languages. All of the detected bugs must be fixed while adjusting the system to solve some glitches. UI/UX design also needs to be improved in order to make it more appealing. Artificial Intelligence could be implemented in a future version to increase the accuracy of the system and get rid of the existing bugs and potential bugs that could appear in the future. In addition, a mobile version of MCWIS is proposed for the preferences of mobile users.

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## References

Bakar, J. A., Omar, K., Nasrudin, M. F., & Murah, M. Z. (2016). NUWT: Jawi-specific buckwalter corpus for Malay word tokenization. *Journal of Information and Communication Technology*, *15*(1), 107-131.

Finnimore, P., Fritzsch, E., King, D., Sneyd, A., Rehman, A. U., Alva-Manchego, F., & Vlachos, A. (2019). Strong baselines for complex word identification across multiple languages. *arXiv preprint arXiv:1904.05953*.

Jamaluddin, N. (2018). *Kepelbagaian pendekatan dalam penelitian tatabahasa bahasa melayu* (In Malay). Retrieved from *https://www. researchgate. net/publication/339446853_KEPELBAGAIAN_ PENDEKATAN_ DALAM_PENELITIAN_TATABAHASA_BAHASA_MELAYU*.

Karim, N. S., Onn, F. M., Musa, H. H., & Mahmood, A. H. (2008). Tatabahasa dewan edisi ketiga. *Kuala Lumpur: Dewan Bahasa dan Pustaka*.

Niklaus, C., Bermeitinger, B., Handschuh, S., and Freitas, A. (2016). A sentence simplification system for improving relation extracti on. In Proc. of COLING'16.

Paetzold, G., & Specia, L. (2017). Lexical simplification with neural ranking. In *Proceedings of the 15th Conference of the European Chapter of the Association for Computational Linguistics: Volume 2, Short Papers*, 34-40.

Rello, L., Ricardo Baeza-Yates, Stefan Bott, and Horacio Saggion. (2013). Simplify or help?: text simplification strategies for people with dyslexia. In Proc. of the 10th International Cross-Disciplinary Conference on Web Accesibility, pages 15:1 – 15:10.

Siddharthan, A. (2002). An architecture for a text simplification system. In Proc. of LEC, pages 64–71. Štajner, S., & Saggion, H. (2018). Data-Driven Text Simplification. In Proceedings of the 27th International Conference on Computati onal Linguistics: Tutorial Abstracts(pp. 19-23).

Shardlow, M. (2014). A survey of automated text simplification. *International Journal of*

*Advanced Computer Science and Applications*, *4*(1), 58-70.

Stajner, S., and Popovi´c, M. (2016). Can text simplification help machine translation. Baltic J. Modern Computing, 4:230–242.

Wright, I., Waterman, M., Prescott, H., & Murdoch-Eaton, D. (2003). A new Stroop-like measure of inhibitory function development: Typical developmental trends. *Journal of Child Psychology and Psychiatry*, *44*(4), 561-575.

Wurm, S. A., Mühlhäusler, P., & Tryon, D. T. (Eds.). (2011). *Atlas of Languages of Intercultural Communication in the Pacific, Asia, and the Americas: Vol I: Maps. Vol II: Texts* (Vol. 13). Walter de Gruyter.

Yasin, A., Gaber, S., Omar, M., Mohd, H., Baharom, F., & Md Din, M. (2012). Designing story card in extreme programming using machine learning technique. In: Knowledge Management International Conference (KMICe) 2012, 4 – 6 July 2012, Johor Bahru, Malaysia.

Xu, W., Callison-Burch, C., & Napoles, C. (2015). Problems in current text simplification research: New data can help. Transactions of the Association for Computational Linguistics, 3, 283-297.

Yimam, S. M., Biemann, C., Malmasi, S., Paetzold, G. H., Specia, L., Štajner, S., ... & Zampieri, M. (2018). A report on the complex word identification shared task 2018. *arXiv preprint arXiv:1804.09132*.

# IMPACT OF WEB 2.0 TOOLS IN PROBLEM-BASED LEARNING METHODS: STUDENTS PERSPECTIVES

Raja Haslinda Raja Mohd Ali*[a], & Saliza Abdul Aziz [b]
[a]bAccounting Information Systems Research and Development Institute (AISRED),
Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia
*Corresponding Author: rj.linda@uum.edu.my

## Abstract

This paper discusses the students' perspectives on the impact of web 2.0 tools in problem-based learning teaching method. Data were gathered from 44 accounting students enrolled in the Accounting System Analysis and Design course in the September semester of 2021. Students were asked to provide their reflection on how the class has been conducted related to the usage of various Web 2.0 tools. During the whole semester, a part of the UUM Online Learning, various Web 2.0 tools such as Padlet, Kahoot!, Quizizz, Socrative, Mentimeter, WheelofNames, Miro, MOOC, and Youtube have been used to increase the students' understanding and engagement in class. At least two online tools were used in each class session, where one tool will be used to assess, formally or informally, the students' understanding on the discussion for that session (such as Kahoot!), and the other tool used to increase the student's participation and engagement in class discussion (such as Miro). Finding shows that web 2.0 tools give significant impact to most of these students in terms of increasing students' focus, accelerate learning process, more understanding on topics discussed, more engagement to the discussion, fun learning environment, and sense of caring. This study will shed some light in terms of the understanding and engagement of students on the subject matters.

*Keywords:* Problem-Based Learning, web 2.0, MOOC, understanding, engagement

## Introduction

Project-Based Learning or "PBL" is a teaching method that allows students to learn through experience of solving real-life problems. With PBL, education has become a part of the students' life skills (Pestrosino, 2007). Students learn to cooperate and develop skills directly related to their own personal needs and allowing them to collaborate to solve real-world problems that are contextually relevant (Edutopia, 2008).

Various studies have been conducted to investigate the impact of technology on PBL method. This paper will add to the body of knowledge by discussing the accounting systems and analysis design students' perspectives on the impact of web 2.0 tools in problem-based learning method.

This paper will be presented as follows. The following section will discuss the studies that have been conducted related to technology and problem-based learning. Next, the methodology used to collect data from students is presented followed by the findings section. The paper conclude with the discussion and conclusion section.

## Literature Review

## Technology

The interactive learning environment could be created by a way of integrating technology into the learning process. It would be possible via specific interactive technologies i.e., using intelligent tutoring systems as well as via initiatives taken by educators i.e., via quizzing tools to provide individually challenging tasks (Seibert, 2021). This is especially when technology is not part of the learning process and depends on the initiative of the educator by integrating technology in a way of promoting a more understanding, engaging, and interactive learning process. Indirectly, this practice encourages learners' cognitive learning and is known as cognitive activation in teaching effective process and quality (Baumer, Kunter, Blum, Brunner, Voss, Jordan, Klusmann, Krauss, Neubrand, & Tsai, 2010; Seidel & Shavelson, 2007).

The cognitive activation learning environment is created with learning activities that could stimulate learners to reflect, solve problems, encourage decision making, as well as be selective and integrate knowledge. This type of learning process leads to sustainable learning and is supported in many studies (Baumert et al., 2010; Kunter, Klusmann, Baumert, Richter, Voss, & Hachfeld, 2013; Lipowski, Rakoczy, Pauli, Drollinger-Vetter, Klieme, & Reusser, 2009). Thus, the learning processes could be successfully implemented with the use of technology while the learners' cognitive engagement with the subject content is enhanced (Gebre, Saroyan, & Bracewell, 2014).

## Problem-Based Learning

PBL pedagogy is a well-established instructional learning process that motivates learners to engage in tasks beyond their current abilities with deeper comprehension knowledge via active learning, planning, and discussion among a group (Schmit, Rotgans, & Yew, 2011; Sun, Ni, Zhao,Shen, & Wang, 2019; Hmelo-Silver, Duncan, & Chinn, 2007). In a way, PBL could strengthen learners' subject knowledge, reasoning capabilities, teamwork and communication skills as well as problem-solving and lifelong skills (Aslan, 2021).

Integration of a blended learning environment could create a deeper understanding of the subject content via problem-oriented strategies, encouraging learners to collaborate with peers and guiding attention to the ill-structured real-life problem (Liao, & Wu, 2022; Wu & Nian, 2021). Therefore, Savery (2015) has highlighted several characteristics for PBL method, namely:

1) Students must have responsibility on their own learning where students engage with the problem with whatever current knowledge or experience that they have. Students will have the responsibility to seek relevant information and discuss the information with the other members in order to develop possible solution.
2) The problems simulation used in PBL must be ill-structured and allow for free inquiry. Students will need to identify the problem and set parameters on how to solve the problem.
3) Learning should be integrated from a wide range of disciplines and subjects that relates to the problem.
4) Collaboration is essential where all members need to share information in order to develop solution.

5) What students learn during their self-directed learning must be applied back to the problem with reanalysis and resolution.
6) A closing analysis of what has been learned from work with the problem and a discussion of what concepts and principles have been learned is essential.
7) Self and peer assessment should be carried out at the completion of each problem and at the end of every curricular unit.
8) Student examinations must measure student progress toward the goals of PBL in terms of articulate what they know and what they have learned.
9) PBL must be pedagogical base in the curriculum.

## Methodology

This study is an exploratory kind of study which applies an evaluation method in order to understand the impact of technology integration in PBL pedagogy to improve learning understanding. The unit of analysis is an individual learner who registered for the Accounting Systems Analysis and Design (ASAD) course in semester one of the year 2021/2022. A total of 44 students from group C were chosen due to their experience in concepts as well as technical types of knowledge. The demographic of the students is presented in Table 1 below.

Table 1: Demographic of Respondents

| Respondents | No. | Percentage |
|---|---|---|
| Gender | | |
| Male | 10 | 20.8 |
| Female | 38 | 79.2 |
| Race | | |
| Malay | 28 | 58.3 |
| Chinese | 17 | 35.4 |
| India | 3 | 6.3 |
| Semester | | |
| Five | 42 | 87.5 |
| Nine | 6 | 12.5 |
| Programme | | |
| Bachelor in Accounting (Hons) | 16 | 33.3 |
| Bachelor in Accounting (IS)(Hons) | 26 | 54.2 |
| Bachelor in Education (Acct.)(Hons) | 6 | 12.5 |

The link to the survey question was posted in Online Learning on students' reflections of the class conducted for the whole semester. The reflections collected was analyzed via thematic analysis to highlight the theme created from the survey response.

The focus of the study is to investigate the course learning objectives of the ASAD are achieved among the learners of the semester of September 2021. The syllabus required the learners to be able: (1) understand the concepts and application process; (2) prepare related diagrams; (3) manage project management; and (4) understand appropriate system development methods. Hence, reflective practice is one of the practical tools which requires trainers to evaluate experience, understand and learn from it for current feedback or future guidance (Britton, 2010).

The survey or reflection is mainly focused on the assessment which is a case related to system analysis and development given in a form of two PBL questions i.e., PBL 1 and PBL 2. The PBL is required to be attempted in a group of four or five which is considered as the coursework. Each class session is conducted in a form of a discussion on how to solve the PBL questions. The lecturer would only act as a facilitator and stimulate questions to give ideas to students on how to solve the issue in the questions. Various technology tools are applied to encourage the learning process i.e., UUM Online Learning, Padlet, Kahoot!, Quizizz, Socrative, Mentimeter, WheelofNames, Miro, MOOC, and Youtube.

## Findings

This section presents the students' reflection of the usage of Web 2.0 tools throughout their learning process in Accounting Systems Analysis and Design course. They agreed that various applications have been used in this course throughout this course. One of the students claimed that:

> *"We have been thought in different teaching methods with varieties of activities that have been done to make us understand more on this subject and get to picture the syllabus covered. Instead of just listening to lecture, we will also have a qahoot session and quiziz session during our class."*
>
> *(Student 1, Female, Malay, Semester 9, B.Ed.(Acct.)(Hons))*

Using various web 2.0 tools in this course has increase the excitement and enjoyment of the students as some of them asserted that:

> *"This class was full of activity that makes student enjoying the process of learning"*
>
> *(Student 45, Female, Malay, Semester 5, B.Acct. (IS)(Hons))*

> *"This class is quite interesting since that dr make a lot of activities during the learning session".*
>
> *(Student 20, Female, Malay, Semester 5, B.Acct. (IS)(Hons))*

> *"I really like the way Dr conduct the class by using Quizizz, Kahoot and Mentimeter."*
>
> *(Student 8, Female, Chinese, Semester 5, B.Acct. (IS)(Hons))*

Various impact have been identified on the usage of Web 2.0 tools on PBL technique ranging from increasing students' focus on the learning process to enhancing sense of being taken care. The details of each impacts are discussed below.

### *More focus*

Some students claimed that using web 2.0 tools can increase their focus on what have been discussed in class as stated by student below:

> *"I think this is the smart way to encourage students to be more focus in class and on what they are studying regarding the topics plus with the lecture hours that is early*

*in the morning which usually most of the students feel lazier or more unready/sleepier"*

*(Student 1, Female, Malay, Semester 9, B.Ed.(Acct.)(Hons))*

Another student pointed out that it helps students to be more alert in class besides giving more opportunities to have equal participation in class.

*"…it is a good idea to spin wheel the names so that we can be more alert in the class until we finish the discussion and it will give the opportunities to all my classmates to involve in the class activity"*

*(Student 3, Female, Malay, Semester 9, B.Ed.(Acct.)(Hons))*

***Make learning process faster and better***

A student asserted that the usage of Quizizz has helped her to learn faster:

*"…it is sometimes quite difficult for me to catch up the whole classes on that time. I think it is because I used to read slides before the class start but for a few classes, I am not able to read the slides earlier. However, when Dr. created a quiz as our activity on that day, I am able to learn from the slides because basically right after I did the quizzes, I will re-check my wrong answers and try to find the correct answers on the slides"*

*(Student 2, Female, Malay, Semester 9, B.Ed.(Acct.)(Hons))*

While some other students agreed that using various web 2.0 tools make their learning process better. They agreed that they can understand the topics better as pointed out by these students:

*"Even the course seems difficult, all the exercises such as Kahoot, Quizziz and more helped me in understanding the topics".*

*(Student 28, Female, Malay, Semester 5, B.Acct. (IS)(Hons))*

*"The Kahoot/Quizizz games and exercise discussions really helped me in understanding the topics better. These activities also helped me in memorising the important parts for each topic"*

*(Student 22, Female, Chinese, Semester 5, B.Acct. (IS)(Hons))*

*"I am able to understand on how the process of information systems analysis and design works. Dr. has taught us very well and at the same time, she used Kahoot! to test my knowledge and understanding for every topic I have learned. I can also strengthen my knowledge as I learned from the mistakes during the Kahoot! session."*

*(Student 37, Female, Malay, Semester 5, B.Acct.(Hons))*

*"Honestly, I love the teaching method utilised during the class session: it is so engaging and interactive. Alhamdulillah, it is much easier for me to understand this course because you always teach us during the quiz sessions such as Kahoot. You will explain every detail regarding the question and answer to make sure we get a better picture of the topic"*

*(Student 43, Female, Malay, Semester 5, B.Acct.(IS)(Hons))*

In addition, a student pointed out that using web 2.0 tool is convenient which enable her to learn at any time.

> *"UUM Open Learning on MOOC also helps me whenever I wanted to study more about the topics"*
>
> *(Student 6, Female, Malay, Semester 9, B.Ed.(Acct.)(Hons))*

***Fun learning environment***

Using web 2.0 tools also provide a fun learning environment to the students. Students asserted that:

> *"Even though, there is a lot of pressure on taking this course and yet it was fun…I also enjoyed the activities that we played in the class such as Kahoot, Mentimeter, Quizizz and so on."*
>
> *(Student 2, Female, Malay, Semester 9, B.Ed.(Acct.)(Hons))*

Also, it is one of good way to test students understanding as claimed by a student:

> *"I also think her use of Quizizz and Kahoot to test our progress is a good way to teach. I am very happy to study this subject."*
>
> *(Student 34, Female, Chinese, Semester 5, B.Acct.(Hons))*

***More engagement***

The findings suggested that employment of web 2.0 tools in class made the students feel more engaged as stated by students below:

> *"So far I feel engaged with each in class activities like Kahoot, group discussion and in class exercise discussion.*
>
> *(Student 44, Male, Malay, Semester 5, B.Acct.(Hons))*

> *"… I feel very participative during classes at the same time understand what the Dr is teaching me that day."*
>
> *(Student 30, Female, Malay, Semester 5, B.Acct.(IS)(Hons))*

***Sense of being taken care***

Another impact of the usage of web 2.0 tool is when a student feels that he has been taken care.

> *"I like that you always make the Mentimeter and ask how do we feel. It give me a sense that I been taken care of even if the work is demanding mentally"*
>
> *(Student 44, Male, Malay, Semester 5, B.Acct.(Hons))*

Based on the findings above, it could be seen that using web 2.0 tools in class has given quite a significant impact to the students especially in the problem-based learning method. The impact ranges from increasing students focus in class on the topics and discussion in class to the sense of being taken care by the facilitator.

## Discussion & Conclusion

The PBL environment indirectly contributed to promoting a wide range of knowledge, and skills enhancement as well as creating a learners' attitude. The learning environment supported by technology on the other hand assists learners in gaining an insight into more understandable and engaged with regards to learning content and ways of problem-solving thinking. Indeed, learners deeply engage and utilize the web 2.0 tools and PBL pedagogy tend to actively participate, more focus as well as more engage. This result is in line with Gebre et. al (2014) that highlighted the use of technology may enhance learners' cognitive engagement with the subject content.

Undoubtedly, the learning process become effectively faster with better understanding and fun learning environment. This result was supported by Karahan and Roehrig (2016) where their study also found that the usage of Web 2.0 provides a fun learning experience to their respondents. The learning environment also create a sense of being taken care and indirectly achieved the learning outcome. Undeniable, the technology also brings new challenges in the learning process which required a responsibility of the educator to make certain alignment to support the process smoothly.

Indeed, further study is required to get a more robust implementation due to the focus of this study is on the Accounting System Analysis and Design course in the September semester of 2021. The sample is relatively small, and the approach presented could not be generalized to other groups of learners. As for the future study, it would be value-added if the same study is conducted in a new setting to view consistency in results and justification. An additional methodology could also possibly be applied i.e., focus groups, observations, questionnaires, feedback, and interviews to deepen the impact generated by integrating technology in PBL for better understanding and learners' engagement.

## References

Aslan, A. (2021). Problem-based learning in live online classes: Learning achievement, problem-solving skill, communication skill, and interaction. *Computers & Education*, 171 (October 2021). 104237. https://doi.org/10.1016/j.compedu.2021.104237

Baumert, J., Kunter, M., Blum, W., Brunner, M., Voss, T., Jordan, A., Klusmann, U., Krauss, S., Neubrand, M., & Tsai, Y. -M. (2010). Teachers' mathematical knowledge, cognitive activation in the classroom, and student progress. *American Educational Research Journal*. 47(1). 133-180. https://doi.org/10.3102/0002831209345157

Gebre, E., Saroyan, A., & Bracewell, R. (2014). Students' engagement in technology-rich classrooms and its relationship to professors' conceptions of effective teaching. *British Journal of Educational Technology*. 45(1). 83-96. https://doi.org/10.1111/bjet.12001

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to kirschner, sweller, and clark. *Educational Psychologist*, *42*(2), 99–107. https://doi.org/10.1080/00461520701263368

Karahan, E. & Roehrig, G. (2016). Use of web 2.0 technologies to enhance learning experiences in alternative school settings. International Journal of Education in Mathematics, Science and Technology, 4(4), 272-283.

Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology*. 105(3). 805-820. https://doi.org/10.1037/a0032583

Liao, C. -H., & Wu, J. -Y. (2022). Deploying multimodal learning analytics models to explore the impact of digital distraction and peer learning on student performance. Computers & Education. 190(2022). 1-14.

Lipowsky, F., Rakoczy, K., Pauli, C., Drollinger-Vetter, B., klieme, E., & Reusser, K. (2009). Quality of geometry instruction and its short-term impact on students' understanding of the Pythagorean Theorem. *Learning and Instruction*. 19(6). 527-537. https://doi.org/10.1016/j.learninstruc.2008.11.001

Savery, J. R. (2015), Overview of Problem-Based Learning: Definitions and Distinctions. In Walker. A, Leary, H., Hmelo-Silver, C. E. & Ertmer, P.A. *Essential Reading in Problem-Based Learning*, (pp 7-10), Purdue University Press.

Seibert, S. A. (2021). Problem-based learning: A strategy to foster generation Z's critical thinking and perseverance. *Teaching and Learning in Nursing*. 16 (2021). 85-88.

Seidel, T., &Shavelson, R. J. (2007). Teaching effectiveness research in the past decade: The role of theory and research design in disentangling meta-analysis results. *Review of Educational Research*. 77(4). 454-499. https://doi.org/10.3102/0034654307310317

Schmidt, H. G., Rotgans, J. I., & Yew, E. H. (2011). The process of problem-based learning: What works and why. *Medical Education, 45*(8), 792–806. https://doi.org/10.1111/j.1365-2923.2011.04035.x

Sun, Y. Q., Ni, L. H., Zhao, Y. M., Shen, X. L., & Wang, N. (2019). Understanding students' engagement in MOOCs: An integration of self-determination theory and theory of relationship quality. *British Journal of Educational Technology, 50*(6), 3156–3174. https://doi.org/10.1111/bjet.12724. Article e0001.

Wu, J. -Y., & Nian, M. -W. (2021). The dynamics of an online learning community in a hybrid statistics classroom over time: Implications for the question-oriented problem-solving course design with the social network analysis approach. Computers & Education. 166 (June 2021). https://doi.org/10.1016/j.compedu.2020.104120

Zotou, M., Tambouris, E., & Tarabanis, K. (2020). Data-driven problem based learning: Enhancing problem based learning with learning analytics. *Educ. Technol. Res. Dev., 68*(6), 3393–3424. https://link.springer.com/article/10.1007/s11423-020-09828-8

# The Impact of Technology on Problem-based Learning in Improving Student Learning Engagement

Saliza Abdul Aziz*[a], Raja Haslinda Raja Mohd Ali[b] & Fathiyyah Abu Bakar[c]
[abc]Accounting Information Systems Research and Development Institute (AISRED),
Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia
*Corresponding Author: saliza@uum.edu.my

## Abstract

Problem-Based Learning (PBL) is a teaching method in which students learn by actively engaging in real-world and personally meaningful projects. It is also a way of student-centered approach or pedagogy in which students learn about a subject via experience and working in groups to solve an open-ended problem found in trigger material. The changing role among the learners in controlling the small groups of learners depends and focused on the student's reflection and reasoning to construct their own learning. However, the facilitator or educator has a role in facilitating learning by supporting, guiding, and monitoring the learning process. The paradigm shifts from traditional teaching and learning philosophy which is more often lecture-based somehow improved with the assistance of technology. An alternative of padlet, Kahoot!, Quizizz, Socrative, Mentimeter, WheelofNames, Miro, MOOC and Youtube had been agreed to be very helpful in better learning engagement besides the UUM Online Learning platform. Reflections from learning the Accounting System Analysis and Design course were gathered from 46 accounting students who enrolled for the September semester of the year 2021. Most of the learners felt engaged with the PBL learning process as they understood more with guidance from the educator via various technology tools. Indirectly, the technology applied in the learning PBL process increased the learners' focus, more clear understanding, created enjoy learning atmosphere, and deeply engaged in the discussion. Even though the constructs for teaching PBL are very different from traditional lecture teaching which often required extra preparation time and support, it successfully creates a more learning engagement among the learners.

*Keywords:* Learning, Engagement, Technology, Problem-Based Learning

## Introduction

The aim of Problem-Based Learning (PBL) is to adopt a new style of teaching and learning by encouraging the application of prior knowledge, collaborative learning, and active engagement (Seibert, 2021). This pedagogy had been adopted over 50 years in institutions of higher learning which reported on the value-added skills developed via the PBL approach. In specific, PBL is claimed to be able to improve the attitudes of learners; assist in academic achievement; develop leadership, communication, teamwork, critical thinking, and management skills; as well as enhance information searching and self-directed learning ability (Bruce, 2018; Polanco, Calderon, & Delgado, 2001; Hirca, 2011; Sahin & Yorek, 2009).

Irrefutable, there are challenges in ensuring the learners engage in the PBL pedagogy. The biggest challenges are teamwork, avoiding conflict, free-riding learners; and difficulty adapting to PBL roles (Bruce 2018). Indeed, enjoyable pedagogy is required to get avoid challenges and improve engagement among learners in the learning process. The learning

engagement would increase the learners' attention and focus as well as motivates them to engage in higher-level critical thinking. Learners perhaps diverse in the level of understanding but either behavioral, cognitive and affective engagement would give impact on the learning process depends on the approach implemented. Indeed, this study trying to understand on the impact of technology on PBL pedagogy in improving the student learning engagement. The scope of this study limited to the Accounting System Analysis and Design (ASAD) course enrolled for the September semester of the year 2021. The technology integration is the tools applied in the ASAD class as an alternative to the UUM Online learning platform which are padlet, Kahoot!, Quizizz, Socrative, Mentimeter, WheelofNames, Miro, MOOC and Youtube.

## Literature Review

### Technology

The integration of technology could create effortful learning and with problem-solving tasks, learners would be able to stimulate their thinking processes (Fiitterer, Scheiter, Cheung, & Stiirmer, 2022). Even though the importance of technology is well-known in easing the process, however, the impact of the use of technology is very crucial in ensuring the targeted output is achieved. The same principle applies in learning, where the frequency of usage is explained nothing much but the effect or the process of integration matter in ensuring the learning engagement and most importantly achieving the understanding of the subject matter.

Previous studies supported that technology indirectly could enhance teaching but still find answers on the benefits that could be claimed to be effortful learning with the integration of technology in teaching (Fiitterer et al., 2022; Cheung & Slavin, 2013; Hu, Gong, Lai, Leung, 2018). More often the previous study focused on the frequency of technology used in the learning process and few on the quality of technology integration in the learning process (Palak & Walls, 2009; Zhai, Zhang, & Li, 2016; Hamilton, Rosenberg, & Akcaogly, 2016; Petko, Cantieni, & Prasse, 2017; Sung, Chang, & Liu, 2016; Huang, Jiang, Yin, & Jong, 2021). Hence, this study tries to get a reflection from learners on the benefits of integrating technology in PBL towards enhancing learning engagement.

Undeniable, cognitive load of technology and distracted attention could deteriorate learners' knowledge retention and hindered the development of problem-solving skills and peer collaboration (Wang, Fang, & Gu, 2020; Perez-Escoda, Castro-Zubizarreta, & Fandos-Igado, 2016). Hence, interactive technology implementation is required to avoid any distraction and ensure the learners engaged actively in the discussion. As in this study the implementation of an alternative of padlet, Kahoot!, Quizizz, Socrative, Mentimeter, WheelofNames, Miro, MOOC and Youtube is introduced with aim for better understanding and avoid distracted attention in learning via PBL pedagogy.

### Problem-Based Learning (PBL)

PBL environment create a new norm that extended the in-class learning sessions to an engaging space for learners. The new environment could improve learners' motivation, communication, and real-world problem-solving skills (Aslan, 2021; Zotou, Tambouris, & Tarabanis, 2020). The given issue, case, or problem is assisted by an educator in encouraging learners to propose and discuss the particular problem-solving. The self-initiated learning engagement form learners with autonomy, energy, and vitality who experience a wide learning process and could improve academic achievement (Liao, & Wu, 2022; Ryan & Deci, 2020).

In enhancing learners, certain constructivist-oriented teaching practices are required. The aim is to provoke learners' active thinking to be appropriate i.e., open-ended tasks or

ill-defined problems which are open for multiple possible results, justification, and solutions (Wong & Liem, 2021; Seibert, 2021). It is basically the concept of PBL where the learning process is formed as constructive, self-directed, collaborative, and contextual learning (Dolmans, De Grave, Wolfhagen, & Van Der Vleutan, 2005; Toutain & Fayolle, 2016).

Indeed, PBL is seen to be as a high degree of learner-centredness which could encourage and motivates learners. Unquestionably, the complexity of the underlying problem needs to be carefully adapted to the target group in ensuring the learners are adequately provided with structured theoretical knowledge taught (Carriger, 2016; Hattie, 2015).

**Learning Engagement**

Engagement is a deeper connection between learners and a subject matter, either in reading materials or performed activities which is part of a learning requirement (Schussler, 2009). Moreover, teamwork, feedback as well as reflection space is a process of engagement and learning. In a way, PBL improves the learning process and leads to greater engagement and less boredom, satisfaction in solving a real problem, acquiring consciousness about the objects of study, and also the sensation of a deeper learning (Matzembacher, Gonzales, & Nascimento, 2019).

Learners' engagement closely related to cognitive and emotional engagement. The cognitive engagement is referring to the learners' effort while the emotional engagement reflected via the learners' response (Manwaring, Larsen, Graham, Henrie, & Halverson, 2017). Engaging in the learning process, learners required to have learning motivation to gain new skills and knowledge, interest as well as engage in the learning situation to avoid poor learning outcomes (Gao, Jiang, & Tang, 2020; Sun & Rueda, 2012; Alebaikan & Troudi, 2010; Ma'arop & Embi, 2016). Hence, the challenge is to create a learning environment with positive attraction, reduce absenteeism, increase engagement and satisfaction in the learning process.

## Methodology

This study is an exploratory kind of study which applies an evaluation method in order to understand the value of technology integration in PBL pedagogy to improve learning engagement. The focus is to know the extent the objectives of the Accounting System Analysis and Design (ASAD) are achieved among the learners of the September semester, 2021. The syllabus required the learners to be able: (1) understand the concepts and application process; (2) prepare related diagrams; (3) manage project management; and (4) understand appropriate system development methods. Indeed, reflective practice is one of the practical tools which requires trainers to evaluate experience, understand and learn from it for current feedback or future guidance (Britton, 2010).

The unit of analysis is an individual learner who registered for the ASAD course in semester one of the year 2021/2022. A total of 46 students were chosen due to their experience in concepts as well as technical types of knowledge. The link to the survey question was posted in Online Learning on students' reflections of the class conducted for the whole semester. The reflections collected then was analyzed via thematic analysis to highlight the theme created from the survey response.

The survey or reflection is mainly focused on the assessment which is a case related to system analysis and development given in a form of two PBL questions. The PBL is required to be attempted in a group of four or five. Each class session is conducted in a form of a discussion on how to solve the PBL questions. The lecturer would act as a facilitator and stimulate questions to give ideas to students on how to solve the issue in the

questions. Various technology tools are applied to encourage the learning process i.e., UUM Online Learning, Padlet, Kahoot!, Quizizz, Socrative, Mentimeter, WheelofNames, Miro, MOOC, and Youtube.

## Results and Discussion

Demographically, the ASAD learners of the semester September, 2021 consisted of 46 students. The learners are diverse in gender where 41 female and 5 male learners. The 41 female learners comprised of 23 Malay, 12 Chinese and 6 Indian learners, whilst the 5 males encompassed of 3 Malay and 2 Chinese learners. The course aim to develop skills and knowledge in relation to the systems development life cycle (SDLC) phases, i.e., system planning, system analysis, system design, system implementation, and system development.

The ASAD course principally exposed learners with the concepts and application process of information systems analysis as well as design. Hence, learners are required to prepare diagrams related to system analysis and system design phases which then assist learners to manage project management in the system development. In addition to that, learners also been equipped with appropriate system development knowledge, methods and modelling techniques.

Learning the ASAD course and assessed via two PBL project required learners to solve a case related to system analysis and development. The group tasks solved in a group of four to five members. The guide, discussion and knowledge sharing related to the PBL case project are conducted in each class session. During this class session, the lecturer would play a role as facilitator for the discussion and stimulate questions accordingly. The questions triggered are mainly to give idea to learners on how to solve the issue in each question. The questions, idea or knowledge sharing are created with an assistance of technology tools i.e., UUM online learning, Padlet, Kahoot!, Quizizz, Socrative, Mentimeter, WheelofNames, Miro, MOOC and Youtube. The usage of technology tools is mainly to create a pleasant learning environment, increase learners understanding as well as to generate a more engaged learning process.

Indeed, the PBL pedagogy adapted in ASAD course via technology integration had successfully create a deep engagement in the learning process. This is supported from the reflection shared from the 46 learners in September semester, 2021. The learners claimed that the technology integration on PBL do gave impacts in improving learners' learning engagement. The impacts in terms of increased the learners' focus, more clear understanding, enjoy the learning atmosphere and deeply engage in the discussion.

*i- Increased the learners' focus*

The difficulty level of each course could indirectly indicate the level of engagement or distraction faced by learners. The attention of learners could be distracted easily by difficult tasks where educators need to encourage the learning process to be continued. It could be started with easier tasks to more challenging tasks to avoid distractions and improve engagement among the learners. In addition to that, the method of the learning process also required an appropriate approach. It can vary in the type of lessons by using a multi-sensory approach to assist in visual focus. This is supported by a few of the learners' comments:

*"The teaching style of the lecturer is interesting and it had drawn my attention"*
(student 1)

*"I have more prepare and focused in lecture to answer the quizzes"*

(student 2)

*"Having a lot of activities help me to be more focus in the class"*

(student 3)

*ii- More clear understanding*

An understanding that is free of confusion or doubt could indicate a learner's engagement in the lesson. As for that, the educator or facilitator should use each of the cognitive components of the learning process to smoothly engage with the learners and improve in the necessary part. Indeed, applying and developing the appropriate tools and strategies could along the process reduce frustration and avoid breakdown to produce the desired result or achieve a certain course learning outcome. This would help learners to be clearer and understand better. In brief, to engage, motivate and teach learners at optimal levels, educators should understand the learning process in general, understand and respond to learners' individual emotional and cognitive profiles, and select instructional strategies and tactics that are effective for diverse learners. The students also highlighted that the tools introduce or integrated into the PBL discussion help in improving their understanding of the subject matter better as each topic is discussed via different tools each week to stimulate more clear understanding.

*"I was able to explore the field of IT in more depth. After performing the PBL 1 and PBL 2 assignments, I was able to see and imagine how the analysis and design of accounting systems could be applied in the real world of work"*

(student 4)

*"Sometimes may find it difficult to grasp an idea through words, but video can be really helpful"*

(student 5)

*"I admit it was a bit difficult to learn this subject, but with the learning methods used by Dr. like giving exercises, quizzes an notes in MOOC it was very helpful for my understanding"*

(student 6)

*"I have more understand with the topics and feel more engaging in the class by using online learning tools to do quizzes in the class. Variety of online learning tools has made the lesson less boring and more interesting to attend"*

(student 2)

*"I really like the way the lecturer taught and make me more understandable about the topic"*

(student 7)

*"Dr always make sure us understand clearly and ready to explain…..helped me understand the syllabus more by applying it in real life problem"*

(student 8)

*"I really enjoyed kahoot! and quizizz sessions the most because they showed our understanding in every topic that we have learned"*

(student 9)

*"….the method that has been to teach this subject is really suitable and not a burden and also easy to understand every topic"*

*(student 10)*

"…..we can enhance our understanding through a lot of digital platforms such as Quizizz, Kahoot, MOOC and also other Microsoft applications"

(student 11)

*iii- Enjoy the learning atmosphere*

The ideal learning atmosphere is where learners feel involved and respond to their learning while being comfortable enough to fully participate in group and individual activities. The enjoyable, pleasant, and suitable atmosphere could encourage learners to engage, participate and share with other learners. Hence, regardless of the level of understanding, learners try to give feedback and are committed to learning. Indeed, enjoyable learning is where educators could capture the attention of learners and develop meaningful as well as create active learning. The ASAD class is claimed to be conducted in such an enjoyable learning atmosphere that learners found it to be very beneficial to them who had engaged in the course successfully.

*"I was also able to find out that there are many online applications that can be used as a teaching method. This is because lecturer is always diversifying her teaching methods and making them interesting"*

(student 4)

*"I feel that I am more expose to the new platform such as padlet, kahoot, quizzie, draw io, canva, mirro and many more it really opens up my eyes to use this platform because it is fun and easy to use"*

(student 12)

*"Exercises and activities provided also make the class more fun and enjoyable"*

(student 5)

*"……about the method in conducting class is I am uncomfortable in the beginning where the lecturer gives lecturing in conducting activities through several websites like kahoot, mentimeter instead of the traditional teaching method. At last, I found it was so fun and not bored as well as interesting"*

(student 13)

*"I was able to learn many new things and was exposed to a variety of interesting platforms for learning. Activities like Kahoot and quizzes are very fun and really enjoy doing them….."*

(student 14)

*"I found that Dr's class is exciting. Dr is not the typical Dr that only read the slide. I can see Dr. effort in creating mentimetre, quizz and Kahoot to make us capture the knowledge way faster"*

(student 15)

*"….I enjoyed studying ASAD with Dr"*

(student 16)

*"….the class was so enjoyable and fun to learn a new thing about the ASAD"*
(student 17)

*"The game that has been use to see on the level of understanding of the student is really interesting and enjoyable"*
(student 10)

*"It is quite interesting because Dr. used all the fun applications while learning the subject"*
(student 18)

*"The usage of Kahoot and Mentimeter enhances the interestingness of the class"*
(student 19)

*iv- Deeply engaged in the discussion*

Learners' attention and focus would be better when able to motivate them to engage in critical thinking. Hence, it is important to ensure every learner has a chance to contribute in order to create a more student-centered class. In fact, engaging in class discussion means students in the whole class are on the same path, thinking together, making their thinking visible, creating knowledge and understanding, as well as retrieving prior knowledge. As students collectively contribute to the class discussion, indirectly it motivates and engages them in creating a sense of belonging as well as the satisfaction of being appreciated for their thoughts and ideas. This reflected in the ASAD class students' reflection.

*"It is a good idea to spin the wheel the names so that we can be more alert in the class until we finish the discussion and it gives the opportunities to all my classmates to involve in the class activity"*
(student 20)

*"……..I like and satisfied because many digital platforms had been used. This has attracted me to participate in the class well"*
(student 21)

*"….gravitate the students to be more active by participating in those activities conducted"*

(student 22)

*"The class is not boring; we not only focus the knowledge but prioritize on the discussion to learn"*
(student 23)

*"Dr. will hold a discussion session so that students will understand more and can ask questions about the topic. Dr. always wants students to participate in activities and discussions"*
(student 16)

Precisely, the results represented the reflection of engagement either cognitively or emotionally towards the PBL pedagogy with the integration of technology in the learning process. Indeed, the usefulness of technology in improving the understanding of the learners has the greatest impact on cognitive engagement. This is via the independent critical thinking ability and able to pay attention in the discussion and learning. The lively

discussion, actively participating in the group as well as interaction positively in finding or solving the problems given indicated the learners' emotional engagement. Thus, it revealed that when learners perceived the learning platform as interesting, more valuable, easier to apply as well as more helpful for interaction with educators, peers, and learning content, learners are likely to have positive emotional reactions to the PBL pedagogy. This is more encouraged to engage in the learning process with the assistance of technology tools as an alternative i.e., padlet, Kahoot!, Quizizz, Socrative, Mentimeter, WheelofNames, Miro, MOOC and Youtube for better understanding.

## References


Alebaikan, R., & Troudi, S. (2010). Blended learning in Saudi universities: Challenges and perspectives. *ALT-J:Research in Learning Technology, 18*(1), 49–59.

Aslan, A. (2021). Problem-based learning in live online classes: Learning achievement, problem-solving skill, communication skill, and interaction. *Computers & Education,* 171 (October 2021). 104237. https://doi.org/10.1016/j.compedu.2021.104237

Britton, B. (2010). *Self-reflection. In Capacity development in practice*, ed. J. Ubels, N.-A. Acquaye-Baddoo and A. Fowler. London and Washington, DC: Earthscan.

Bruce, J. (2018). Problem-based Learning: Nursing students' attitude, self-reported competence, tutorial performance and self-directed learning readiness. Journal of Nursing Education and Practice, 8(10). 11-19.

Carriger, M. S. (2016). What is the best way to develop new managers? Problem-based learning vs. lecture-based instruction. *International Journal of Management in Education, 14*(2), 92–101. https://doi.org/10.1016/j.ijme.2016.02.003

Cheung, A. C. K., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. *Educational Research Review*. 9(June 2013). 88-113. https://www.sciencedirect.com/science/article/abs/pii/S1747938X13000031?via%3Dihub

Dolmans, D. H. J. M., De Grave, W., Wolfhagen, I. H. A. P., & Van Der Vleuten, C. P. M. (2005). Problem-based learning: Future challenges for educational practice and research. *Medical Education, 39*(7), 732–741. https://doi.org/10.1111/j.1365-2929.2005.02205.x

Fiitterer, T., Scheiter, K., Cheng, X., & Stiirmer, K. (2022). Quality beats frequency? Investigating students' effort in learning when introducing technology in classrooms. *Contemporary Educational Psychology*. 69 (2022). 1-20.

Gao, B. W., Jiang, J. & Tang, Y. (2020). The effect of blended learning platform and engagement on students' satisfaction – the case from the tourism management teaching. Journal of Hospitality, Leisure, Sport & Tourism Education. 27(2020). 1-11. https://doi.org/10.1016/j.jhlste.2020.100272

Hamilton, E. R., Rosenberg, J. M., & Akcaogly, M. (2016). The Substitution Augmentation Modification Redefinition (SAMR) model: A critical review and suggestions for its use. *TechTrends*, 60(5). 433-441. https://link.springer.com/article/10.1007/s11528-016-0091-y

Hattie, J. (2015). The applicability of visible learning to higher education. *Scholarship of Teaching and Learning in Psychology, 1*(1), 79–91. https://doi.org/10.1037/stl0000021

Hirca, N. (2011). Impact of problem-based learning to students and teachers. Asia-Pacific Forum on Science Learning and Teaching. 12(1).

Huang, S. Jiang, Y., Yin, H., & Jong, M. S. (2021). Deoes ICT use matter? The relationships between students' ICT use, motivation, and science achievement in Eash Asia. *Learning and Individual Differences*, 86(February 2021). 101957 https://doi.org/10.1016/j.lindif.2020.101957

Hu, X., Gong, Y. Lai, C., & Leung, F. K. S. (2018). The relationship between ICT and student literacy in mathematics, reading, and science across 44 countries: A multilevel analysis. *Computers & Education*. 125 (October 2018). 1-13. https://www.sciencedirect.com/science/article/abs/pii/S0360131518301416?via%3Dihub

Liao, C. -H., & Wu, J. -Y. (2022). Deploying multimodal learning analytics models to explore the impact of digital distraction and peer learning on student performance. Computers & Education. 190(2022). 1-14.

Ma'arop, A. H., & Embi, M. A. (2016). Implementation of blended learning in higher learning institutions: A review of the literature. *International Education Studies, 9* (3), 41–52.

Manwaring, K. C., Larsen, R., Graham, C. R., Henrie, C. R., & Halverson, L. R. (2017). Investigating student engagement in blended learning settings using experience sampling and structural equation modeling. *The internet and higher education, 35*, 21–33.

Matzembacher, D. E., Gonzales, R. L., & Nascimento, L. F. M. D. (2019). From informing to practicing: Students' engagement through practice-based learning methodology and community services. *The International Journal of Management Education*. 17(2019). 191-200. https://doi.org/10.1016/j.ijme.2019.03.002

Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education*, 41(4). 417-441. https://doi.org/10.1080/15391523.2009.10782537

Petko, D. Cantieni, A., & Prasse, D. (2017). Perceived quality of educational technology matters: A secondary analysis of students' ICT use, ICT-related attitudes, and PISA 2012 test scores. *Journal of Educational Computing Research*, 54(8), 1351-1359. https://doi.org/10.1016/j.compedu.2011.12.013

Perez-Escoda, A., Castro-Zubizarreta, A., & Fandos-Igado, M. (2016). Digital skills in the Z generation: Key questions for a curricular introduction in primary school. *Comunication, 24*(49), 71–79. https://doi.org/10.3916/c49-2016-07

Polanco, R., Calderon, P., & Delgado, F. (2001). Effects of a Problem-Based learning Program on Engineering Students' Academic Achievements, Skills Development and Attitudes in a Mexican University. Paper presented at the Annual Meeting of the American Educational Research Association. Seattle, WA. April 10-14. 1-19.

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology,* 61(April 2020). 101860 https://doi.org/10.1016/j.cedpsych.2020.101860

Sahin, M., & Yorek, N. (2009). A comparison of problem-based learning and traditional lecture students' expectations and course grades in an introductory physics classroom. *Science Research and Essays*. 4(8). 753-762.

Schussler, D. L. (2009). Beyond content: How teachers manage classrooms to facilitate intellectual engagement for disengaged students. *Theory Into Practice, 48*(2), 114–121.

Seibert, S. A. (2021). Problem-based learning: A strategy to foster generation Z's critical thinking and perseverance. *Teaching and Learning in Nursing*. 16 (2021). 85-88.

Sun, J. C. Y., & Rueda, R. (2012). Situational interest, computer self-efficacy and self-regulation: Their impact on student engagement in distance education. *British Journal of Educational Technology, 43*(2), 191–204.

Sung, Y. -T., Chang, K. -E., & Liu, T. -C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education*, 94 (March 2016). 252-275. https://doi.org/10.1016/j.compedu.2015.11.008

Toutain, O., & Fayolle, A. (2016). Labour market uncertainty and career perspectives: Competence in entrepreneurship courses. In M. Mulder (Ed.), *Competence-based vocational and professional education. Bridging the worlds of work and education* (pp. 985–1005). Springer. https://link.springer.com/book/10.1007/978-3-319-41713-4

Wang, C., Fang, T., & Gu, Y. (2020). Learning performance and behavioral patterns of online collaborative learning: Impact of cognitive load and affordances of different multimedia. *Computers & Education, 143*, Article 103683. https://doi.org/10.1016/j.compedu.2019.103683

Wong, Z. Y., & Liem, G. A. D. (2021). Student engagement: Current state of the construct, conceptual refinement, and future research directions. Educational Psychology Review. 34(2022). 107-138. https://link.springer.com/article/10.1007/s10648-021-09628-3

Zhai, X., Zhang, M., & Li, M. (2016). One-to-one mobile technology in high school physics classrooms: Understanding its use and outcome. *British Journal of Educational Technology*. 49(3). 516-532. https://doi.org/10.1111/bjet.12539

Zotou, M., Tambouris, E., & Tarabanis, K. (2020). Data-driven problem based learning: Enhancing problem-based learning with learning analytics. *Educ. Technol. Res. Dev., 68*(6), 3393–3424. https://link.springer.com/article/10.1007/s11423-020-09828-8

# Investigating Presence and Social Presence during Teaching and Learning using Shared Virtual Worlds

Juliana Aida Abu Bakar
School of Creative Industry Management & Performing Arts,
UUM College of Arts & Sciences
Universiti Utara Malaysia
Corresponding Author: liana@uum.edu.my

## Abstract

Shared virtual worlds provide spatial environment and lively interactions between users. These features may provide presence and social presence when other educational means seems far from possible. Compared to online video conferencing platforms, investigation on presence and social presence during teaching and learning in shared virtual worlds is relatively scarce. Hence, this study evaluates presence and social presence amongst students during teaching and learning session in shared virtual worlds. Using one-group post-test only quasi-experimental design, 46 students participated in this study through purposive sampling. Adopting Presence Questionnaire with seven Likert-scale, results reveal that students agreed they experience presence in the shared virtual worlds (average mean = 5.73, standard deviation = 1.18) and social presence during teaching and learning in shared virtual worlds. This study may offer substantial evidence of presence and social presence in shared virtual worlds to be used for remote classrooms.

*Keywords:* Virtual Reality, Metaverse, Presence, Social Presence, Avatar.

## Introduction

Shared virtual worlds (VW) have been introduced as a meeting place for most educators and students in higher learning institutions. The uses of VW are varied and can be adjusted to various class requirements. Some may use the shared virtual world as a meeting space, a place to share their project progress, inexpensive excursions or virtual field trips and many more engaging activities.

Synchronous learning happens at the same time for both educators and students. In this learning mode, students can ask questions and give feedback in real-time using either unmute over a microphone or type it in the chat box. The availability of avatars and spatial ability in shared VW may provide adequate presence and social presence, which are paramount in ensuring the influence in immersive experiences as recently found in Huang, Zhou, Hao & Deng (2022) and the effectiveness of therapy as in Bonomo & Baraldo (2022). However, further investigation needs to be done to confirm such statement.

## Related Work

Remote classes use online interactive technologies to reach students at homes and other physical sites. Most of these technologies have features such as video and/or audio conferencing, chat rooms, and social networking services. One of these technologies is the virtual world which provides a shared 3D environment with an avatar to represent teachers and learners. Previous work in education has examined the use of VW in teaching and learning and its affordances to facilitate learning.

## Virtual Worlds

Virtual worlds (VW) are computer-generated environments in which participants adopt an avatar (a computer-generated representation of themselves) to navigate and have some degree of control in such environments. Avatars can interact with each other, and with objects inside the environment.

The VW provides a space for students to work on projects together. This collaborative use provides engagement as well as it allows students to collaborate with other students when other educational means are not possible. Due to its visually engaging features, VW really benefited students with a kinaesthetic type of learner. This type of students prefers to be fully engaged through touching and interacting with objects and doing this with their hands during the learning session.

There are a few VW platforms that have been used for the virtual learning environment namely, the Mozilla Hubs and AltSpaceVR. Mozilla Hubs is a tool for communicating and collaborating privately and allows to connect with people and bring in resources from around the internet for meetings and virtual events. It lets users enter immersive virtual rooms and spaces. Users can collaborate and interact with others using tools. This platform is very easy to use and uncomplicated since users do not need to create an account or download an app when using Mozilla Hubs.

AltspaceVR is the premier place to attend live shows, meetups, cool classes, and more with friendly people from around the world. It offers the opportunity to share virtual reality experience personally and professionally. Users can organize their own events as well as attending public events that were arranged by other users. There are a few useful key features provided by AltspaceVR such as public event calendar, content channels, VR world and Microsoft Mesh compatibility. This platform is powered by Microsoft hence, it is among the most reliable social virtual platforms. Also, it is entirely free for use using the consumer version.

## Teaching and Learning in Virtual Worlds

Educators have begun to examine teaching and learning in VW. Second Life (Baker, Wentz, and Woods, 2010; Dickey, 2011), Active Worlds (Dickey, 2011; Peterson, 2006), and Whyville (Neulight, Kafai, Kao, Foley, & Galas, 2007). The typical setup for teaching and learning in VW is replicating the ones in real-world environments. Most of the output is in the form of guidelines to perform teaching and learning in VW for educators and teachers such as those stated in Ma, Oikonomou, & Zheng (2009).

While many have discussed positives on affordances and learning outcomes, the increasing use of VW has raised concern on users' cognitive overload due to massive information available (Jestice et al., 2010). However, teacher presence is paramount in controlling the amount of information released (Kuznetcova, Lin & Glassman, 2021). Yushimora and Borst (2021) compares student experiences in attending lectures and doing presentations in between VR and desktop viewing but there is lack of discussion on student experiences inside the shared virtual worlds. In their experiment, they have found higher presence for the use of headsets in viewing and presenting. Presence in this context is defined as the subjective sense of being in a specific location, even though they are in different environments. It is found that presenting using a headset gets more attention than viewing through a desktop and using a headset. Moreover, for presentations using a headset, there may be a tendency towards higher behavioural interdependence and perceived emotion than viewing using desktop. In this study, presence is defined as the

sense of being there in a shared VW.

Social presence is the level to which one believes there is a companion and not secluded, being aware of the other, and the other also being aware of one's existence (Harms and Biocca, 2004). Social presence may have a significant relationship with presence as in Slater et al. (2000). In this study, social presence refers to the feeling of togetherness in a shared space, safe and secure being with the rest of the community. Such feeling will subsequently contribute to their emotional wellbeing during remote classes, particularly in a shared VW. The availability of avatars and spatial ability in shared VW may provide adequate presence and social presence, however, further investigation needs to be done to confirm such statement.

## Materials and Methods

In this study, two shared virtual worlds, Mozilla Hubs and AltspaceVR have been selected due to their esteemed reputation for handling large number of participants synchronously. Adopting Presence Questionnaire (Slater et al. 1995), one-group post-test quasi-experimental design was conducted which includes designated activities prior.

### Participants

Participants were purposively sampled from two classes undertaking Virtual Reality courses, summed up to 46 students consist of 17 male and 29 female students, with the range of age between 21 to 25 years old.

Table 1 summarizes the distribution of demographic profiles of the participants. All participants have experience using VW and/or playing three-dimensional (3D) games. This indicates the exposure of these participants which may contribute to the technical ability of controlling and manipulating VW. However, the perk of having shared VW is due to heavily dependent on strong Internet connection which resulted in four dropouts. These dropouts were entertained in other chat rooms such as WhatsApp and Padlet channels.

Table 1
*Percentage Distribution*

| Profile Factors | Particulars | f | % |
|---|---|---|---|
| Gender | Male | 17 | 36.96 |
| | Female | 29 | 63.04 |
| Age | 21-25 years | 46 | 100.00 |
| | 26-30 years | 0 | 0 |
| | 30-34 years | 0 | 0 |
| Experience in Virtual Environment and/or 3D games | 0 - 6 months | 3 | 6.52 |
| | 7 - 12 months | 8 | 17.39 |
| | 13 - 18 months | 9 | 19.57 |
| | 18 months and above | 26 | 56.52 |
| Internet Connection | Poor | 0 | 0 |
| | Intermittent | 4 | 8.69 |
| | Fast | 42 | 91.31 |

**Procedure**

An educational objective was set in which the students need to discuss collaborative features and functions of the shared VW. There is also a need to prepare a contingency plan as the new environment perhaps at one point does not cooperate with the rest of the original plan. In this study, it is anticipated an intermittent Internet connection will occur due to unforeseen circumstances, hence another channel of communication and interaction is set up in WhatsApp and Padlet platforms. Few ground rules are also set to avoid unpleasant experiences especially when encountering strangers in the shared virtual world as the world is also open to the public.

For a start, the virtual world used is the default environment which is freely available and needs less modification. The students only need to select ready avatars and provide their names to identify themselves through a few steps upon entering the virtual world. Inside the virtual world, they were gathered in the designated space to undergo class activities. The activities for each class were listed as in Table 2.

Table 2
*The Activities in the Shared Virtual Worlds*

| Task | Activities | Minute(s) |
|---|---|---|
| I | The students were informed on the objectives of getting to the virtual world and briefed on selection of avatar and ground rules in the virtual world. | 16 |
| II | The students were asked to gather at the main hall to attend a 20-minute lecture session and feel free to ask questions. | 30 |
| III | The students were asked to describe their experience in the shared virtual world by thinking out loud. | 20 |
| IV | The students were asked to put their screenshot of their best experience in the class bulletin board (Padlet) and briefly describe in writing. | 30 |
| V | The students were debriefed about the session by sharing take-aways and notable experiences. | 20 |
| | TOTAL | 120 |

While students were doing their activities, the lecturer as an active participant observed their behaviour such as the navigation and control over the objects inside the virtual world, as well as their engagement in class in terms of their presence and social presence. Apart from the observation, Tasks III and IV would serve as evidence to capture student experiences. Then, Presence Questionnaire with seven Likert scale was distributed. After their activities, students were encouraged to explore the VW on their own, screenshot their experience, and shared their screenshots over Padlet platform. The following section prevails the findings of this study and further discusses them.

## Results & Discussion

This paper focuses on Presence and Social Presence discussions whereas the findings on observation throughout the session have been discussed in Abu Bakar, et al. (2021).

### Presence

Presence, or sense of being there, is evident as soon as they embodied themselves well in their avatars. They were aware of being inside the virtual world, and they could navigate and control the objects. Table 2 depicts that students strongly agreed they were presence in the VW (average mean = 5.73, s.d.= 1.18). This somehow supports the previous findings of Yushimora and Borst (2021) which reveals a higher presence in VW with the use of head-mounted devices. Nevertheless, this study has shown that without head-mounted devices, it is evident that Presence could still be experienced. Hence, desktop viewing might as well be considered as more practical compared to head-mounted devices should VW to be adopted in remote classrooms.

Table 2
*Results on Presence Questionnaire*

| ID | Item | Mean (m) | Std. deviation (s.d.) |
|---|---|---|---|
| Q1 | I had a sense of "being there" in the VW. | 6.1 | 0.8 |
| Q2 | There were times during the experience when the VW was the reality for me. | 6.0 | 0.9 |
| Q3 | The VW seems to me to be more like somewhere that I visited. | 5.3 | 1.4 |
| Q4 | I had a stronger sense of being in the VW. | 5.9 | 1.0 |
| Q5 | The VW as a place in a way similar to other places that I've been today | 5.2 | 1.4 |
| Q6 | During the experience I often thought that I was really standing in the VW very much. | 5.6 | 1.6 |
| | **Average** | 5.73 | 1.18 |

The item highest score "I had a sense of being there in the VW (m=6.1, s.d.=0.8) reveals that students agreed the VW offers them Presence and to certain extent, the reality (m=6.0, s.d.=0.9). The VW looks similar to places they visited scored the lowest (m=5.2, s.d.=1.4) as the room and the open space perhaps unfamiliar to them. Thus, the VW must be a confined space and looks similar to typical classrooms rather than an open space which looks like a fantasy world to them.

Figure 1 depicts the situation inside the shared VW based on the screenshots shared by the students. There is also another perspective that promotes performative logic whereby an avatar represents what they want to be instead of their real selves by showing representational, performative, and fantasy avatars.


*Figure 1.* Screenshots show the participants' avatars in the VW called Mozilla Hubs.

It is also observed that the selection of avatar did not impede the presence of students, though it is quite pestering for the lecturer to see various forms of embodied entities in his/her classroom. To avoid such a scene, the rules of avatar selection to only use human-like characters may need to be adhered to. However, this may diminish the excitement of students to enter the shared virtual world, as they may care about their best representation of themselves.

**Social Presence**

Social presence is the sense of togetherness with others and the surrounding in the virtual world. The use of the virtual world can make an impression on the students and sparks their curiosities. The similar situation occurs whenever they feel presence in the virtual world, they feel attached to the environment and comfortable to move around by themselves (Slater et al., 2000; Yushimora, 2021). Figure 2 provides some screenshots showing that social presence might surface.


(a)

(b)

*Figure 2.* Screenshots show students interacting with (a) the environment in Mozilla Hubs, and (b) their peers in AltspaceVR.

Students also made interaction with and manipulated surrounding objects such as scribbling the wall as in Figure 2(a). They were aware of the presence of their peers as they were seen interacting with each other before and after activities as shown in Figure 2(b). These indicate that after a while, the students were comfortable being inside the VW and not to be bothered by cognitive overload that occurred when there is excessive information available as described by Jestice et al. (2010).

## Conclusion

This article discussed how the shared VW has been used in classrooms and to what extent, students experienced presence and social presence attending lectures in such worlds. By conducting one group post-test experimental design, this study investigated presence and social presence during teaching and learning in the shared VW. With presence, teaching and learning may become easier as students have the feeling of embodiment to the shared VW which subsequently ease their mind to absorb new knowledge. Likewise, social presence provides safe and secure feeling to students as they are surrounded by community that is highly trusted by them. The existence of presence and social presence may combat the cognitive overload situation due to the excessive information.

In a nutshell, virtual world excites students, hence proper planning must be done prior to avoid any unforeseen circumstances. Students also interact and communicate well, via talking instead of typing, with their peers, hence denotes the evidence of social presence. They feel safe which makes them comfortable to move around the virtual world and they could foresee the excitement and fun which normally associated with the virtual world.

The findings are encouraging; however, student experience may vary according to the nature of courses. Also, learning outcomes in the shared VW are perhaps equally as important as student experience and warrant further research. There are also other classroom activities that can be done inside shared VW such as presentation, and laboratory works. Students collaborating with another students in different institutions particularly from different regions, perhaps can provide insights on student cultural experiences in the shared VW.

## References


Aksoy, M. and Ceylan, T. (2021). An Action Research on Improving Classroom Communication and Interaction in Social Studies Teaching, Education Research International, Volume 2021, https://doi.org/10.1155/2021/9943194

Abu Bakar, J.A., Husain, A. and Pendit, U.C. (2021). "Student Experiences in Attending Lectures in Shared Virtual Worlds", in the Proceedings of International Scholar Symposium, 286-294.

Baker, S.C., Wentz, R.K. and Woods, M.M. (2009). Using Virtual Worlds in Education: Second Life as an Educational Tool, Teaching of Psychology, 36, 59–64, Taylor & Francis Group, LLC. ISSN: 0098-6283/1532-8023 DOI: 10.1080/00986280802529079.

Bonomo, E and Baraldo, M. (2022). The virtual reality in smoking therapy, Tabaccologia, 20, 1, DOI: 10.53127/tblg-2022-A007, https://www.tabaccologiaonline.it/article/view/55

Childs, M. (2010). Learners' Experience of Presence in Virtual Worlds. PhD thesis University of Warwick.

Dickey, M.D. (2011). The pragmatics of virtual worlds for K-12 educators: investigating the affordances and constraints of Active Worlds and Second Life with K-12 in-service teachers Education Tech Research Dev, 59, 1–20, DOI 10.1007/s11423-010-9163-4

Harms, C., and Biocca, F. (2004). "Internal consistency and reliability of the networked minds measure of social presence," in Seventh Annual International Workshop: Presence 2004 (Valencia), 246–251.

Huang, Z., Zhu, Y., Hao, A. and Deng, J. (2022), "How social presence influences consumer purchase intention in live video commerce: the mediating role of immersive experience and the moderating role of positive emotions", Journal of Research in Interactive Marketing, Vol. ahead-of-print No. ahead-of-print, pp. 1-17. https://doi.org/10.1108/JRIM-01-2022-0009

Jestice, R.J. (2010). The Effectiveness of Virtual Worlds for Education: An Empirical Study, Americas Conference on Information Systems AMCIS.

Johnson, A. P. (2008). A Short Guide to Action Research, Boston: Allyn and Bacon.

Kuznetcova, I., Lin, T. J., and Glassman, M. (2020). Teacher Presence in a Different Light: Authority Shift in Multi-user Virtual Environments, Technology, Knowledge and Learning, 1-25.

Minhua, M., Oikonomou, A. and Zheng, H. (2009) Second Life as a Learning and Teaching Environment for Digital Games Education. In: Proceedings of the 12th Annual International Workshop on Presence (PRESENCE 2009). International Society for Presence Research, Los Angeles. ISBN 9780979221736.

Pakanen, M., Alavesa, P., Berkel, N., Koskela,T. and Ojala, T. (2022). "Nice to see you virtually": Thoughtful design and evaluation of virtual avatar of the other user in AR and VR based telexistence systems, Entertainment Computing, Volume 40, 100457, ISSN 1875-9521, https://doi.org/10.1016/j.entcom.2021.100457.

Schultze, U. (2014). Performing embodied identity in virtual worlds. European Journal of Information Systems 23, 84–95.

Slater, M., Usoh, M., & Steed, A. (1995). Taking steps: The influence of a walking technique on presence in virtual reality. ACM Trans. Comput.-Hum. Interact., 2(3):201–219, Sept. 1995.

Slater, M., Sadagic, A., Usoh, M., and Schroeder, R. (2000). Small-group behavior in a virtual and real environment: a comparative study. Presence 9, 37–51. doi: 10.1162/105474600566600

Toh, W. and Kirschner, D. (2020). Self-directed learning in video games, affordances and pedagogical implications for teaching and learning. Computers & Education, 154, Article 103912. https://doi.org/10.1016/j.compedu.2020.103912

Yoshimura, A. and Borst, W.C. (2021). A Study of Class Meetings in VR: Student Experiences of Attending Lectures and of Giving a Project Presentation. Front. Virtual Real., https://doi.org/10.3389/frvir.2021.648619 https://www.frontiersin.org/articles/10.3389/frvir.2021.648619/full

# How E-Commerce Simulator Provides Authentic Learning Experience for Undergraduates?

Muhammad Noor Abdul Aziz*[a], Shahrul Azmi Mohd Yusof[b] & Mohd Faiz Mohd Yaakob[c]
[ac]School of Education, Universiti Utara Malaysia
[b]School of Computing, Universiti Utara Malaysia
*Corresponding Author: matno@uum.edu.my

## Abstract

The development of entrepreneurship skills for students is one of the primary goals of many educational courses, particularly those focusing on practical economics and management. There are numerous issues associated with the late start of an e-commerce study in Malaysia. This has resulted in undergraduates learning commerce in a traditional learning method. As such, this paper intends to explore authentic learning experience from the e-commerce simulator among undergraduates. A qualitative cases study is adopted in gaining insights from the participant through interviews and reflection. Four themes emerged from the study: Increasing business knowledge, Promoting teamwork, Suggesting continuous practice and Encouraging reflection. The findings suggest positive learning experiences gained by the participants in the study. Suggestions are made to include paragogy and self-assessment to improve the use of the simulator in future classrooms.

*Keywords:* E-commerce, Authentic learning, Qualitative, Paragogy

## Introduction

Within the last decade, the huge rise in demand for e-commerce has expanded considerably due to the fast growth of economic globalisation and technological innovation. The pandemic that has led to the exponential progress of international e-commerce has emerged from the spread of the Internet connections and the new normal, which is both an opportunity and a difficulty for integrating e-commerce in colleges and universities. Chang and Niu (2016) argued that appealing features of e-commerce such as fine internet environment, stable consumer colony, secure payment system, convenient delivery and distribution and sound credit mechanism allow for possible opportunities. However, the biggest now is training on e-commerce.

The development of entrepreneurship skills for students is one of the primary goals of many educational courses, particularly those focusing on practical economics and management. Educators must figure out the most effective way to teach pupils the critical lessons and skills they will need in the future about the significance of e-commerce in enterprises (König et al., 2020). E-commerce issues in entrepreneurship education offer a modern learning environment that is perfectly matched to students' habits and interests and can give the necessary resources for effective teaching and learning. Creating real-world opportunities for students to apply these abilities, such as founding and running an e-commerce or other online activities, as well as implementing business collaboration and cooperation among students, would help to bridge the gap between theory and practice (Ferraz & Boas, 2020).

There are numerous issues associated with the late start of an e-commerce study in Malaysia, including a limited number of professional talents involved in e-commerce in

various disciplines (Lin et al., 2021), outdated curriculum content (Feng & Shen, 2019), single teaching methods and means (Philip & K, 2017), and insufficient teaching ties (Radović et al., 2021). As a result, the demand for e-commerce graduates has gradually increased, and a substantial number of organisations are unable to obtain e-commerce talent (Lin et al., 2021). Despite the various improvements in the e-commerce curriculum's teaching materials and methods such as student-centred learning, optimizing teaching content, self-cultivation (Feng & Shen, 2019), due to its strong theoretical features, this curriculum cannot entirely motivate students' learning initiative (Adaji et al., 2020). The Internet's rapid expansion has brought with it a wealth of information for users, particularly young people. Students' learning initiative cannot be stimulated by the traditional approach of Internet learning (Dhawan, 2020).

The image of an online business is primarily aesthetically pleasant in order to attract clients. Due to the lack of a professional touch, products that are not exhibited professionally may be disregarded by a potential consumer (Nasr et al., 2014). Understanding the time and procedure required to emphasise good aesthetic design would result in attracting new consumers and retaining existing customers, as well as improving consumer perceptions and increasing future sales and lowering attrition rates. As such, in this study, the researchers delved into the issue of authentic learning experience by using the e-commerce simulator. The guiding question that navigates this study is: How do undergraduates gain authentic learning experience from the e-commerce simulator?

E-Bazaar Simulator is an innovation in the method of delivery of teaching and learning that varies from traditional technique whereby it is a simulation of an e-commerce website that promotes various local business from groceries to clothes where students can set up their stores, add team members as store staffs, as well as additional products. The system will include a sales report for sales analysis where students can view their total sales and business profits. This simulator will run on virtual credit wallets that will be given to the students as currency at the start of this lesson module. Students will have to learn how to execute their business plan by creating their online stores, add products and market their products as well as managing business cash flows. The students will play both roles of seller and customer where they will have to buy items on a list provided from other stores to complete the assignment. Their assessment will be evaluated on who gained the most profit and saved more credit on their purchases. This form of active learning will help the students in improving their skills and talent in managing a good business. E-Bazaar Simulator will also generate a formative and summative assessment for the improvement of teaching and learning for the students.

## Related literature

### Active learning through connectivism

Student-centred and inquiry-based learning, two well-known pedagogical methods, are nestled within of active learning. The researchers' approach for active learning is based on the critical notion that undergraduate students should participate as active agents during classroom instruction. The theoretical underpinning of this work is the connectivism concept proposed by Siemens (2005). According to connectivism, learning is not only possible for individuals, but can also be done in groups or through peer-to-peer interactions that use the internet to find and create new learning opportunities. By letting students work alone or collaboratively at their own pace, connectivism reduces time limitations. The network supports the students' learning while teachers, particularly those working remotely, guide the pupils. Siemens also discussed the connectivism's guiding principles, which are crucial to comprehend and put into practise when it comes to online

teaching and learning. Sitti et al. (2013) experimented with Siemens' model of connectivism and their findings showed that the instructional model, which was based on the connectivism learning theory, was adequate and suited to the level of education being provided to students in higher education who wanted to improve their problem-solving abilities in ICT for everyday use. Another study by Kizito (2016) highlighted that as students work to create learning artefacts, they were guided through the four interaction levels of operation, wayfinding, sense-making, and creativity using the framework for interaction and cognitive engagement in connectivism learning contexts. This is aspired in the current study where an e-commerce simulator is incorporated in designing classroom instruction that promotes various learning possibilities for undergraduates. In a local study by Norbaiti Sidik et al. (2021) with 116 undergraduate students revealed that as they seek help from the same group of students, there is a strong propensity to stay in the same online learning group for online tasks which promotes active learning via the application of the theory of connectivism.

**Authentic learning experience**

Trying to close the gap between classroom complexity and real-world complexity is a never-ending task. However, there is a case to be made that connecting the classroom to the outside world is exactly what an authentic learning experience should be concerned with. Through these opportunities, students can mix ideas and theories from their formal education with those from the actual world (Tiilikainen et al., 2019). Therefore, authentic learning offers a way for students to comprehend how their identities are formed in society. It's crucial for students to actually perform a real-world role as opposed to just acting it out (Tilchin & Kittany, 2016) because by participating in authentic learning, students are gaining more than just the content knowledge. Students are encouraged to work hard by completing real-world tasks and creating things that represent them. One of the best ways for authentic learning to take place in the classroom is by involving students in the use of simulators as part of teaching and learning activities (Göçer et al., 2014).

**Teaching methods for entrepreneurship**

Entrepreneurship skills are one of the main qualities for business and marketing students who want to effectively enter the job market after graduation. Many employers prefer students with entrepreneurship skills and experience for entry-level positions. They consider these students to be more responsible for their acts, to have leadership skills, and to know how to perform. Students with entrepreneurial experience are often considered to have stronger communication and sales skills that are required to be competitive in business today. The study conducted by Beránek (2015) found that students that dealt with actual online business operations had to think carefully about setting up, implementing, interacting and marketing practices. With these activities, students have learned how to grasp business principles in e-commerce, including how to execute an e-commerce business plan and others. Even though the students operated their online business for a short amount of time, they have acquired some of the criteria used to measure the status of their company, customer satisfaction and financial performance, and others. Problem-solving and implementation of e-commerce operations have helped students to develop analytical decision-making skills.

A study conducted by Fadzil et al. (2019) found that knowledge of the digital business is an essential factor in deciding to venture into e-commerce. Digital business education gives students information to generate basic ideas and awareness on how to start new ventures in e-commerce. Entrepreneurs' technological skills are one of the primary factors contributing to the success of major ventures involving e-commerce entrepreneurs

in Malaysia. Their past work experience using technology has greatly helped them to set up a company. Moreover, their understanding of technologies has also improved their ability to explore the Internet and develop new platforms, such as blogs, websites and social media, to grow their business. Entrepreneurs with basic tech skills are typically one step ahead of others, as they are more experienced in interacting with this technological force. Fadzil et al., (2019) further explain that strong communication skills offer entrepreneurs an edge in attracting consumers to buy their goods. E-commerce is more associated with non-verbal communication, where most of the time communication takes place online (via emails, social chat rooms, and newsletters). Hence entrepreneurs need to write correctly and rhetorically to keep customers happy and satisfied. This is because a successful piece of writing would certainly win the confidence of consumers and generate massive profits in return.

## Methodology

This study is based on a series of reflection and interviews with 30 undergraduates who enrolled in the IT Entrepreneurship course. The students were selected purposively because part of the course learning outcome requires them to simulate business activities before they can be awarded marks for course completion. This is known as purposeful sampling (Palinkas et al., 2015) which refers to the selection of samples with a lot of information about the phenomenon of interest. The participants provided rich information about the use of the simulator in assisting their understanding of the business concepts from the course.

Data were collected initially with weekly reflection entries which were sent in the form of video or audio files. Before the end of the course, the students were interviewed in their respective groups. All the groups were asked some reflective questions on their experiences using the simulator and what were their struggles and concerns. The interview protocol was developed based on the students' reflection and it serves as a validating tool to their reflection entries. The researchers iteratively analysed the qualitative data for emerging themes.

The researchers ensured that codes were categorically assigned to the data's emergent patterns before the data were analysed (Braun & Clarke, 2019). To prevent bias in interpretation, researchers discussed their points of view and solidified them with a qualitative expert who have over 30 years of experience in the field of research. After receiving the expert's comments, the researchers scrupulously addressed the comments before sharing the analysis with the participants to verify the results. Additionally, by combining the results from two data sources in this study, the researchers were able to confirm that data triangulation was done appropriately. To maintain anonymity (Allen & Wiles, 2016), the names of the participants were changed to groups.

## Results

The authors allocated codes from the data. The categories of codes were then assigned. The themes that emerged are reported as below.

Theme 1: Increasing business knowledge

The participants generally highlighted in their reflection that through the simulator, they were able learn some strategies in buying and selling.

> "We learnt on the strategy in buying items." (Reflection G1)
> "From the simulator, we learn on decision making to buy and sell products." (Reflection G2)

It is also described in the interview that they got to practise their social skills when they played the game in the simulator.

> "I managed to learn something on giving discounts to the customers because the simulator offers discounts and slashes in price as one of the menus." (Interview G4)

Theme 2: Promoting teamwork

It was evident in the reflection that almost all the groups claimed that they had to work in team to make good sales for the product that they were selling.

> "First round of sales was better because we had enough members to help out. So, teamwork is important." (Reflection G5)
> "As a leader, I did not have the skill in promoting but my team mates are awesome sellers. I picked up the skill from them. We make a great team." (Interview G7)

The participants did point out that they were some miscommunications that made them feel challenged during the simulation.

> "Not all members helped out equally. But again, everything has its first time. (Interview G8)
> "We did not have enough members to secure good sales in the first round. (Reflection G2)

All in all, mostly the participants agreed that the simulator provided a new perspective of teamwork even though all of them were only seeing their team mates via online platform as opposed to physical meeting.

Theme 3: Suggesting continuous practice

It can be concluded that almost all participants wanted to have a few rounds of the simulator when the first round ended. Their excitements are recorded below:

> "Need another round of the simulator to practise more skills (Reflection G7)
> "Can't wait for Dr. Shah to start another round. It was awesome." (Interview G1)
> "We really enjoyed the simulator. Can we have more?" (Reflection G4)

Apart from exclaiming to wanting repeated sessions of the simulator, the participants also felt that the simulator made them reflect and brush up their content knowledge.

> "We got to study some tips in making purchases after the second round of the simulator." (Reflection G6)

> "I personally feel that I need to revise my notes. I have not been paying attention well in class and this game tells me straight to my face." (Interview G3)

Theme 4: Encouraging reflection

The participants pointed out that by using the simulator, they were trained to reflect constantly on their learning activities.

> "I will work on the shy attitude. I realize that it is not helping my group in gaining sales with me being shy." (Reflection G1)
> "We were too focused in purchasing until we forgot to check our orders. It was a lesson learnt." (Reflection G6)

Since reflection is at the core of using the simulator, some students felt that learning is best done by reflecting.

> "Our group feels that we need to work on our word choice. After reflecting, we realise that our words are not attractive" (Reflection G2)
> "I think the simulator allows us to reflect on our decisions. We did not make much profit because we did not give any discounts." (Interview G5)

All in all, they unanimously recognised that reflection after using the simulator was helping them to create learning moments in a more meaningful and impactful way.

## Discussion

Revisiting the research question, the researchers concluded it is answered by the four themes that were generated from the analysis. Firstly, the simulator had an impact in learning by increasing undergraduates' business knowledge. The students shared many instances where their content knowledge is put to test in a real-life scenario like making decisions in buying stocks and selling them at the right time. These content knowledge might not be easily understood and practised if traditional learning method is used in the classroom. Yan (2018) corroborated that the simulation-based scenario improves the reason for innovations, strategic planning, and entrepreneurial expertise just like what is experiences by the participants in this study. Furthermore, it is worth noting that the participants developed other relevant skills such as social skills while utilizing the e-commerce simulator in this study. The opportunity given to use the simulator enhances their communication skills among their team mates as well as with their course instructor in an authentic environment even though it was carried out in an online platform. This is an emergent finding from the data as previous studies suggested that communication is restricted and challenged when learning activities are carried out via online mode (Alawamleh et al., 2022; Zarzycka et al., 2021).

Since the e-commerce simulator was used in groups, one of the emerging themes in this study is promoting teamwork. The students unanimously agreed that one-man-show does not guarantee any success as much as the simulator is concerned due to the various aspects of business strategies that have to be attempted throughout the simulation period. This proposition is supported by Lateef (2010) who felt that team members who have received adequate training and information can be adaptable enough to change their habits

and fit into any new scenario, and they become more skilled over time with support from their other counterparts and facilitator. It is worth noting that even though the use of simulator did promote teamwork, but some participants in this study argued that not all members in the group helped out equally in making the business proposals and excelling in the simulation due to miscommunication. Things can be ironed out if communication issues are tackled at group level as suggested by Blackmore et al. (2017) who suggested that instructors should consider the results of multiple shorter interventions as opposed to a single longer intervention in using simulations as a teaching method in the digital classroom.

Continuous learning practice in the 21st century classroom can be aided with the use of e-simulators because students are easily engaged when they are given activities that require them to embark on a few interventions before they master certain skills in the syllabus. As depicted by the participants in this study, they were excited to play the simulator again and again as it challenged their groups to perform better. Bunt and Gouws (2020) elaborated that it can be a powerful learning experience in terms of how students learn in classroom because they have direct control over what is taught and the repercussions of their choices are mimicked in real time. Since the 21st century classroom requires more than just sitting and grasping learning, using e-simulators as part of self-teaching and learning activity is timely for the students in this study.

Another striking theme in this study that is worth being discussed is the reflection component that was highlighted by the participants. It has changed attitudes and views of the participants about the e-simulator and learning the course content when the instructor persistently made them reflect on the use of the simulator in the classroom. Sachdeva (2017) added that simulation can assist in exposing systems' latent states whereby the simulator itself can be improved with the reflection provided by both the instructor and students. Since the spirit in scholarship of teaching and learning is at the reflective practices by the teacher and their students, it is evident in this study that reflection plays an integral role in communicating learning progress of the students and improving teaching activities on the instructor's side. Drawing on the social constructivist view, the quality of reflection from critical questions asked by the instructor shows evidence on the transfer of knowledge (Shawa, 2020). The participants felt that while using the simulator in planning to buy and sell products, it tested their decision-making skills and this is one of the most prominent skills in the 21st century classroom. From their reflection, it is evident that they could record their learning journey and make better decisions in the next rounds in using the simulator and collectively improve their business knowledge. Contrastingly, Reynaldo et al. (2021) argued in their paper that decision-making skill is too complicated to be checked immediately and can best be checked via questionnaire. However, in this current study, the researchers used students' reflection to gage their struggles and improvements pertinent to the decision-making skills.

## Conclusion and recommendations

There are three conclusions that can be drawn from this study. Firstly, it is essential to diversity teaching methods that suit learners in the 21st century classroom and using e-commerce simulator is one the best tool that can measure their learning progress. It is also a transformational teaching experience for both students and instructors when simulators are used in delivering and understanding business concepts. Secondly, the use gamification in the classroom opens rooms for continuous learning development and affirming the role of the instructor as effective facilitator in the classroom. Finally, by integrating simulation in learning activities will allow authentic learning experience for students to participate in

meaningful teaching and learning experiences and increasing student engagement in the classroom.

For future use of the e-simulator in the classroom, the authors suggest that it can be integrated with feedback from peers who can comment constructively for the betterment of their classmates. If this element of paragogy is included in the simulator, it will promote peer learning too. Next, self-assessment can also be included in the simulator so that reflection from students can be integrated directly in the simulator as opposed to having it done separately. This is also important to improve the simulator from time to time.

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## References

Adaji, I., Oyibo, K., & Vassileva, J. (2020). *E-commerce shopping motivation and the influence of persuasive strategies*. *3*(November), 1–14. https://doi.org/10.3389/frai.2020.00067

Alawamleh, M., Al-Twait, L. M., & Al-Saht, G. R. (2022). The effect of online learning on communication between instructors and students during Covid-19 pandemic. *Asian Education and Development Studies*, *11*(2), 380–400. https://doi.org/10.1108/AEDS-06-2020-0131

Allen, R. E. S., & Wiles, J. L. (2016). A rose by any other name: Participants choosing research pseudonyms. *Qualitative Research in Psychology*, *13*(2), 149–165. https://doi.org/10.1080/14780887.2015.1133746

Beránek, L. (2015). The attitude of the college students to entrepreneurial skills development in the subject E-commerce. *Informatics in Education*, *14*(1), 1–13. https://doi.org/10.15388/infedu.2015.01

Blackmore, A., Kasfiki, E. V., & Purva, M. (2017). *Simulation-based education to improve communication skills : A systematic review and identification of current best practice*. 1–6. https://doi.org/10.1136/bmjstel-2017-000220

Braun, V., & Clarke, V. (2019). *Successful qualitative research : A practical guide for beginners*. SAGE Publications.

Bunt, B., & Gouws, G. (2020). Using an artificial life simulation to enhance reflective critical thinking among student teachers. *Smart Learning Environments*, *7*(12), 1–19.

Chang, J., & Niu, B. (2016). *Application of electronic commerce in the field of higher education*. *2*(Iccita), 231–234. https://doi.org/10.2991/iccita-16.2016.43

Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Fadzil, A. F. M., Hashim, U. J., Yaacob, M. R., Sallehudin, H., Muhayiddin, M. N., Mukhtar, D., Salleh, F., & Ibrahim, R. (2019). Entrepreneurial Psychology and Competencies: Some Perspectives from E-Commerce Entrepreneurs in Malaysia. *Entrepreneurial Psychology and Competencies: Some Perspectives from E-Commerce Entrepreneurs in Malaysia*, *7*(2), 31–79.

Feng, Z., & Shen, H. (2019). *Research on the curriculum reform of "An Introduction to E-Commerce" based on MOOC*. *371*(Erss), 398–402.

Ferraz, O. L., & Boas, M. V. (2020). Bridging the gap between theory and practice : The impact of school – university partnership in a PETE program. *Sport, Education and Society*, *0*(0), 1–12. https://doi.org/10.1080/13573322.2020.1851182

Göçer, Ö., Hua, Y., Göçer, K., Gunhan, S., Moaveni, S., Chou, K. C., Charlson, J., Chinyio, E., Zhu, Y. Q., Zuo, J. J., Korpela, J., Kerosuo, H., Abuelmaatti, A., Ahmed, V., Jing, X., Wang, Q. K. Q., Li, Y. Y. Y., Zhao, D., McCoy, A. P., … Wu, W. W. Y. (2014). A Ship in a box. *Applied Mechanics and Materials*, *29*(2), 35. https://doi.org/10.1007/s10798-010-9123-7

Kizito, R. N. (2016). Connectivism in learning activity design : Implications for pedagogically-based technology adoption in African higher education contexts. *International Review of Research in Open and Distributed Learning*, *17*(2).

König, J., Jäger-biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure : Teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education*, *43*(4), 608–622. https://doi.org/10.1080/02619768.2020.1809650

Lateef, F. (2010). Simulation-based learning: Just like the real thing. *Journal of Emergencies, Trauma and Shock*, *3*(4), 348–352. https://doi.org/10.4103/0974-2700.70743

Lin, C., Xi, Z., Gao, C., & Tsai, S. (2021). *Research on the training model of e-commerce professionals based on big data analysis*. *2021*.

Nasr, L., Burton, J., Gruber, T., & Kitshoff, J. (2014). Exploring the impact of customer feedback on the well-being of service entities : A TSR perspective. *Journal of Service Management*, *25*(4), 531–555. https://doi.org/10.1108/JOSM-01-2014-0022

Norbaiti Sidik, Siti Nurul'Ain Hj Zaiton, Norhafini Hambali, Siti Fairuz Sujak, Tengku Intan Suzila T. S, & Fazlinashatul Suhaidah Zahid. (2021). Exploring connectivism through online engagement. *International Journal of Academic Research in Business and Social Sciences*, *11*(11), 1350–1365. https://doi.org/10.6007/IJARBSS/v11-i11/11303

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., Hoagwood, K., Angeles, L., & Northwest, K. P. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm Policy Ment Health.*, *42*(5), 533–544. https://doi.org/10.1007/s10488-013-0528-y

Philip, M. P., & K, M. R. (2017). Effectiveness of teaching methodologies in undergraduare commerce colleges: Thematic review of literature. *Journal of Advance Research in Education & Litrature*, *3*(7), 1–5.

Radović, S., Firssova, O., Hummel, H. G. K., Vermeulen, M., Radović, S., Firssova, O., Hummel, H. G. K., Vermeulen, M., Firssova, O., & Hummel, H. G. K. (2021). Strengthening the ties between theory and practice in higher education : An investigation into different levels of authenticity and processes of re- and de-contextualisation. *Studies in Higher Education*, *46*(12), 2710–2725. https://doi.org/10.1080/03075079.2020.1767053

Reynaldo, C., Christian, R., Hosea, H., & Gunawan, A. A. S. (2021). Using video games to improve capabilities in decision making and cognitive skill : A literature review. *Procedia Computer Science*, *179*, 211–221. https://doi.org/10.1016/j.procs.2020.12.027

Sachdeva, A. K. (2017). The value proposition of simulation-based education. *Surgery*, 6–11. https://doi.org/10.1016/j.surg.2017.11.008

Shawa, L. B. (2020). Advancing the scholarship of teaching and learning using learning theories and reflectivity. *CEPS Journal*, *10*(1), 191–208. https://doi.org/10.26529/cepsj.298

Siemens, G. (2005). Connectivism : A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, *2*(1). http://www.itdl.org/

Sitti, S., Sopeerak, S., & Sompong, N. (2013). Development of instructional model based on connectivism learning theory to enhance problem-solving skill in ICT for daily life of higher education students. *Procedia - Social and Behavioral Sciences*, *103*, 315–322. https://doi.org/10.1016/j.sbspro.2013.10.339

Tiilikainen, M., Karjalainen, J., Toom, A., Lepola, J., & Husu, J. (2019). The complex zone of constructivist teaching: a multi-case exploration in primary classrooms. *Research Papers in Education*, *34*(1), 38–60. https://doi.org/10.1080/02671522.2017.1402080

Tilchin, O., & Kittany, M. (2016). An adaptive approach to managing knowledge development in a project-based learning environment. *Journal of Education and Training Studies*, *4*(10), 42–53. https://doi.org/10.11114/jets.v4i10.1681

Yan, M. R. (2018). Improving entrepreneurial knowledge and business innovations by simulation-based strategic decision support system. *Knowledge Management Research and Practice*, *16*(2), 173–182. https://doi.org/10.1080/14778238.2018.1442994

Zarzycka, E., Krasodomska, J., Mazurczak-Mąka, A., & Turek-Radwan, M. (2021). Distance learning during the COVID-19 pandemic: students' communication and collaboration and the role of social media. *Cogent Arts and Humanities*, *8*(1). https://doi.org/10.1080/23311983.2021.1953228

# The Application of Problem-Solving Methods based on Corpus Analysis to Improve Malay Grammar Skills

Hishamudin Isam*[a], Mashetoh Abd Mutalib[b], & Yusniza Yaakub[c]
[abc]School of Language, Civilization and Philosophy,
UUM CAS
*Corresponding Author: din@uum.edu.my

## Abstract

The results of the assessment analysis for the subject of Malay Language Grammar I showed that students were only able to master grammar skills at the surface level, while the transferred skills, namely applying the theory in analysis and using the Malay language exactly in writing, have not yet been fully achieved. Face-to-face Q&A among the students involved found that they thought that conventional grammatical topics studied were quite difficult and boring. Hence, to address the issue, this paper proposes the application of problem solving methods based on corpus analysis in teaching and learning grammar to improve grammar skills. The study, which carried out the analysis of this action study, involved a total of 25 undergraduate students who attended the Malay Language Grammar I course, with 9 of them were male students and the rest were female students. The instruments used are (a) scalable observation forms on behaviour and assignment evaluation, (b) scalable reflection forms on the impact, interests and responses of respondents, and (c) face-to-face interview questions related to observational analysis and reflection. The scope of grammar skills refined for 6 weeks through three (3) levels of intervention is related to form, group and formation process. The results of the analysis showed that the application of problem solving based on corpus analysis to improve grammar skills was well received by the research respondents. It has also proven that this application is able to improve grammar skills as it was well received by the study respondents, with a scale of 50% over 50% for each item observed by the researcher and reflected by the respondents. By looking at the continuity of observational analysis and reflection in this action study, it is appropriate to proceed by conducting a comparative study of two groups of students (control group and treatment group) to strengthen the findings of the study.

*Keywords:* problem solving, corpus analysis, grammar, observation, reflection

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## Introduction

During the restructuring of the Information on Course for all minor courses of Malay language education, the Malay Language Grammar I course was also revised, starting from the objectives, course learning outcomes (CLO), syllabus, method of assessment and reference, to the revision of student achievement for four (4) consecutive semesters. The

overall analysis of student achievement showed very encouraging achievement, with the percentage of graduation being 100% and students getting high grades (A and A-) exceeding 60%. However, an analysis based on the method of assessment found something unexpected.

The results of the analysis showed that 95% of the students involved were able to master grammar skills based on the results of achieving high marks in quizzes and tests (objective and structural). Meanwhile, 69% of students were found unable to master grammar skills if the assessment was carried out in the form of problem solving involving critical analysis activities of grammatical problems (discussion of formulas and formula conflicts), and presentation of grammatical problems (question and answer sessions). As a result, students can only master grammar skills at the surface level (understanding the meaning, concept and morphological formula), while the transferred skills, which are applying theory in analysis and using the Malay language exactly in writing, have not yet been fully achieved. This situation will certainly cause problems as they are prospective teachers who will eventually teach Malay language subjects (which are included in the grammar aspect) at the school levels (primary and secondary).

**Students' Early View**

Face-to-face and written Q&A among the students involved (current students, especially male students) found that they thought that grammar topics were difficult and boring due to the involvement of often misleading formulas and problems. Most of the students, especially the male students interviewed, noted that this situation made them less interested in learning grammar topics, thus disrupting their focus and involvement in completing the assigned tasks. Therefore, in order to address the problem, most students only use memorisation techniques to understand the formulas learned, in accordance with the teaching and learning techniques used in the classroom that favour the process of memorizing to understand a grammatical formula. This is in line with the opinion expressed by Awang Sariyan (2009) who said that the process of teaching and learning grammar is not an easy matter. The process is often considered 'dry' and tedious as it is common for the process of teaching and learning grammar to be carried out in combination through an inductive approach. Through this approach, students are presented with the memorisation of certain formulas, and are finally given training based on an understanding of a grammatical formula learned (Abdo Almekhlafi & Ramani Perur Nagaratnam 2011; Le Huong Hoa & Le Quang Truc 2020).

The consequences of this kind of teaching and learning process will only make grammar teaching and learning sessions uninteresting and boring. It is worse if the student is required to memorise abstract formulas of his nature, which only describe universal characteristics thus causing the learning of grammar (linguistic studies) to become increasingly difficult, condensing and no longer in demand (Asmah, 2009). In order for students to master grammar skills based on the achievement of exam results, the existing teaching and learning process is considered sufficient. Nevertheless, if the aim is to enable students to master grammar skills with the intention of producing students who are able to apply theory and use the exact language (grammar) in writing, then the teaching and learning methods of grammar should be innovated (Vijayalakshmi, 2014).

**The Latest of Teaching and Learning of Grammar**

In this regard, the use of accurate, interesting, up-to-date (contemporary) techniques and innovating is highly demanded in the process of teaching and learning the grammar of a language because it is through this precise technique that students in particular can take

advantage of a limited period of time to understand the important aspects of grammar. In doing so, Konig, Jager-Biela, and Glutsch (2020) suggest that a language teacher do the processing of teaching techniques, using technological aids that can stimulate and encourage students to interact and think critically and creatively in the process of learning grammar. One of the examples of technologically auxiliary materials that can be used in the process of teaching and learning grammar is the use of computers and their software. According to Raja and Nagasubramani (2018), The use of the Computer-Based Instruction approach can facilitate the delivery of materials and actively promote student engagement. This is acknowledged by Mamun, Lawrie, and Wright (2020) by saying that computers have the privilege of being a much-needed technological aid in the process of teaching and learning, including teaching and learning languages involving grammar aspects.

Hence, to overcome this issue, this paper work suggests the application of problem-solving methods based on corpus analysis in the teaching and learning of grammar. The main purpose of this application is to attract students to deepen their grammar knowledge not only at the surface level (understanding the meaning, concept and morphological formula), but also to the end that enable them to understand the grammatical aspects at the internal level (answering and solving grammatical problems). It is hoped that the application of this method will also enable students to apply the theory in the analysis and use the Malay language exactly in writing, in line with the results of the course learning (CLO) and the assessment tests conducted.

**Application of Problem Solving Methods Based on Corpus Analysis**

Problem solving is not a new method of learning a grammar (Myhill, Jones, & Watson, 2013). This method is commonly used to enable students to understand more clearly what a grammatical problem is. Numerous studies have been conducted to prove that the application of problem-solving methods is excellent for measuring the potential of students in mastering a subject (Abu Bakar Nordin 2013; Stapleton, & Wu 2015; Marzni, Rohizani, & Fadzilah 2018). During the application of the methods, a variety of techniques have been introduced to aid in the process of the application to run smoothly. Among them is the introduction of corpus analysis as a trigger to the solution of grammatical problems. However, the focus of the language is on English as most of these studies are conducted in the west (Biber 2005; Samburskiy 2014; Friginal, Dye & Nolen 2020). Meanwhile, the form of questioning for the assessment of this method is usually still tied to the form of an objective question, structure or short essay.

To be aware of the need to overcome students' understanding regarding the problems at the surface level only as stated in the introduction, and understanding their needs of today's latest methods that can overcome the problem of tiredness of learning aspects of the code of conduct are considered 'dry'. Hence, the application of problem-solving methods based on corpus analysis is expected to be a way opener to the solution of both problems. However, before the application of the method is fully implemented, an action study should be carried out to understand the behaviour of students in mastering grammar based on this method.

## Research Implementation Method

This study applied the method in the form of action studies by Efron and Ravid, (2020) which was carried out based on 3 (three) interventions during the implementation phase. During this method, the two main points that will be important to understand the student's behaviour in mastering grammar through the application of problem solving based on corpus analysis are observation and reflection.

According to Efron and Ravid, observation and reflection of the study respondents can answer to the form of student behavior during the teaching and learning process. Observation will focus on the observation by the researchers on the behavior of the respondents in terms of interest and response, while the observation of the assignment assessment will focus on the aspect of involvement in the teaching and learning process. Reflection, on the other hand, is the respondent's view of the activities carried out, focusing on three main points involving their own views on the impact, interest and attitude related to the application of problem solving based on corpus analysis.
The population and sampling of the subjects were 25 undergraduate students who attended the Malay Language Grammar I course, with 9 of them were male while the rest were female. The instruments used are (a) scalable observation forms on interest-related behaviors and responses, as well as assessment of involved-related tasks, (b) scalable reflection forms on impact, respondent's interest and response, and (c) face-to-face interview questions related to observational analysis and reflection. The scope of grammar skills carried out to apply problem solving based on corpus analysis is related to forms, groups and formation processes (involving forms and groups). Three (3) interventions were conducted for 6 weeks (2 weeks per intervention) to perform this action study, which involved the following processes:

**Intervention 1: Corpus Analysis Approach 1**

a. Plan: Planning TnL activities by using a corpus analysis approach with a focus on discussion of existing formulas vs new formulas
b. Strategy: Demonstration method
c. Observation: Pay attention to the TnL process and the value of the student's assignment results
d. Reflection: Discussions between students and instructors about the effectiveness of users of this approach and the efforts that can be made to improve its implementation. The result is of thematic analysis (focus on impact, interest and attitude).

**Intervention 2: Corpus Analysis Approach 2**

a. Plan: Planning TnL activities by using a corpus analysis approach with a focus on the discussion of conflict formulas
b. Strategy: Demonstration method
c. Observation: Pay attention to the TnL process and the value of the student's assignment results
d. Reflection: Discussions between students and instructors about the effectiveness of users of this approach and the efforts that can be made to improve its implementation. The result is of thematic analysis (focus on impact, interest and attitude).

**Intervention 3: Corpus Analysis Approach 3**

a. Plan: Planning TnL activities by using a corpus analysis approach with a focus on discussion of conflict problem solving formulas from real data
b. Strategy: Demonstration Method
c. Observation: Pay attention to the TnL process and the value of the student's assignment results
d. Reflection: Discussions between students and instructors about the effectiveness of the users of this approach and the efforts that can be made to improve its implementation. The result is of thematic analysis (focus on impact, interest and

attitude).

## Findings of the Study

The following are the findings of the observation and reflection formulations that have been carried out:

### Summary of Observation Results

The results of observations during the intervention sessions 1, 2, and 3 regarding the application of problem solving based on the corpus analysis carried out have shown a positive behaviour by the respondents towards this method. Among the 25 respondents observed, 14 of them showed the highest interest (scale 5) in the application of problem solving based on corpus analysis, while the remainder (11 respondents) showed a keen interest (scale 4). The high and deep interest was highlighted in the response during the intervention with the same findings (scale) as the findings of the scale of interest. Meanwhile, in term of assignment assessment, the results of the observation of engagement showed that 16 out of 25 respondents were very active (scale 5) during the intervention process, while the rest (9 respondents) showed active engagement (scale 4). The summary of the observation results is illustrated in Table 1 below:

Table 1
*The Summary of Observation Results*

| No. | Respondents | G | Observation Results | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Attitude | | | | | | | | | Assignment Assessment | | | | |
| | | | Interest | | | | | Response | | | | Involvement | | | | |
| | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| 1 | Respondent 1 | M | | | | | / | | | | | / | | | | | / |
| 2 | Respondent 2 | M | | | | / | | | | | / | | | | | | / |
| 3 | Respondent 3 | M | | | | | / | | | | | / | | | | | / |
| 4 | Respondent 4 | M | | | | / | | | | | / | | | | | / | |
| 5 | Respondent 5 | M | | | | | / | | | | | / | | | | | / |
| 6 | Respondent 6 | M | | | | / | | | | | / | | | | | / | |
| 7 | Respondent 7 | M | | | | / | | | | | / | | | | | | / |
| 8 | Respondent 8 | M | | | | | / | | | | | / | | | | | / |
| 9 | Respondent 9 | M | | | | | / | | | | | / | | | | | / |
| 10 | Respondent 10 | F | | | | / | | | | | / | | | | | | / |
| 11 | Respondent 11 | F | | | | / | | | | | / | | | | | | / |
| 12 | Respondent 12 | F | | | | / | | | | | / | | | | | | / |
| 13 | Respondent 13 | F | | | | / | | | | | / | | | | | / | |
| 14 | Respondent 14 | F | | | | | / | | | | | / | | | | | / |
| 15 | Respondent 15 | F | | | | | / | | | | | / | | | | / | |
| 16 | Respondent 16 | F | | | | / | | | | | / | | | | | / | |
| 17 | Respondent 17 | F | | | | | / | | | | | / | | | | | / |
| 18 | Respondent 18 | F | | | | | / | | | | | / | | | | / | |
| 19 | Respondent 19 | F | | | | | / | | | | | / | | | | | / |
| 20 | Respondent 20 | F | | | | | / | | | | | / | | | | | / |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | Respondent 21 | F | | | | | / | | | | | / | | | | / | |
| 22 | Respondent 22 | F | | | | / | | | | | / | | | | | / | |
| 23 | Respondent 23 | F | | | | / | | | | | / | | | | | / | |
| 24 | Respondent 24 | F | | | | | / | | | | | / | | | | | / |
| 25 | Respondent 25 | F | | | | | / | | | | | / | | | | | / |

Based on Table 1 above, it can be seen that it is a result of the observation of 25 respondents involved in the process of intervention 1, 2, and 3 application of problem solving based on the analysis of the corpus carried out. Among the 25 respondents, 9 were male respondents and the rest were female respondents (16 people). If read horizontally, there is an interesting relationship between the scale of interest, response and engagement involving male respondents, 5 male respondents showed a high interest and response regarding the application of problem solving which is based on the analysis of corpus (scale 5), and the figure (the number of respondents) shows an increase in the same scale (scale 5) for the assessment of tasks involving engagement, that is, with a total of 7 people. This situation implies that the application of problem solving based on corpus analysis can be of interest to male respondents so that they are able to show a good response, and lead to the involvement of those who are active in carrying out the assigned tasks during the intervention processes of 1, 2 and 3. This shows a positive situation because during the early-stage face-to-face questioning process, the average students, especially the male students who were surveyed stated that conventional learning of grammar topics is quite boring thus interfering with their interest and focus and involvement in completing the tasks given by the lecturer.

Meanwhile, the observation of behaviour related to interest and response as well as assessment of tasks for female respondents' engagement also showed a positive relationship. The study of Table 1 horizontally showed that 9 out of 16 female respondents showed a high level of interest and response (scale 5). However, compared to male respondents, the number remained the same (not showing an increase in volume) for the highest scale (scale 5) for the assessment of tasks involving involvement in activities during the intervention processes of 1, 2 and 3 being carried out. Despite the fact that the number of respondents still remained equal to the highest scale (9 people), but from the observation of each individual of the respondents themselves, there was a significant difference. For example for respondents 10, 11 and 12, although the scale of the request and response is 4, the scale of the involvement is 5. This situation shows that there is a positive effort shown by the three respondents to make the intervention processes of 1, 2 and 3 a success. Meanwhile, for respondents 15, 18 and 21, the opposite occurred when showing high interest and response (scale 5) but declined to a scale of 4 on the assessment of engagement-related tasks. This phenomenon is interesting to understand, and one of the efforts to understand this phenomenon is to carry out reflection activities.

**Summary of Reflection Results**

As a cross-reference from the results of the observations from the researchers to the respondents, the findings of the formulation of the results of the reflection on the respondent's own views on their acceptance of the application of problem solving based on the corpus analysis when the intervention processes of 1, 2, and 3 were carried out. The scale placed by the respondents significantly showed positive acceptance, in particular with regard to impact and attitude. 18 respondents marked a scale of 5 (highest) for impact, 14 respondents marked a scale of 5 for interest (equal to the number of respondents observed by the researchers, but different individuals), and 20 respondents marked a scale of 5 for attitude. The high number of scale 5 markings for impact and

attitude showed a very positive acceptance by the respondent regarding the application of problem solving based on the corpus analysis when the intervention processes of 1, 2, and 3 were carried out. This can be examined in accordance with Table 2 below.

Table 2
*Summary of Reflection Results*

| No. | Respondents | G | Students' View - Reflection Results | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Impact | | | | | Interest | | | | | Attitude | | | | |
| | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| 1 | Respondent 1 | M | | | | / | | | | | | / | | | | | / |
| 2 | Respondent 2 | M | | | | | / | | | | / | | | | | | / |
| 3 | Respondent 3 | M | | | | | / | | | | | / | | | | | / |
| 4 | Respondent 4 | M | | | | | / | | | | / | | | | | | / |
| 5 | Respondent 5 | M | | | | / | | | | | | / | | | | | / |
| 6 | Respondent 6 | M | | | | | / | | | | / | | | | | | / |
| 7 | Respondent 7 | M | | | | | / | | | | / | | | | | | / |
| 8 | Respondent 8 | M | | | | | / | | | | | / | | | | | / |
| 9 | Respondent 9 | M | | | | / | | | | | | / | | | | | / |
| 10 | Respondent 10 | F | | | | | / | | | | / | | | | | / | |
| 11 | Respondent 11 | F | | | | | / | | | | / | | | | | | / |
| 12 | Respondent 12 | F | | | | / | | | | | / | | | | | | / |
| 13 | Respondent 13 | F | | | | | / | | | | / | | | | | | / |
| 14 | Respondent 14 | F | | | | | / | | | | | / | | | | | / |
| 15 | Respondent 15 | F | | | | / | | | | | | / | | | | / | |
| 16 | Respondent 16 | F | | | | | / | | | | / | | | | | / | |
| 17 | Respondent 17 | F | | | | | / | | | | | / | | | | | / |
| 18 | Respondent 18 | F | | | | | / | | | | | / | | | | / | |
| 19 | Respondent 19 | F | | | | | / | | | | | / | | | | | / |
| 20 | Respondent 20 | F | | | | | / | | | | | / | | | | | / |
| 21 | Respondent 21 | F | | | | / | | | | | | / | | | | / | |
| 22 | Respondent 22 | F | | | | / | | | | | / | | | | | | / |
| 23 | Respondent 23 | F | | | | | / | | | | / | | | | | | / |
| 24 | Respondent 24 | F | | | | | / | | | | | / | | | | | / |
| 25 | Respondent 25 | F | | | | | / | | | | | / | | | | | / |

Table 2 above highlights the overall findings of the results of reflection by respondents with a high scale marking of impact and attitude. If observed horizontally, it can be said that, male respondents showed the highest reception with 6 out of 9 respondents marking a scale of 5 for impact, 5 out of 9 marking a scale of 5 for interest and all 9 respondents marking a scale of 5 for attitude-related reflection. and 3 run. This situation shows that they can accept both the teaching and learning process with the application of problem solving based on corpus analysis when the 1, 2, and 3 intervention processes were carried out. The results of the scale marking reflection which was then screened with a face-to-face interview to the respondents recorded the following findings:

Table 3
*Male Respondents' views as a result of Reflection on Attitude*

| **Respondents** | **Attitude-related question: How is your acceptance of activities in the** |
|---|---|

| | **intervention process?** |
|---|---|
| Respondent 1 | *Pada saya sangat mudah dikendalikan. Mungkin saya kategori* tech savy<br>(In my opinion, it is very easy to handle. Maybe because I am a tech savvy person) |
| Respondent 2 | *Menarik dan saya suka. Tak sangka kita boleh belajar tatabahasa menggunakan perisian komputer*<br>(Interesting, and I like it. I've never thought we can learn grammar through computer software) |
| Respondent 3 | *Sangat best. Kalau macam ni, saya rasa saya boleh minat mempelajari tatabahasa*<br>(Very good! If (the learning) it's like this, I think I will be interested in learning grammar) |
| Respondent 4 | *Mula tu rasa pelik. Tapi ok, saya boleh ikut. Saya rasa saya boleh*<br>(At first, it feels awkward. But then, it is okay, and I can follow. I think I can) |
| Respondent 5 | *Saya slow sikit teknologi. Tapi saya boleh cuba. Lagi pun, ia lain dari teknik biasa yang kena hafal. Bosan cara tu*<br>(I'm a bit slow in technology. But I can try. Moreover, it is a different technique that doesn't require us to memorise. That way (memorising) is boring) |

The views of the male respondents regarding their attitude as shown in Table 3 show that they are positive towards the application of problem solving based on corpus analysis with the use of phrase markers 'easy to handle', 'can learn', 'can interest', 'can follow', and 'can try'.

Meanwhile, in Table 2, 12 out of 16 female respondents indicated the highest scale (scale 5) for impact, 9 out of 16 indicated a scale of 5 for interests and 11 out of 16 female respondents indicated a scale of 5 for attitudes. Although in terms of percentage, the number of admissions is rather low compared to male respondents, it is sufficient to prove the existence of an element of acceptance of female respondents to the application of problem solving based on corpus analysis. This is reinforced by the findings from cross-referencing based on responses from face-to-face interviews to female respondents, as recorded below:

Table 4
*Female Respondents' views as a result of Reflection on Interest*

| **Respondents** | **Attitude-related question: Are you interested in leveraging corpus analysis in problem solving for grammar skills such as those learned during the intervention process?** |
|---|---|
| Respondent 15 | *Sangat berminat. Best la. Cuma benda ni masih baru, so slow sikit*<br>(So interested. It's just that this thing is new, so I might be a bit slow) |
| Respondent 18 | *Dah biasa menghafal je kan, tapi ok juga. Baru tahu tentang hal ini. Tapi rasanya ok, berminat*<br>(I'm used to memorising, but it's okay. I just knew about this, but I think it's okay. I'm interested) |
| Respondent 21 | *Minat tapi saya kena kerja keras sikit sebab saya slow bab teknologi. Apapun, ia sangat membantu untuk bakal guru macam kami*<br>(I'm interested, but I need to work harder as I'm a bit slow regarding |

| | |
|---|---|
| | technology. Anyway, it's very helpful for future teachers like us) |
| Respondent 22 | *Minat boleh datang kemudian, tapi saya yakin analisis korpus ni sangat membantu*<br>(Interest can come later, but I'm sure this corpus analysis will be very helpful) |
| Respondent 25 | *Tambah minat sebenarnya. Inilah kegunaan teknologi. Baru kita nampak kegunaannya untuk bidang kemanusiaan*<br>(This is able to add interest, actually. This is the use of technology. Only now we can see its use in humanity) |

Table 4 above shows the tendency of female respondents' interest in the application of problem solving based on corpus analysis. Although there are concerns about not being proficient in technology, female respondents have a high degree of trust and interest in trying new things which is to leverage corpus analysis in problem-solving for grammar skills such as those learned during the intervention processes.

As a summary of the findings of the study of the results of analysis and discussion, it can be said that the application of problem solving based on corpus analysis to improve grammar skills is well received by the study respondents. The results of an action study that focused on observation work based on behaviour related to interests and responses, as well as the assessment of tasks related to respondents' complicity during the intervention processes of 1, 2 and 3 were carried out, as well as the results of reflection (scale marking and face-to-face interview) on the impact, interest and attitude of the respondents have proven this. In relation to the observational analysis and reflection in this action study, it is appropriate to continue further by conducting a comparative study of two groups of students (control group and treatment group) to strengthen the findings of this study.

## Conclusion

In conclusion, the teaching and learning of conventional grammar topics that are said to be 'dry' and boring resulting in an impact on the grammar skills of students (potential teachers) at the surface level only, should be addressed immediately. The action survey conducted as shared in this paper has presented the findings that show positive acceptance of respondents (potential teachers) towards the application of problem solving based on corpus analysis to improve grammar skills. In this regard, it is hoped that these findings can be used as a way opener for the study of the application of problem solving based on a wider corpus analysis.

## References

Abdo Almekhlafi & Ramani Perur Nagaratnam. (2011). Difficulties in teaching and learning grammar in an EFL context. *International Journal of Instruction, 4*(2), 69-92.

Abu Bakar Nordin. (2013). Kurikulum kearah penghasilan kemahiran berfikiran kritis, kreatif dan inovatif. *Jurnal Kurikulum dan Pengajaran Asia Pasifik* 1(1), 10-18.

Asmah Haji Omar. (2009). Ucapan Profesor Emeritus Datuk Dr Asmah Haji Omar dalam Majlis Segunung Budi. *Majlis Pencaran Buku Segunung Budi Selautan Kenangan*. Anjuran Akademi Pengajian Melayu, 29 Oktober 2009, Akademi Pengajian Melayu, Universiti Malaya.

Awang Sariyan. (2009). Bagaimanakah tatabahasa dapat diajar dengan berkesan?

Prosiding Bengkel Pengajaran Tatabahasa, Fakulti Bahasa, Universiti Pendidikan Sultan Idris. 19 Ogos 2009.

Biber, D. (2005). Corpus linguistics and the study of English grammar. Indonesion *Journal of English Language Teaching, 1*(1), 1-22.

Efron, S. E., & Ravid, R. (2020). *Action research in education: A practical guide* (2nd ed.). New York: The Guilford Press.

Friginal, E., Dye P., & Nolen, M. (2020). Corpus-based approaches in language teaching: Outcomes, observations, and teacher perspectives. *Boğaziçi University Journal of Education, 37*(1), 43-68.

Konig, J., Jager-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany. European Journal of Teacher Education, 43(4), 608-622.

Le Huong Hoa & Le Quang Truc. (2020). Students' difficulties in learning English for specific purpose grammar at the People's Police University. *Journal of Science, 2*(1), 78-97.

Mamun, M. A., Lawrie, G., & Wright, T. (2020). Instructional design of scaffolded online learning modules for self-directed and inquiry-based learning environments. *Computers & Education, 1*(144), 1-17.

Marzni Mohamed Mokhtar, Rohizani Yaakub, & Fadzilah Amzah. (2018). Cabaran guru Bahasa Melayu dalam usaha menerapkan kemahiran berfikir aras tinggi (KBAT) dalam pembelajaran dan pemudacaraan (PDPC) penulisan karangan argumentatif. *Malaysian Online Journal of Education, 2*(2), 7-14.

Myhill, D., Jones, S. & Watson, A. (2013). Grammar matters: How teachers' grammatical knowledgeimpacts on the teaching of writing. *Teaching and Teacher Education*, 36, 77-91.

Raja, R, & Nagasubramani, P. C. (2018). Impact of modern technology in education. Journal of Applied and Advanced Research, 3(1), 33-35.

Samburskiy, D. (2014). Corpus-informed pedagogical grammar of English: Pros and cons. *Procedia-Social and Behavioral Sciences, 154*, 263-267

Stapleton, P. & Wu, Y. (2015). Assessing the quality of arguments in students' persuasive writing: A case study analyzing the relationship between surface structure and substance. *Journal of English for Academic Purposes*, 17, 12- 23.

Vijayalakshmi. (2014). Innovative and creative means of teaching grammar. *Proceeding in National Conference on English for Employability* (NCEE 2014) on 15th March, 2014 at Veltech Dr. RR and Dr SR Technical University

# Examining the Use of Scaffolding Approach in Teaching Case Study: An Approach Towards Enhancing Students' Critical Thinking and Problem-Solving Skills

Ooi Sue Chern*[a], Lim Chee Chee[b]
[a]Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia
[b]School of Economics, Finance and Banking, Universiti Utara Malaysia
*Corresponding Author: suechern@uum.edu.my

## Abstract

The literature in accounting education indicates an increasing trend in the use of case studies. Case studies could improve students' critical thinking and problem-solving skills that are essential and relevant for employability and academic success. However, there are lack of empirical evidence examining the use of case studies in developing and enhancing students' critical thinking and problem-solving skills. In view of this, the purpose of this study is to investigate how case study, as a teaching and learning method, can enhance students' critical thinking and problem-solving skills among undergraduate students at Universiti Utara Malaysia (UUM). A case study comprising critical thinking and problem-solving skills questions was developed. Students were required to prepare a report (i) identifying and analysing the dilemma faced by the case protagonist, (ii) applying appropriate theory in justifying the issues in the case, and (iii) evaluating and concluding how the dilemma experienced by the case protagonist affects the case organisation. Findings suggest that the scaffolding approach is effective in teaching case studies as the scaffolding approach help to enhance students' critical thinking and problem-solving skills. Therefore, the study calls for instructors to adopt the scaffolding approach when teaching case studies.

*Keywords:* Case study, critical thinking skill, problem-solving skill, scaffolding approach, accounting education

## Introduction

Case studies have been extensively used in disciplines such as healthcare, law, businesses, and accounting (Bonito, 2019; Hristova *et al.*, 2021; Weil *et al.*, 2004). The importance of case studies in imparting knowledge and developing different skills has led educators to increasingly adopt case studies in their teaching. The traditional pedagogical approach in accounting often focuses on technical problem solving, featuring single solution answers rather than cases or scenarios with multiple solutions (Wynn-Williams *et al.*, 2008). Such an approach fails to deliver the richness and intricacies of the business world. In light of this, educators have prescribed the use of case studies in improving students' proficiencies and competencies (Boyce *et al.*, 2001; Wu & Brogt, 2019).

Case studies present the complexity and ambiguity in the business world, enabling students to use their judgments and analytical reasoning skills when dealing with day-to-day business decisions (Weil *et al.*, 2004). Case studies also develop and enhance students' critical thinking and problem-solving skills and allow students to apply their knowledge to solve practical problems (Porzecanski *et al.*, 2021). According to Hoffer (2020), case studies support active learning and are useful in fostering engagement and inclusion in culturally diverse classrooms.

Although case studies support active learning and foster the development of critical thinking and problem-solving skills, limited studies have examined the incorporation of scaffolding approach in case study method in developing and improving students' critical thinking and problem-solving skills. This matter is particularly vital as the accounting profession calls for universities and colleges to produce graduates who can interpret and think beyond the numbers in financial statements, spot trends and irregularities, and seek solutions to real world problems (Wu & Brogt, 2019). The professional accounting body, Association of Chartered Certified Accountants (ACCA), has also emphasised on the inclusion of critical thinking and problem-solving skills in the future skills set of accountants (ACCA, 2016). This is because traditional teaching approaches in which instructors impart knowledge to students via lectures are criticised as ineffective in developing and improving students' problem-solving abilities (Sawyer *et al.*, 2000). At the same time, it has been found that students were not equipped with analytical skills to effectively analyse case studies resulting in case instructors dominating the case discussion (Mostert, 2007).

Drawing on the importance and increasing use of case studies in accounting education, one of the authors of this paper has adopted the case study method as her teaching strategy. When the initial attempt of using case study in teaching did not achieve desirable learning outcomes, the author has discovered that the incorporation of scaffolding approach in case study method could potentially improve teaching and learning experiences for both lecturer and students. Thus, the main objectives of this study are to examine the use of case study in developing' students' critical thinking and problem-solving skills, and the incorporation of scaffolding approach in case study method in improving' students' critical thinking and problem-solving skills. The context of this study involved the use of a case study in advanced financial accounting and reporting course. More specifically, a case study related to the change in accounting standard was developed by both authors for discussion by students enrolled in the class of advanced financial accounting and reporting course protagonist (see e.g. Ooi & Lim, 2022).

The case study requires students (i) to identify and analyse the problem in the case, (ii) to apply appropriate theory in justifying the issues in the case, and (iii) to evaluate and conclude how the dilemma experienced by the case protagonist affects the case organisation. Students are required to prepare a report about the case using their critical thinking and problem-solving skills by exercising their judgments and applying the knowledge they have learned in other course lessons to solve real-world problems. The report is then graded according to a critical thinking and problem-solving skills rubric developed by Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia (TISSA-UUM). The students' marks for the case study are analysed to determine whether students meet the quality assurance criterion for critical thinking and problem-solving skills, i.e. whether at least 70% of students have acquired fair, good and excellent levels of critical thinking and problem-solving skills. At the same time, a survey was conducted to find out students' perspectives about the use of scaffolding approach in learning case study after the case study has been used for classroom discussion. The instructor who taught the case study was also asked to write reflective notes about how the use of case study and scaffolding approach could further improve students' critical thinking and problem-solving skills in the future.

The paper is structured as follows. Literature related to case study method is reviewed, follow by the authors experience of developing an accounting case study. Then, the following section reports and discusses the results of the study. In the concluding section, the limitations of the study and suggestions for future research are presented.

## Case Study as a Teaching and Learning Method

Case studies have been widely used by accounting and finance educators. The use of case studies in classrooms was pioneered by Harvard Business School (HBS). According to Nitin Nohria, the former dean of HBS, case study method is a valuable teaching approach as cases introduce business problems to students and enable students to recall concepts and theories when discussing and solving the cases. Cases also cultivate students' proficiencies in critical analysis, reasoning and decision-making as they require students to analyse real business scenarios and make managerial decisions (Nohria, 2021). Therefore, using case studies as a learning pedagogy is vital in preparing students to learn about real business scenarios and to make managerial decisions (Ballantine & Larres, 2004).

Furthermore, case studies could develop different skills and competencies in students. These skills are communication and teamwork skills. A case provides students a business scenario involving an organisational dilemma with learning usually involving individual preparation, small-group discussion and class discussion (Naude & Derera, 2014). Students are expected to prepare for case assignment, to conduct discussion in small study groups and then in the classroom. When conducting discussions with their peers, students learn how to communicate and collaborate with their peers (Nohria, 2021). Thus, case study method[1] is an active learning approach that improves students' communication and teamwork skills (Naude & Derera, 2014).

Case study method also develops high-order reasoning skills by enabling students to enhance their critical thinking and problem-solving skills through preparing, discussing and analysing the cases (Jermakowicz & Hayes, 2011; Pomykalski, 2010). Critical thinking is a metacognitive process that requires individuals to analyse, evaluate and justify his or her chosen stance (Dwyer *et al.*, 2014; Wilkin, 2017). It involves identifying and solving problems, evaluating and utilising information, testing ideas, recognising of judgments and putting them to test in light of new information, and communicating effectively with others (Rios, 2015). Critical thinking is becoming an increasingly important skill in higher education because it permits students to gain a more complex understanding of the information they obtain, and fosters good decision-making and problem-solving in real-world applications (Ku, 2009; Wilkin, 2017).

As such, case study method serves as an ideal instructional approach to promote critical thinking and problem-solving skills as it offers the opportunity for immediate data analysis that includes an understanding of the results (Popil, 2011). Case studies also expose students to a real-world scenario in the classroom and provoke students' critical thinking by making them think professionally, and encouraging students to use concepts and theories they have learned in solving problems or forming a conclusion (Hassall *et al.*, 1998; Weil *et al.*, 2004). The following section reports the development of a case study that could be used to improve accounting students' critical thinking and problem-solving skills.

## Developing and Disseminating an Accounting Case Study

The authors have developed a case related to the change in accounting standard for students enrolled in advanced financial accounting and reporting course at Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia (TISSA-UUM) for semester A211 (2021/2022). The case was developed with the view that students should

[1] Case study method is a teaching and learning approach that requires participatory, discussion-based way of learning for case users to hone their skills in critical thinking, communication and teamwork. Case study method also entails engagement and partnership between the case instructors and case users. Meanwhile, case studies refer to narrative and scenarios that present unresolved and provocative issues, situations or questions to case users. Case studies normally contain questions of how and why.

put themselves in the case protagonist's shoes to determine the impacts of the change in accounting standard on the case organisation's financial reporting (see e.g. Ooi & Lim, 2022). Students were provided with information about the case organisation and the dilemma experienced by the case protagonist.

The case was given to students two weeks before classroom discussion and report submission. Students were briefly informed what they should do and how their performance would be assessed. In the first week after the case distribution, students were required to work in a group of five members to record a three-minute video summarising the case, highlighting the main issues and the chosen theory to justify the impacts of the change in accounting standard. In the second week, students were required to work in their groups to prepare a report (i) identifying and analysing the dilemma faced by the case protagonist, (ii) applying appropriate theory in justifying the change in accounting standard, and (iii) evaluating and concluding how the dilemma experienced by the case protagonist affects the case organisation. The discussion questions in the case are aligned with the learning objectives of the case. Thus, the case supports critical thinking and problem-solving skills in view that it requires students to understand, synthesise and evaluate the information in the case to conclude whether the change in accounting standard favourably or adversely affecting the financial reporting of the case organisation. This method of questioning is in line with Snyder and Snyder (2008, p. 91) notion of critical thinking that uses the questioning techniques of "analysing, synthesising and evaluating information to solve problems and make decisions (think) rather than merely to repeat information (memorise)".

Students were asked to submit the final report at the end of the second week before case discussion in classroom taking place. The report was graded based on critical thinking and problem-solving skills rubric. The case study assignment weighed 10% towards the overall grade of the course. During class discussion, the instructor assigned specific groups to share their answers and allowed them to ask questions.

## Incorporating Scaffolding Approach in Case Study Method

The evaluation of students' performance in cycle 1 shows that students struggled to identify the major issues in the case after the case was distributed to them. According to the instructor who taught the case (and also one of the authors of this paper), "the majority of students analysed the content in the case superficially and had difficulties in integrating what they have learned in previous lessons to the case" [TISSA-Instructor][2]. In an effort to help students to have a better understanding of the case, the instructor has taken the initiative to adopt "scaffolding approach" to facilitate students' learning in trying to enhance their critical thinking and problem-solving skills. West *et al.* (2018) and Browne *et al.* (2009) underline scaffolding as an assistance offered by an instructor to students to support learning. Under the scaffolding approach, the instructor assists students to master a task or skills that are beyond the students' capability. Students are expected to make errors, but, with the instructor feedback and prompting, students would be able to complete the task or mastering specific skills. When students start mastering the task or skills, the support and assistance provided by the instructors gradually diminishes. The following are the six scaffolding strategies introduced by West et al. (2018):

- Strategy 1: A basic version of a lesson, assignment, or reading, are given to students and its complexity, difficulty, or intricacy gradually increases over time.
- Strategy 2: A concept, problem, or process is illustrated to students in numerous ways to ensure understanding.

[2] Pseudonyms are used to cover the identities of the respondents of this research.

- Strategy 3: An exemplar or model of an assignment is provided to students as reference to complete task.
- Strategy 4: A vocabulary lesson is delivered to students before they read a challenging text.
- Strategy 5: The purpose of a learning activity is articulated to students, including the directions that students need to adhere, and the learning goals they are expected to achieve.
- Strategy 6: An explanation is provided to students to describe how the recent lesson develops from the knowledge and skills taught in an earlier lesson.

The instructor has adapted the proposed strategies when incorporating the scaffolding approach in teaching case studies in TISSA-UUM. This is primarily because the strategies proposed by West et al. (2018) were based on the context of pre-schools and elementary schools which may not be appropriate to be adopted in higher-educational institutions. The first strategy requires the instructor to ask students to perform a few tasks, starting with a simplified version of an assignment, then gradually increasing the complexity and difficulty level in the subsequent assignments. So, the instructor asked the students to post a three-minute video and students were given one week to do so. In the video, students were asked (i) to summarise what the case was about, (ii) to identify who is the case protagonist and what are the main issues of the case, and (iii) to provide appropriate theories that could be used to justify the issues in the case. These simple activities aim to help students get familiar with the facts and contents of the case, to break down the potential issues into sub-issues and to identify possible solutions and explanations to the case.

However, the video posted by students showed that some students were not able to identify the key problem in the case. Students also had difficulties in understanding the key concepts, identifying appropriate theories to justify the issue and concluding whether the problem faced by the case protagonist led to positive or negative outcomes. Upon realising the challenges faced by the students, the instructor explained to students the learning objectives of the case, how to prepare their report and how the report will be graded (i.e., Strategy two: The instructor describes the learning objectives of the case, the purposes of the activity, and the directions students should follow). The instructor hopes that when students know the case's objectives and how the report will be graded, students are more likely to understand the importance of the assignment and be motivated to achieve the learning objectives.

During the discussion, the instructor also asked students to illustrate how they identified the key issue in the case. After listening to students' explanations, the instructor provided her own illustration of how students could identify the problem statement in the case (i.e., Strategy three: The instructor describes or illustrates the problem in different ways to ensure understanding). The instructor also explained the key concepts in the case, such as "substance over form" and "off-balance-sheet financing". Students' lack of understanding of these concepts led to their inability to relate the concepts to the case and answer the discussion questions. Considering this, the instructor explained the two concepts related to the case to students using other examples. The instructor hopes that after this preliminary facilitation, students will have a greater understanding of the content and would be able to relate the concepts to the issues in the case (i.e., Strategy four: The instructor explain key concepts or principles to students).

Students were also advised to read additional reading materials before they attempted one of the discussion questions. It was learned that many students had difficulties answering a question that required them to relate theory to the issue in the case.

To guide students to answer the question, the instructor advised students to read additional reading materials that are somewhat related to previous lessons. This is to assist students to have a better understanding of the relevant theories so that they were able to apply them in the case (i.e., Strategy five: The instructor describes how the current assignment builds on the knowledge from previous lesson).

The case discussion took place online the following week after the instructor provided the facilitation. The instructor started the lesson by introducing the case, providing students with ideas to understand the case, and highlighting the key concepts, theory and discussion questions. Then, some groups were assigned to present their answers, while others were assigned to ask questions with the instructor facilitating the case discussion. The case discussion was organised in a systematic manner to discuss the questions based on the solutions provided in the teaching note. After the case discussion, the final report was graded and returned to students, together with the grading sheet containing scores for the critical thinking and problem-solving skills criteria and general written feedback (i.e., Strategy six: The instructor provides feedback to enable students to reflect on their learning). Students' performance in the case study is presented in the following section.

## Instructor and Students' Evaluation of the Case Study

Instructor and students' evaluation is critical to assess whether case study method is an appropriate teaching and learning method to improve students' critical thinking and problem-solving skills. Therefore, after grading students' reports, the instructor was asked to analyse how students answered the questions in the case that related to (1) problem identification, (2) problem analysis, (3) generation and application of new ideas, solutions or strategies, (4) evaluation of ideas, solutions or strategies, and (5) decision-making. These are the five traits contained in the rubric developed by TISSA-UUM to evaluate the critical thinking and problem-solving skills of students (see Appendix 1).

The number of students for this research is 68: 16 males (24%) and 52 females (76%). The evaluation conducted by the instructor indicates that 100% of students achieved the level of "Good" and "Excellent" for all traits except for trait number four (no. 4) on whether students can evaluate ideas, solutions or strategies (see Table 1). Most students were able to demonstrate the ability in traits: (1) problem identification, (2) problem analysis, (3) generation and application of new ideas, solutions and strategies, and (5) decision-making. However, five students achieved the level "Fair" for trait number four (no. 4). These students had difficulties in answering questions relating to the evaluation and discussion of the concept about "substance over form". Their answer showed that they lacked the understanding of "substance over form" and could not relate this concept to the scenario in the case.

Table 1
*Assessment scores of critical thinking and problem-solving skills of students taking advanced financial accounting and reporting* course

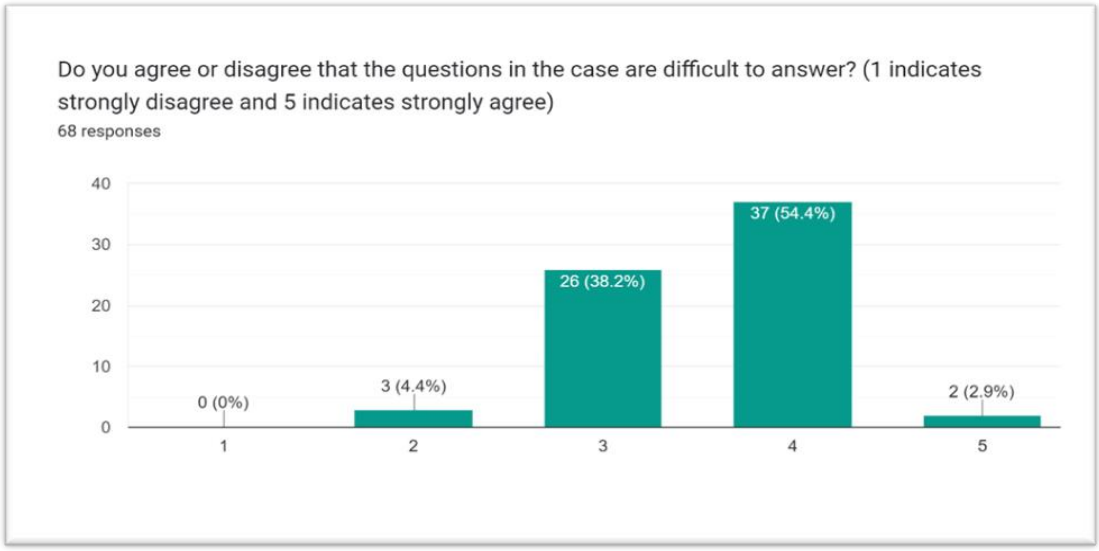
| Critical Thinking and Problem-Solving Skills (Traits) | Poor | Fair | Good | Excellent | Achieved target |
|---|---|---|---|---|---|
| | (0-3) | (4-6) | (7-9) | (10-12) | |
| (1) Problem identification | 0 | 0 | 40 | 28 | 68 |
| | 0% | 0% | 59% | 41% | 100% |
| (2) Problem analysis | 0 | 0 | 54 | 14 | 68 |

| | | | | | |
|---|---|---|---|---|---|
| | 0% | 0% | 79% | 21% | 100% |
| (3) Generation and application of new ideas, solutions or strategies | 0 | 0 | 54 | 14 | 68 |
| | 0% | 0% | 79% | 21% | 100% |
| (4) Evaluation of ideas, solutions or strategies | 0 | 5 | 45 | 18 | 68 |
| | 0% | 7% | 66% | 26% | 100% |
| (5) Decision making | 0 | 0 | 45 | 23 | 68 |
| | 0% | 0% | 66% | 34% | 100% |

Meanwhile, students were asked to indicate the difficulty level and the interesting level of the case. A five-point Likert scale is used to record the students' responses (e.g., 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree). Students were also requested to reflect on what they had learned and what they enjoyed about the case. Students were assured that their feedback would remain anonymous.

All 68 students answered the survey. Most of the students ranked the level of difficulty of the discussion questions between level 3 (average) and level 4 (difficult). For instance, 26 students (38%) agreed the difficulty level of the discussion questions as "average", while the other 37 students (54%) considered the discussion questions as "difficult". Meanwhile, three students considered the discussion questions as "easy", while another two students regarded the questions as "very difficult" (see Figure 1). This result demonstrates that although most students found the discussion questions difficult, they were still able to exercise their judgement, and use their critical thinking and problem-solving skills in solving the problems, as most of them obtained "Good" and "Excellent" scores for the assignment.

*Figure 1.* Students' consensus on the difficulty level of the discussion questions in the case




Furthermore, 63 students (93%) agreed that the case was engaging (see Figure 2). Their written comments suggest that the "case is interesting" and the discussion questions in the case are "simple and direct" [Student-A & Student-B]. However, students mentioned that they had to "give serious thought to the discussion questions" during the preparation stage of the assignment. The questions in the case require students to exercise "higher-order thinking skills" [Student-B, Student-C & Student-D].

In addition, students expressed that they like the case because it "sheds light about real-world business scenario" [Student-E & Student-F]. The case requires students "to apply the knowledge they have learned in the past when answering the questions" [Student-F]. The case also encourages students to exercise their "critical thinking skills" [Student-H] and students were able to analyse "the impacts of the change in accounting standard on the case organisation" [Student-G]. Although some students struggled to figure out what they should do initially, they believe that they were able to complete the case study "with the assistance and support provided by the instructor" [Student-I].

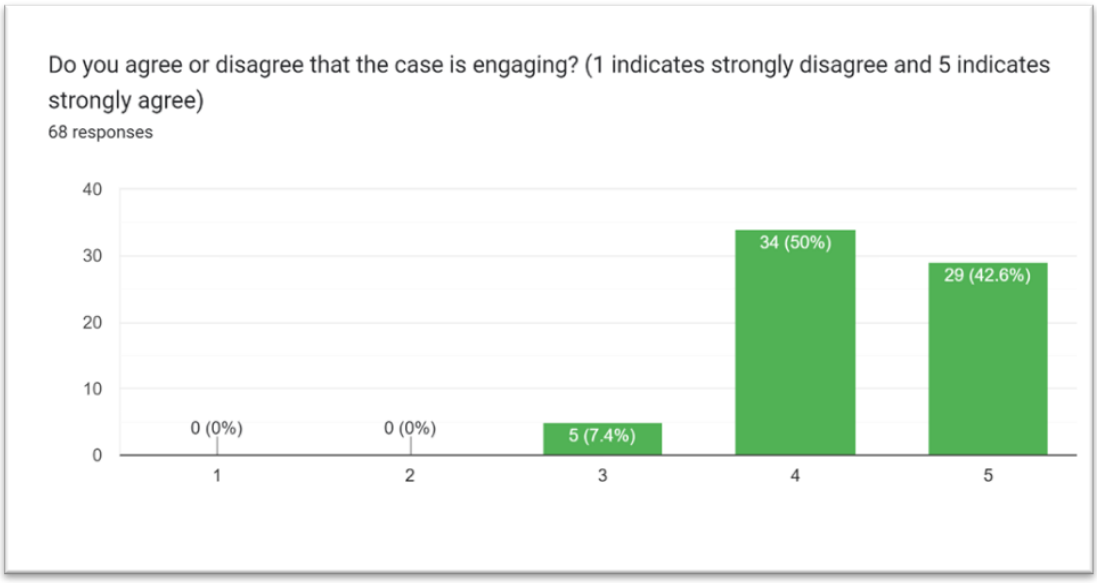



*Figure 2.* Students' consensus on the engagement level of the case

Meanwhile, the instructor who taught the case highlighted the importance of providing facilitation and support to students when teaching case studies. According to the instructor, students should not be left alone to complete the case study. Students should be informed explicitly "what they should do, and what are expected from them" [TISSA-Instructor]. Students should also be monitored continuously to ensure that they are involved in the assignment. For example, suppose the instructor learned that students struggle to understand the case, assistance should be extended to facilitate students to complete their tasks. In that situation, the instructor should intervene by "introducing the case briefly and providing some guidelines to students on how they should approach it" [TISSA-Instructor]. The instructor could also set up activities by asking students "simple questions, summarizing the content in the case, proposing theories, or initial views about the case" [TISSA-Instructor]. Therefore, the roles of the instructor are essential in facilitating case-based learning in the classroom. However, the instructor, cautioned that excessive support and facilitation provided to students under the scaffolding approach may lead to spoon-feeding where the instructor provides the students with all the information about the case.

## Discussion and Conclusion

This study aimed to examine the use of case studies in enhancing students' critical thinking and problem-solving skills and the potential use of scaffolding approach to further improve these skills. The authors developed a case study and tested it in advanced financial accounting and reporting course at TISSA-UUM. The data support that the case

study method engages students in their learning by presenting real-life organisation scenarios to prepare students for their professional careers. The data also stresses the importance of the scaffolding approach in teaching case studies effectively. The scaffolding approach enables the instructor to facilitate students in their case-based learning by providing support and feedback when performing the case-based assignment.

Six strategies were highlighted as the fundamental strategies that instructors could use when teaching case study. In the beginning, the instructor could simplify the complexity of the assignment by breaking down the main questions into simple questions to guide students in understanding the context of the case. The instructor should also inform students the learning objectives of the case, the purposes of the case-based assignment, and the directions students should follow when performing tasks. This is to provide students a clearer view of the assignment and motivate them to achieve the learning objectives. If students struggle in completing the assignment, the instructor may explain the problem to students. If needed, the instructor may also give a lesson describing complex concepts and principles and highlighting how the assignment is based on previous lessons' knowledge. This facilitation and support provided to students are to engage students with the case actively. Finally, upon completing all the tasks, feedback should be provided to students to enable them to reflect on their learning and seek further improvement.

Other instructors may mimic these six scaffolding strategies because the result indicates the approach is effective in teaching case studies, with all students achieving good and excellent outcomes for all traits in the critical thinking and problem-solving skills rubric. This implies that the use of scaffolding approach is practical in teaching case studies as the approach enhances students' critical thinking and problem-solving skills. Students also concurred that the facilitation provided by the instructor during the case preparation enabled them to complete the case-based assignment.

However, the study is subject to limitation which may be addressed by future research. It is learned that the study focuses on a single context, TISSA-UUM. It is suggested that future research could use the case developed by the authors and the scaffolding approach introduced in this research at different institutions with different instructors by establishing the appropriateness of the case study teaching method presented in this research. It may also be informative if future research could examine whether demographic factors such as students' age, gender and background influence the scaffolding approach and case study method. Finally, it is suggested that the use of case studies in teaching accounting course could be expanded, especially for teaching complex issues in the business world and in classes where the development of leadership skills, interpersonal skills and written communication skills are the key objectives.

## Acknowledgement

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## References

ACCA. (2016). *Drivers of change and future skills*. United Kingdom: ACCA.

Ballantine, J. A., & Larres, P. M. (2004). A critical analysis of students' perceptions of the usefulness of the case study method in an advanced management accounting

module: The impact of relevant work experience. *Accounting Education*, *13*(2), 171-189.

Bonito, S. R. (2019). The usefulness of case studies in a Virtual Clinical Environment (VCE) multimedia courseware in nursing. *The Journal of Medical Investigation*, *66*(1.2), 38-41.

Boyce, G., Williams, S., Kelly, A., & Yee, H. (2001). Fostering deep and elaborative learning and generic (soft) skill development: The strategic use of case studies in accounting education. *Accounting Education*, *10*(1), 37-60.

Browne, L., Hough, M., & Schwab, K. (2009). Scaffolding: A promising approach to fostering critical thinking. *SCHOLE: A Journal of Leisure Studies and Recreation Education*, *24*(1), 114-119.

Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking skills and Creativity*, *12*, 43-52.

Hassall, T., Lewis, S., & Broadbent, M. (1998). Teaching and learning using case studies: A teaching note. *Accounting Education*, *7*(4), 325-334.

Hoffer, E. R. (2020). Case-Based Teaching: Using Stories for Engagement and Inclusion. *International Journal on Social and Education Sciences*, *2*(2), 75-80.

Hristova, T., Todorova, T., & Markova, M. (2021). Using Case Study Method for Forming Clinical Thinking Ability in Nursing and Midwifery Education. *TEM Journal*, 471-475.

Jermakowicz, E. K., & Hayes, R. D. (2011). Framework-based teaching of IFRS: The case of Deutsche bank case learning objectives and implementation guidance. *Accounting Education*, *20*(4), 399-413.

Ku, K. Y. (2009). Assessing students' critical thinking performance: Urging for measurements using multi-response format. *Thinking skills and Creativity*, *4*(1), 70-76.

Mostert, M. P. (2007). Challenges of case-based teaching. *The Behavior Analyst Today*, *8*(4), 434.

Naude, M., & Derera, E. (2014). Using the case study method to enhance the learning skills of supply chain management students. *Industry and Higher Education*, *28*(5), 351-359.

Nohria, N. (2021). *What the Case Study Method Really Teaches*. Harvard Business School Retrieved 21 June 2022 from https://hbr.org/2021/12/what-the-case-study-method-really-teaches#:~:text=Cases%20teach%20students%20to%20size,better%20when%20used%20in%20context.

Ooi, S. C., & Lim, C. C. (2022). Was the change in accounting standard favourable to the financial reporting of AirAsia? From IAS 17 Leases to IFRS 16 Leases. *The Case Journal*. https://doi.org/https://doi.org/10.1108/TCJ-02-2022-0040

Pomykalski, J. (2010). Critical thinking through case study analysis. *Northeastern Association of Business, Economics, and Technology Proceedings*, 172-176.

Popil, I. (2011). Promotion of critical thinking by using case studies as teaching method. *Nurse education today*, *31*(2), 204-207.

Porzecanski, A. L., Bravo, A., Groom, M. J., Dávalos, L. M., Bynum, N., Abraham, B. J., Cigliano, J. A., Griffiths, C., Stokes, D. L., & Cawthorn, M. (2021). Using Case Studies to Improve the Critical Thinking Skills of Undergraduate Conservation Biology Students. *Case Studies in the Environment*, *5*(1), 1536396.

Rios, L. O. S. (2015). *Critical Thinking Toolkit*. Inter-American Teacher Education Network.

Sawyer, A. J., Tomlinson, S. R., & Maples, A. J. (2000). Developing essential skills through case study scenarios. *Journal of Accounting Education*, *18*(3), 257-282.

Snyder, L. G., & Snyder, M. J. (2008). Teaching critical thinking and problem solving skills. *The Journal of Research in Business Education*, *50*(2), 90.

Tunku Puteri Intan Safinaz School of Accountancy. (2021). *Critical Thinking and Problem Solving (CTPS) Rubric*. Tunku Puteri Intan Safinaz School of Accountancy, UUM.

Weil, S., Oyelere, P., & Rainsbury, E. (2004). The usefulness of case studies in developing core competencies in a professional accounting programme: a New Zealand study. *Accounting Education*, *13*(2), 139-169.

West, A., Swanson, J., & Lipscomb, L. (2018). Scaffolding. In P. Lombardi (Ed.), *Instructional methods, strategies and technologies to meet the needs of all learners*. Granite State College.

Wilkin, C. L. (2017). Enhancing critical thinking: accounting students' perceptions. *Education+ Training*, *59*(1), 15-30.

Wu, J., & Brogt, E. (2019). *Optimising complex case studies as teaching tools in accounting and law education*. New Zealand: University of Canterbury.

Wynn-Williams, K., Whiting, R. H., & Adler, R. W. (2008). The influence of business case studies on learning styles: An empirical investigation. *Accounting Education: an international journal*, *17*(2), 113-128.

## Appendix 1

Critical Thinking and Problem Solving (CTPS) Rubric (Source: Obtained from Tunku Puteri Intan Safinaz School of Accountancy (Tunku Puteri Intan Safinaz School of Accountancy, 2021)

| **Critical Thinking and Problem Solving (CTPS) Rubric** | | | | | | |
|---|---|---|---|---|---|---|
| **CONTENT (Critical Thinking and Problem Solving)** | | | | | | |
| | **Traits** | **Poor (0-3)** | **Fair (4-6)** | **Good (7-9)** | **Excellent (10-12)** | **Score** |
| **1** | **Problem Identification** | **Unable** to identify issue/problem even with assistance. | **Able** to identify issue/problem with minimum assistance. | **Independently able** to identify issue/problem with clarity. | **Independently able** to identify issue/problem very clearly and accurately. | |
| **2** | **Problem Analysis** | **Unable** to analyze issue/problem and fail to define the contributing factors. | **Able** to analyze issue/ problem but does not clearly describe the contributing factors. | **Able** to analyze issue/problem and clearly describe some of the contributing factors. | **Able** to analyze issue/problem and clearly describe all the contributing factors. | **x 2** |
| **3** | **Conceptualization and Generation of solutions** | **Unable** to generate any new ideas and/or offer alternative solutions. | **Able** to generate new ideas and/or provide alternative solutions with some assistance. | **Able** to generate new ideas and/or provide alternative solutions without assistance. | **Able** to generate new ideas and/or provide alternative solutions with accuracy, clarity and detailed. | **x 2** |
| **4** | **Evaluation** | **Unable** to evaluate appropriate alternative solutions. | **Able** to evaluate several alternative solutions with some reasonable assistance. | **Able** to evaluate several alternative solutions with minimum assistance. | **Able** to evaluate several alternative solutions clearly and accurately without assistance. | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **5** | **Decision making** | **Unable** to make decision based on identified ideas and solutions even with assistance. | **Able** to make decision based on identified ideas and solutions with some assistance. | **Able** to make good decision based on identified ideas and solutions with minimum assistance. | **Able** to make excellent decision based on identified ideas and solutions without assistance. | |
| **TOTAL SCORE** | | | | | | **/84** |

# Flipping the Classroom with The Humble Lesson Plans

Siti Seri Delima Abdul Malak
Tunku Puteri Intan Safinaz School of Accountancy (TISSA-UUM), Universiti Utara Malaysia, Malaysia
Corresponding Author: seridelima@uum.edu.my

## Abstract

Flipped learning is an active learning approach that seek to ensure that teaching and learning happens in meaningful and engaging ways. Studies had shown that it also led to better attainment of the course learning outcomes. In this teaching and learning strategy, the lesson plans were designed and used to flip the classroom. This was done by sharing the lesson plans earlier and before each new lesson commenced. They were developed based on social constructivism lens, by incorporating the 5E design of flipped classroom scenarios (Engagement, Exploration, Explanation, Elaboration and Evaluation). The set induction, the lesson and set closing were designed to ensure that students became active learners, either as individuals or with and among peers. Active learning activities were incorporated in every lesson. The design of every subsequent lesson plan; incorporated reiteration based on the previous lesson's experiences and reflections by the instructor. In total 24 unique lesson plans were developed for the Integrated Case Study course. Reflections by students revealed positive responses and appreciations to the availability of the lesson plans, the activities that were conducted and the overall scaffolding provided by the lesson plans. Consequently, this showed that how a humble lesson plan could be an impactful instrument in flipping the classroom to be a two-way street in teaching and learning, interactively and actively.

*Keywords:* Flipped learning, lesson plan, SOTL, reflective, active, action research.

## Introduction

Flipped learning is an approach that leans towards learner-centered rather than traditional instructor-centered teaching and learning practices (Sivarajah, Curci, Johnson, Lam, Lee and Richardson, 2018). It may also encompass various spectrum of the teaching and learning experiences with the incorporation of technology, collaborative and cooperative learning, independent learning and students' diversity (Inan, Balakrishnan and Refeque, 2019). One of the fundamental aspects of flipped learning is that the materials should be made available to the students prior to the commencement of each lesson, so that they have insights to be built upon in the classroom.

A lesson plan is defined as a "*the instructor's road map of what students need to learn and how it can be done effectively during the class time* (Centre for Teaching Excellence, Singapore Management University)." It is there to guide the instructor in delivering and ensuring students' attainment of the course learning outcomes. Iqbal, Siddique and Abdul Mazid (2021) contended that an effective lesson plan should considered the merging of constructivism theory, Gangne's nine events of learning and continuous formative assessment. Without a lesson plan, they argued that the instructors would be resorting to

traditional lecture, and students to rote learning.

This study then merges the innovative practice of flipped learning with the humble lesson plans. This was done by developing every lesson plan with a learner-centered approach using the 5E instructional model. The flipping was started with the sharing of the lesson plan to the students prior to commencement of each lesson. The intention was to flip the classroom with adequate guidance and scaffolding through the planned teaching and learning activities as designed in the lesson plans. These ensured that students acquired pre-knowledge before further teaching and learning happened in the classroom.

This paper explores the development and delivery of lesson plans that aims to flip the classroom into a learner-centered teaching and learning practices. It then provides evidence in the form of reflections on the effectiveness of the lesson plans, from the eyes of the students and the instructor.

## Context and participants

This study is a form of an action research in scholarship of teaching and learning. An action research is defined as, "*The process through which teachers collaborate in evaluating their practice jointly; raise awareness of their personal theory; articulate a shared conception of values; try out new strategies to render the values expressed in their practice more consistent with educational values they espouse; record their work in a form which is readily available to and understandable by other teachers; and thus develop a shared theory of teaching by research practice* (Elliot, 1991)."

This lesson plans were developed for Integrated case study (ICS) course that was offered as part of the Accounting Programme in Universiti Utara Malaysia. ICS is a capstone course for accountancy programs, that integrates knowledge from financial accounting & reporting, management accounting, taxation, audit, finance, management and business, information technology and other social sciences courses. Rather than topics or chapters, students were given six unique cases every semester that ran over 14 weeks.

The objectives were to enable learners to integrate and apply the knowledge that they had acquired from the years at the University. It was also to enhance their technical core competencies, cognitive, leadership and teamwork skills in an unstructured business environment. The study was done over three semesters in A192, A201 and A202. These semesters were done in a remote learning environment, where teaching and learning was impacted by the COVID-19 pandemic.

## The Development of the Lesson Plans

Each lesson plan was designed for every unique case that would be used for the allotted lessons. The structure of the lesson plan included sections for set opening, lesson, set closing and feedbacks and reminders. Since the course was not topical in nature, the learning outcomes for every lesson were tied directly to the achievement of the overall course learning outcomes listed below:

- Interpret various accounting and business-related issues in an organizational context

(C5)

- Make independent research (C3, P7)
- Develop alternative solutions to issues, devise action plans, and resolve implementation issues (C6)
- Demonstrate ideas, views and recommendations effectively both verbally and in writing (C4)
- Demonstrate ethical awareness ethical considerations as part of the decision-making process (C3, A5)
- Demonstrate leadership and teamwork in issues development and resolution (C3)

Specific instructions and tasks were developed in every lesson plan to ensure that course learning outcomes were achieved. The approach that was used in developing the lesson plans was to apply the 5E instructional model (Engage, Explore, Explain, Elaborate, Evaluate). The 5E model is a planning tool for inquiry teaching that provides a structure for students to connect science ideas with their experiences and apply their learning to contexts (Schallert, Lavicza and Vendervieren, 2022). Figure 1 below illustrates the development of the lesson plans, the flipping of the classroom via the design and sharing of the lesson plans. Finally, the continuous quality improvements that led to the iterations in the subsequent lesson plans designed for the rest of the teaching weeks and incoming semesters.

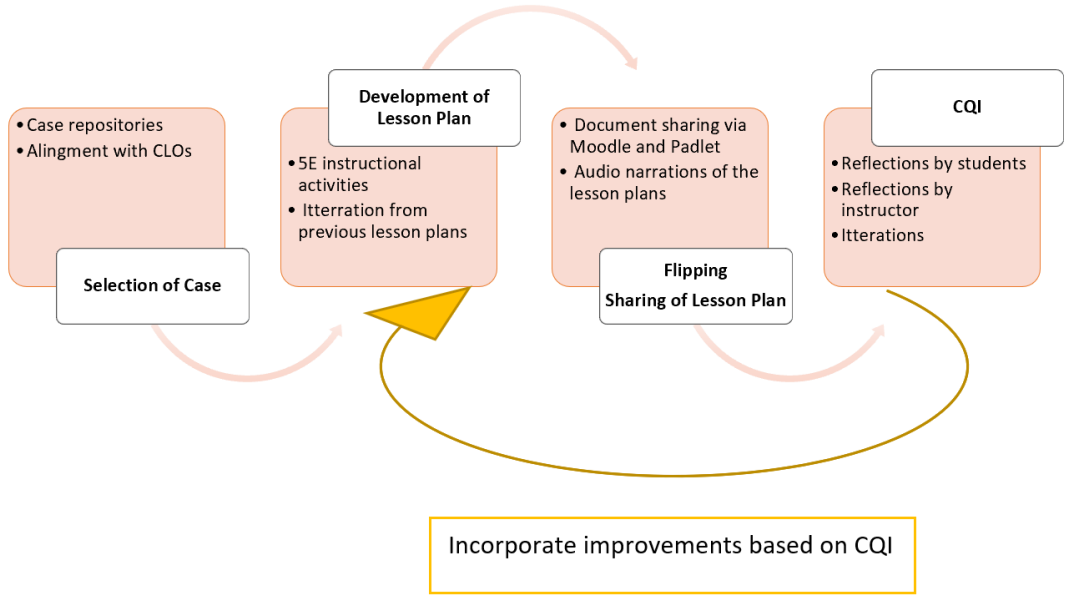


**Figure 7 The research flow**

In total, 24 unique lesson plans were developed for this course over the three semesters. Below is a mapping of the lesson plan for A201 against the 5E instructional model as a sample. It mapped the elements of the 5E model against the instructional teaching and learning activities that were developed, shared and conducted for every lesson. The instructional activities included the integration of tools 2.0 (i.e. Padlet, Flipgrid, EdPuzzle, Mentimetre), collaborative and co-operative learning (i.e. jigsaw, peer assessment, group collaborations), formative assessment through scaffolding activities that lead to the reports or presentations and development of soft skills (teamwork, critical thinking, leadership and digital skills).

**Table 1 Mapping of the lesson plan for A201 against the 5E instructional model**

| | **Case 1**<br><br>**Can We Do It Alone? The Case of De Cyber Hotel.** | | **Case 2**<br><br>**SOGO Department Store: Integrating Environmental**<br><br>**Sustainability into a Retail Store's Operations** | | **Case 3**<br><br>**COSTCO Wholesale Corporation Financial Statement Analysis** | | **Case 4**<br><br>**1MDB** | | **Case 5**<br><br>**Tabung Haji** | | **Case 6**<br><br>**Danone: Adopting Integrated Reporting or Not?** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Out-of-class activities** | **In-class activities** | **Out-of-class activities** | **In-class activities** | **Out-of-class**<br><br>**Activities** | **In-class activities** | **Out-of-class activities** | **In-class activities** | **Out-of-class activities** | **In-class activities** | **Out-of-class activities** | **In-class activities** |
| **Engage** | Sharing of the case online.<br><br>**Individual reading** of the case. | Instructor will lead the discussion based on students' **Flipgrid** videos and preliminary analysis. | Sharing of the case online.<br><br>**Individual reading** of the case. | Instructor will lead the discussion based on students' **Flipgrid** videos and preliminary analysis. | Sharing of the case online.<br><br>Individual reading of the case. | Instructor will lead the discussion based on students' Flipgrid videos and preliminary analysis. | Sharing of the case online.<br><br>Individual reading of the case. | Instructor will lead the discussion | Sharing of the case online.<br><br>Individual reading of the case. | Instructor will lead the discussion | Sharing of the case online.<br><br>Individual reading of the case. | Instructor will lead the discussion |
| **Explore** | **Complete the case analysis** | Instructor will lead the | Complete the case analysis | Instructor will lead the | A virtual visit to Costco: | Instructor will lead the discussion | **Watch the documentaries** by Al- | Instructor will lead the | Browse the given articles | Instructor will lead the | **Conduct research on the history** | Instructor will lead the |

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| | **framework** template.<br><br>Watch a video that introduce the hotel industry and their booking system. | discussion based on students' Flipgrid videos and preliminary analysis | framework template.<br><br>**Watch videos** on:<br><br>ESG and CSR<br><br>Future of retail<br><br>**Discuss with group mates** and start discussion on group video presentation | discussion based on students' Flipgrid videos and preliminary analysis.<br><br>**Poll via Mentimeter** | Video on history of Costco<br><br>Current state: https://www.bloomberg.com/quote/COST:US<br><br>A refresher on financial statement analysis: https://www.accountingcoach.com/financial-ratios/explanation | based on students' Flipgrid videos and preliminary analysis. | Jazeera on 1MDB.<br><br>Download a copy of the latest Malaysian Code of Corporate Governance | discussion<br><br>**Activity in Mentimeter** | that cover the case against Metrowangsa and Tabung Haji<br><br>A refresher on COSO at: https://www.coso.org/Pages/default.aspx<br><br>Watch a video on Islamic Finance. | discussion | of Integrated Reporting.<br><br>**Virtual visit to Danone.** | discussion. |

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| **Explain** | Complete a 2-minutes **individual video** description on the case using **Flipgrid**. | Instructor will lead the discussion based on students' **Flipgrid** videos, preliminary analysis and teaching notes. | Complete a a-90 seconds **individual video** description on the case using **Flipgrid** | Instructor will lead the discussion based on students' Flipgrid videos and preliminary analysis. | Complete a 60 seconds individual video answer to the following question, "Can you describe how Costco operates?" on the Flipgrid. | Instructor will lead the discussion based on students' Flipgrid videos and preliminary analysis. | **Share a picture of the 1MDB scandal that intrigues** you.<br><br>**Upload the** picture on our<br><br>**Padlet** and write a short description on why it intrigues you? | Case debriefing – from your eyes what was 1MDB and how it impacted you? – open<br><br>discussion | Brainstorm with your friends on the key facts and issues surrounding the case | Discussions would be based on the key question shared. | Discuss with group mates and start discussion of your group video presentation.<br><br>Brainstorm on key questions. | Discussions would be based on the key question shared. |
| **Elaborate** | Brainstorm the case – **complete the puzzle together** with **group** members. | **Jigsaw method** in completing the **SWOT analysis during class.** | Brainstorm the case – assignment of key questions and preparation of answers prior to class. | **Open floor questions** to be discussed in class were also shared.<br><br>These was to prompt further discussions | Preparation of answers to the questions:<br><br>Analysis of Common Size Statements<br><br>Sustainable Growth Model Ratios<br><br>Benchmark Ratios | In class discussion on:<br><br>Analysis of Common Size Statements<br><br>Sustainable Growth Model Ratios<br><br>Benchmark Ratios | Extend Exhibit 9 of the 1MDB case study by including key<br><br>facts/events that happened on the dates and complete the case study template. | **Mapping the issues/facts/practices in the 1MDB against the MCCG** Principles? What and<br><br>where did they clash? | Preparation of answers to key questions. | Discussions would be based on the key question shared. | **Preparation of a synchronous class activity** | **Conduct the synchronous activity in the class.**<br><br>**Decision time: If you were Laura** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Key questions:<br><br>Describe the case (Group A)<br><br>ESG - What exactly it is? (Group B and C)<br><br>Why does it matter? (Group D and E)<br><br>How was it enforced in Hong Kong? (Group F and G)<br><br>How Sogo did it? (Group H) | in class.<br><br>What is the relevant theory that supports ESG? Open floor<br><br>How to help Michelle? From paper to practice? Open floor<br><br>Forward looking: how to fit in the future retail? Open floor | | | | Each group please appoint two representatives to be ready with the answers | | | | **Palmeiro, what would you decide?** |
| **Evaluate** | Search #stopclickingaround. What do you find? | Decision time - Always remember the impacts of every | Submission of a group video presentation. | Evaluation of groups' video presentations. | Submission of a written individual report | Decision time by Torres.<br><br>Evaluation of the individual | Submission of a group report including the case analysis template | Lesson learnt from the case – **moving forward; open discussion** | Submission of an individual online video presentation | Evaluation of the individual video present | Submission of a group video.<br><br>Watch the | Evaluation of the group video presentation. |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Submission of **a group report** including the case analysis template. | decision made by the protagonist (Costs v Benefits).<br><br>Evaluation of the group reports and feedbacks to students. | Watch the videos and evaluation activities via **Edpuzzle**. | | | reports and feedbacks to students. | | | | ation. | videos in **Edpuzzle.** | **Teamwork and leadership assessments** via **TEAM MATES**. |

## Findings and discussions

### Reflections by students


Figure 8 Word cloud on reflections by students

The word cloud in Figure 2 was generated from the reflections by students on the sharing of the lesson plans in A201. Aptly, **"guidelines"**, **"types of assistance"** and **"types of plans"** reflected the nature of a lesson plan as an instructional guideline. The structure of the lesson plans was also prominent with the word's **"task"**, **"case analysis"**, "**report format"**, **"report content"**, **"due date"**, **"learning session"** and **"class time."** "**First time experience**" resonated among them, most likely from the fact that for many these was their first encounter of a lesson plan tailored to each lesson and shared earlier with them. **"Ideas"** was prominent, being a reflection of the generation of ideas by the lesson plan for students to critically analyse and respond to each case.

Positive experience portrayed by the words of **"effective way"**, **"clear instruction", "good preparation"** and **"effective way"** alluded to the benefits of flipping the classroom by sharing the lesson plan with students earlier. The integration of technology was reflected upon by **"different tools every time."** Students also looked forward to **"next class"** guidance. The words **"exhausting jobs"** and **"last minutes"** appeared to be negative connotations. However, further review of the reflections showed that students were happily alluding to the mix of presentations, video or report that did not burden students and was not exhausting. The last minutes were on them reflecting on their other courses that did not have any lesson plan for them to be prepared early. Overall, the reflections by students had been positive in embracing and benefitting from the lesson plans. The development of the lesson plan through the 5E model appeared to contribute to this overall positive experiences.

### Reflections by instructor

The development of the lesson plans had required the instructor to carefully and thoroughly reflected on the progression of the course in terms of the case selection, delivery, tools of teaching and learning and assessments. This had been done early before the semester commenced and pushed the instructor to be well-prepared going into the classroom. The application of the 5E model had significantly assisted the instructor in developing effective and meaningful lesson plans. At the centre

of the development was making students active participants of the teaching and learning process. The instructor had integrated various technology to assist in the engagement process. Students appeared to enjoy the student centered learning approaches, assisted by the tools 2.0.

Throughout the semester, the lesson plans were shared with the students earlier. After every lesson plan was delivered, the instructor reflected upon what worked and what did not and tweaked on the following lesson plans. Overall, the execution of the lesson plans had been fulfilling for the instructor. Students had to take charge of their own learning process through the planned instructional activities. The lesson plans assisted the instructor to do this early. Flipping it through sharing, laid open everything, for students to be prepared and for the learning to happened, prior and during the class. Students could not come to class not knowing what would happen and what were the expectations on them.

Nonetheless, the instructor and students, at times, was limited to the online environment were the learning happened. Internet connectivity and device capabilities were some of the constraints. In addition, the instructor also felt constrained with the remoteness of not seeing students' physically. The lack of physical presence meant she could not effectively address students' diversities and ensure smoother transitions between activities.

## Conclusion

*"The teacher must adopt the role of facilitator not content provider"*

This quote by Vgostky summed up what was the central idea behind flipping the classroom with the humble lesson plans. The development and sharing of the 5E's based lesson plans had transform the role of the instructor from a traditional teacher to a facilitator and the students as leaders, in empowering their own teaching and learning.

For continuous quality improvements, future lesson plans would need to consider firstly, the time management of the lesson plans, on whether suggested time on each activity should be stated. Secondly, additional digital tools that could be incorporated in the future. Finally, how the lesson plans could evolve and be transformed, once the classroom moved back to physical setting, post pandemic.

This study would be improved by incorporating a structured evaluation on the effectiveness of the lesson plans in improving the attainment of the learning outcomes and pre and post reflections by students. Further variations into the activities in the 5E based lesson plans would also be explored.

## Reference

Elliot, J. (1991). Action research for educational change. McGraw-Hill Education (UK).

Inan, N. K., Balakrishnan, K., & Refeque, M. (2019). Flipping perceptions, engagements and realities: A case study. Turkish Online Journal of Distance Education, 20(1), 208-222.

Iqbal, M. H., Siddiqie, S. A., & Mazid, M. A. (2021). Rethinking theories of lesson plan for effective teaching and learning. *Social Sciences & Humanities Open*, *4*(1), 100172.

Sivarajah, R. T., Curci, N. E., Johnson, E. M., Lam, D. L., Lee, J. T., & Richardson, M. L. (2019). A review of innovative teaching methods. *Academic radiology*, *26*(1), 101-113.

# Appendix 1

## Example of a Lesson Plan

**LESSON PLAN CASE 1: Can We Do It Alone? The Case of De Cyber Hotel.**

**Online set opening (now until 26th October 2020)**

1. Read the case and complete the case analysis framework template on your own.

2. Watch video: https://www.youtube.com/watch?v=oMCrdM_ClAU
   *Tip: Doing self-background research on the industry, company or regulations will help you in analyzing a case.*

3. Know your group mates and start discussion of your group report.
   *Tip: conduct a SWOT analysis to assist you.*

4. Attend the Google Suite workshop on the 20th October 2020. Share with me via UUM Online forum your e-certificate as proof of attendance.

**Lesson (on 27th October 2020 (Tuesday), via Webex 9.30 am)**

1. **Before class, complete a 2-minutes individual video description on the case.**
   Students may use the case analysis framework as their guideline for the video.
   Submit via: https://flipgrid.com/819b88a7 (It is opened already when you received this lesson plan.
   If you have problem submitting via Flipgrid, you may submit via Whatsapp but do consult me first.

2. **Brainstorm the case – complete the puzzle together.**
   *Tip: Be ready to share your group SWOT analysis.*

   *Instruction: we will rotate who will be sharing and leading each group during online synchronous lesson. For Case 1, you may choose your own leader. For subsequent cases, I will pre-select.*

3. **Decision time** - Search #stopclickingaround. What do you find? Always remember the impacts of every decision made by the protagonist (Costs v Benefits).

**Set closing and feedback**

1. Class wrap up and be ready to finalise report.

2. Lecturer will provide feedback for the report in UUM Online

**Submission of a group report including the case analysis template is online via UUM Online before 30th October 2020**. Between 10 to 15 pages excluding the case analysis template and reference lists. It should be submitted through Turnitin Assignment. A button has been set for Case 1 in your UUM Online. For group report, only ONE representative will submit the report.

Gentle reminder: *Let me know off any team issue earlier on. Remember that leadership and teamwork are part of the assessments. Class participation is also equally important as part of the leadership assessments.*

# Improving Problem Solving Skills Through Simulated Problem-Based Learning (SPBL): A Case Study of International Business Course

Shir May Ooi*[a], Norliza Hamir Basah[b]
[ab]Department of International Business, School of International Studies
Universiti Utara Malaysia,
06010 UUM Sintok, Kedah, Malaysia
*Corresponding Author: shirmay@uum.edu.my

## Abstract

The current evolution of higher education and careers is discussed based on the knowledge, skills and capability of graduates to meet industries' expectations. The advancement of robotic technology, artificial intelligence and cyber-technology are making some jobs disappear and substantial shifts in employment, skills and recruitment across industries and geographies. To keep the pace of these new challenges, certainly, the future workforce needs to align its skillsets. The curriculums that are developed by a university should have the constituents that can produce holistic graduates. Problem-solving skill is one of the top skills needed in the Fourth Industrial Revolution. The GFMA 2023 international business introduces simulated problem-based learning (SPBL) in order to improve students' problem-solving skills. It combines simulation and problem-based learning and involves engaging participants in roles to overcome obstacles in achieve company's goals. BIBM students are able to comprehend and apply the contextual knowledge of international business and eventually, they are able to produce solutions (problem-solving) to matters concerning complex international business issues accordingly. However, the analytic, synthesis and evaluation skills among BIBM students have to be improved. The skills of comprehensive examination of gathered data, subsequently composing all those small parts of data into whole new ideas or solutions for complex international business challenges have to be further developed.

*Keywords:* Problem Solving Skills, Simulation, Problem-Based Learning, International Business Course.

## Introduction

The development of higher education and careers in the 21st century is discussed based on knowledge, skills and ability of graduates to meet industries expectations. The changes in revolution of industry may have massive effect on the education of people especially in higher learning institutions (Benešová & Tupa, 2017). The curriculum that is designed by a university should have the elements that can produce holistic graduates. Problem-solving skill is one of the top skills needed in the Fourth Industrial Revolution. According to Ng (2017), the advancement of robotic technology, artificial intelligence and cyber-technology, some jobs will disappear and substantial shifts in employment, skills and recruitment across industries and geographies. To keep the pace of these new challenges, certainly the future workforce needs to align its skillsets.

Therefore, in Bachelor of International Business Management (BIBM), School of International Studies (SOIS) intend to produce graduates with leadership qualities capable of applying critical thinking/ problem-solving and communicating their thought of day to day world issues related to global business dimensions and international trade operations in various thematic areas such as international business operation, international marketing, strategy and structure of international business, global manufacturing and political, economic, law and business ethics among

others. One of the core component subjects of BIBM program is GFMA 2023 International Business. This subject concentrates on the process and strategy of international business from multiple perspectives. Equipped with the International Business perspectives, students will be expected to understand the implications of International Business for their future organization's strategy, structure and functions, in particular with rapid pace change of globalisation era. It covers important theories related to international business operations and the scholars associated with these theories. Therefore, the objective of the course is to explain strategies available for companies in order to compete in the global business, differentiate business operations for companies engaged in international business and describe complex international business issues from multiple perspectives. Thus, the outcome of the course, the BIBM student is able to comprehend and apply the contextual knowledge of international business and ultimately, student of BIBM able to produce solutions (problem-solving) to matters concerning complex international business issues accordingly.

The GFMA 2023 international business introduces simulated problem-based learning (SPBL) in order to improve students' problem-solving skill. It combines simulation and problem-based learning. Simulation involves placing participants 'in roles which require them to overcome obstacles in pursuit goals" or role-playing. Meanwhile, problem-based learning (PBL) can be defined as learning resulting from the processes involved when working towards the understanding or resolution of a problem (Barrow & Tamblyn, 1980).

**Problem Statement: Issues in Teaching International Business**

GFMA 2023 International Business is the compulsory core subject for Bachelor of International Business Management (BIBM) program. This subject requires student to be competent with high level of thinking and problem solving skills. Students not only need to understand international theories and concepts but also to be able to evaluate and interpret complex international business operation and issues to formulate effective firm's internationalisation decisions and strategies. However, Student often difficult to apply the concepts and strategies of international business to understand and to solve the real issue in business. Existing case study (highlighted in Table 1) designed to test problem solving skills fails as students are in difficulty to interpret complex international business issues from multiple perspectives and real international business scenario. Student often difficult to apply the concepts and strategies of international business to understand and to solve the real issue in business.

**Table 1**

*BIBM Mapping Table*

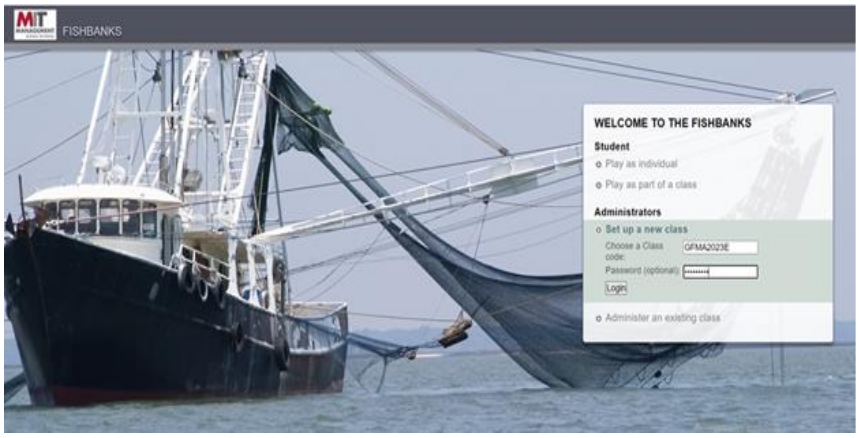
| CLO | TOPIC | ASSESSMENT METHOD | PLO | MQF | MQF ATTRIBUTES | MARKS | WEIGHTAGE |
|---|---|---|---|---|---|---|---|
| **CLO 1** | Chapter 1-5 | Quiz 1 | PLO1 | MQF 1 | Knowledge | 15 | 5% |
| **CLO 1** | Chapter 6-10 | Quiz 2 | PLO1 | MQF 1 | Knowledge | 15 | 5% |
| **CLO 1 & 2** | Chapter 1-6 | Mid Semester Examination | PLO1 | MQF 1 | Knowledge | 20 | 20% |
| **CLO 3** | Chapter 1-12 | Group Assignment | PLO5 | MQF 5 | Written Communication | 20 | 20% |
| **CLO 4** | Chapter 1-12 | Case Study (Problem Solving) | PLO6 | MQF 6 | Problem Solving | 10 | 10% |
| **CLO 1&2** | Chapter 7-12 | Final Examination | PLO1 | MQF 1 | Knowledge | 100 | 40% |

Source: BIBM syllabus

Hence, existing lecture is inadequate to transfer knowledge of international business and nurture higher order of critical thinking and problem solving skills. Traditional teaching is criticized of its effectiveness in helping student to acquire higher level of thinking skill and problem-solving abilities (Lemke, 2001). Case study is ineffective to expose students with comprehend real world issues. BIBM graduates are not only must equipped with IB knowledge but they are required to be able to apply the concepts and strategies and solve the real IB issues.

Shifting a classroom from traditional teaching to the SPBL is one of innovative way of improving student's learning experience for international business concepts and strategies. It is a combination of simulation and problem-based learning, in which student takes a specific role and settle specific "real problem" with the context of international business decision making and problem solving. Figure 1 is the example of SPBL conducted in GFMA 2023.

***Figure 1: SPBL – Fishbank***




Hence, the SPBL is a practical ground for GFMA 2023 students to comprehend the process of formulating international business strategies and the resolutions by taking part as manager in international business department in strategies formulation and implementation. Despite that, it improves their high order thinking skills vis-à-vis problem-solving skills.

**Research Questions**

1. Does SPBL is effective to improve students problem-solving skills?
2. What are BIBM students' perception about the SPBL implementation in International Business classroom?

## Literature Review

Problem-solving is a universal job skill that applies to any position and every industry. While everyone is tasked with some form of problem-solving in their workplace, not all employees are good on it. Understanding the critical components involved in problem-solving will help students to improve their skill set and demonstrate their expertise to employers (Symons & Pierce, 2018). Strong problem solvers are a valuable addition to any team. Considered a soft skill (a personal strength, as opposed to a hard skill that is learned through education or training), an aptitude for creative and effective problem-solving is nonetheless one of the most valued attributes employers seek in their job candidates (Bardach & Patashnik, 2019).

**Problem-Based Learning**

According to Duch, Groh & Allen (2011) Problem-Based Learning (PBL) is a teaching method in which complex real-world problems are used as the vehicle to promote student learning of concepts and principles as opposed to direct presentation of facts and concepts. Students are asked to find solutions to the problem and present them in a clean and efficient manner to determine which is most feasible and most likely to succeed (Tan & Ng, 2006). In addition to course content, PBL can promote the development of critical thinking skills, problem-solving abilities, and communication skills. It can also provide opportunities for working in groups, finding and evaluating research materials, and life-long learning. Duct et al. (2011) claimed that any subject area can be adapted to PBL with a little creativity. Like virtually all active-learning pedagogies, problem-based learning (PBL) is grounded in the belief that learning is enhanced when placed in context. For PBL, the context is a real-world problem. In its purest form, students are placed in an authentic problem before they have developed the knowledge needed to solve the problem posed. The problem presented contains multiple solutions, and students construct the knowledge they need to develop what they consider to be the appropriate solution (Schmidt, Rotgans, & Yew, 2011). The teacher (or tutor) serves as a "guide on the side" and uses questions to coach students toward appropriate resources or tools that can help solve the dilemma (Torp & Sage, 1998). Using a simulation to structure PBL produces a step like approach to its problem solving with students and teachers working through the PBL simulation in a systematic manner. Although PBL implementation varies even within that context, a generic model can be described as follows:

1. A problem situation, which provides the basis for study, is encountered before any preparation or study has occurred.
2. The problem situation is presented to students in the same manner it would be in the real world. Often students encounter the problem-solving situation within a small group that is guided by a tutor.
3. Students work through the problem in a manner that challenges their ability. The tutor facilitates learning by asking questions and monitoring the learning process.
4. Students continually identify needed areas of learning, which prompts and guides individualized study.
5. Students apply the knowledge and skills learned in Steps 3 and 4 to the problem, evaluate the effectiveness of learning, and reinforce and contextualize their learning.
6. The learning produced during this process is integrated into the student's existing knowledge base.

PBL helps students frame the simulation in a self-directed learning environment and builds students 'problem-solving skills as they solve a realistic dilemma with multiple solutions. Unfortunately, the realistic situation posed by PBL can allow students to pursue interests outside curriculum goals. Students lacking motivation to learn the content, teachers without sufficient classroom management skills or content knowledge, and materials not sufficiently grounded in curriculum goals can move learning away from intended curriculum. In such cases, students can research areas of interest and ignore the more challenging pursuit of building curriculum-driven knowledge. A simulation can alleviate these potential difficulties with PBL by placing boundaries and structure on its problem by guiding students and teachers through the overwhelming complexity that can accompany a purer PBL strategy.

## Research Methodology

Qualitative research is adopted in this action research to assess the effectiveness of SPBL to improve students' problem solving skills in International Business classroom. This is to ensure that

the students of BIBM not only able to demonstrate understanding of the subject but able to apply in practical context matters concerning international issues with critical thinking and high level or problem solving skill. Qualitative research involves in-depth research and analysis with different people. The different perceptions, needs and experiences from these people provide new insight to the field of study (Guba & Lincoln, 1994). Knowles and Cole (2008) stated that qualitative research is more concerned about uncovering knowledge about how people feel and think in the circumstances in which they find themselves, instead of making judgements about whether those thoughts feelings are valid. Students from GFMA 2023 International Business in Universiti Utara Malaysia are the targeted sampling. In general, these respondents are considered appropriate as the sampling of the study area because all are from BIBM backgrounds and they are needed to comprehend and apply the contextual knowledge and strategies of International Business. The research has also analysed BIBM students' perception towards the implementation of SPBL in International Business classroom.

Even though qualitative research method involves many types like survey questionnaire, observation or interview; however, this research requires observation as a primary source of data collection. Qualitative researchers interview or observe interviewees that are able to provide their experience or expertise. researchers are able to study on the different point of view from interviewees and this provide new insights in the field of research (Bryman & Bell, 2007; Denzin & Lincoln, 2011; Weaver & Olson, 2006).

**Data Collection**

This section discusses the design parameters of the SPBL. SPBL method is drawn from the concept of simulation and problem-based learning teaching and learning strategy. Simulation and problem-based learning have been widely recognized as effective teaching and learning strategies, empowering active participation and learning through experiences in many fields of studies including International Business. This section is sought to overview the design parameters of SPBL, steps, procedures, and roles that have been conducted in International Business classroom for three weeks.

**Preparation for Simulation**

The number of students taking part in the simulation may vary, from a small group of students to larger number group as few as ten or to hundreds of students. For the purpose of the teaching and PBL, the simulation is divided into groups that take their role as strategy makers to represent company, discuss current issues and formulate yearly operational strategies for their respective company.

The role of the instructor is important in designing the learning outcomes, councils, selection of topics, assigning roles and managing time. The simulation runs for 3 weeks, implies PBL technique in-class simulation. One of the important aspects of designing the SPBL project is learning outcomes. Learning outcomes are coordinated with the learning outcomes of the program and course syllabus and transferable skills of GFMA 2023 International Business.

**Discussing Key Strategies in International Business**

In addition to providing background information for students regarding the various decision-making explanations / models, students need to have some background concerning the key strategies in international business within the state. When conducting this simulation in the International Business course, a specific case study will be given to all groups. For instance, a case study related to international business strategy. Each student will be playing an individual role; it is important for them to have a working knowledge of all the key actors that will be included in the simulation.

**Presenting The Issues**

In addition to the readings related to International business strategy, students will also need some background readings and or discussion about the particular entry strategy issue being used for the simulation. Ideally, at least one class session would be dedicated to discussing this entry strategy issue in order to adequately prepare students to deal with the issue during the simulation process. Some material and academic journal were given to the students to familiarize themselves with the current situation. More detailed information is presented later about entry strategy in international business.

**Conducting The Simulation**

Once students have been assigned their decision-making role and all groups have been created, students were introduced to the simulation. On the first week of the actual simulation, each group will meet to discuss their approach to the operating issue. It is very important that all groups keep track of everything that occurs during the simulation. As such, the President should decide on a note-taking strategy for the group by either assigning some- one or creating a schedule. Upon completion of the simulation, these notes should be distributed to all group members before writing their final simulation paper.

On the second week, the simulation began by having students initiate measures to implement the entry strategy they discussed on the first week. In order to implement strategy, students will need to interact with other members of the domestic and international community. On the second week of the simulation, students are introduced to a crisis situation relating to the entry strategy in international business issue that is the focus of the simulation. A single event can be used as the trigger of the crisis, or the crisis can build over several smaller events. For example, if the crisis relates to cash flow and catches yield in different fishing sites, then a single international pirate attack on vessel may serve as the catalyst for the crisis students will need to address. This simulation is designed to last around three total class days, so this is the final day that the students will play their roles and make decisions during the simulation. The goal on this day is to try to get each group to come to some type of solution to the crisis at hand or to at least make some headway on the crisis.

On the final week, the simulation is considered completed. During this time, students can compare the outcomes of their simulations across groups and see which actions appeared to be more successful than others. By comparing their own actions to those of other groups, they can see how different actions may have resulted in different outcomes, even when the initial circumstances were similar. This is very helpful in illustrating some of the positive and negative consequences of a variety of possible entry modes strategy.

## Analysis and Discussion

This section analysed the problem-solving skills of International Business students after the completion of simulation and role-play exercise. The data was based on written reports and reflection. The data was collected based on written reports, consist of the opening statement, position paper and analytical paper of student.

**Student's Reflection on Problem-Solving skills**

47 out of a total of 50 students gave their respond that SPBL helped to improve their problem-solving skills. 3 students commented that the challenges in simulation were too difficult for them to analyse. Below are some reflections written by the students after the completion of the simulation exercise in the classroom.

*Student 1:*

"The simulation does help me a lot to improve my problem solving skills. As a leader, I have to act professionally and optimistic in order to gain trust from other people. I learnt not to be selfish in making a decision "

*Student 2:*
"Those problems are very complex but in the same time reaching to an agreement and resolution should not be impossible as it is a real-life situation. And that drives me to find resolutions and agreement on this issue thus making me read more and study more thus enhancing my critical analysis."

*Student 3:*
"In solving any problems, firstly I was taught to identify the conflict and issue raised and must understand everyone's (respective department) interest too. Secondly, I must come out with as many possible solutions as I can and evaluate either the option is feasible or not. And lastly I need to choose the best solution that will bring benefits to every country."

*Student 4:*
"The simulation does help me to improve my ability in solving problems. Through the simulation, I learned to think in different ways instead of the ways that I always think of".

Student 5:
"Yes. It made me think critically and outside of the box. It has tremendously helps me to improve my ability in solving problems skills."

**Instructor's Reflection On the Conduct of Simulations**
*Week 1:*
Students are clueless with the whole idea of simulation and role play once it was introduced in the classroom. Students have the first impression that simulation that will be conducted is similar like copying what the other has done before. Instructor needs to tell this simulation is new assessment and explain in detail on how actually simulation takes place and what is required to conduct a simulation. Students also took some effort to obtain some information about simulation and role play in the classroom. When students were given the case study for each group, they quickly search for the information to be shared and presented with their peers. They started to discuss about what type of approaches will be used to explain their operational decision making. The process of developing their problem solving skills has expanded during the problem solving period. Instructor also provide some advice and insights on how to select the correct operating fishing approaches based on their case studies. Overall, students are still adapting with the environment to come up with their own decision making, and how to simulate themselves as one of the operational decision makers.

*Week 2:*
Students look more confident after been given sufficient time to conduct a research on yearly operational fishing decision making process. They engage more with their group members to decide the fishing sites Harbor, Coast and Deep accordingly and amount of fishing boats to buy or sell. They come up with a strategic plan on fishing to be implemented towards another fishing sites as per their case study. Students are more relaxed and enjoyed the simulation conduct as they presented their issue/crisis pertaining their respective case studies as assigned by the instructor. Students are comfortable in exchanging ideas and opinions with the members and other groups. Nevertheless, a small number of students are still lack of confidence and reluctant to actively participate during the simulation. These students tend to be just a listener rather than contributing their ideas during the simulation. The instructor noticed this situation and tried to approach the students to encourage them

to engage more actively in the simulation. In sum, students already enhance their ability to solve a problem given by creating their own ideas and opinions during the simulation. They also develop their confidence and communication skills during the conduct of simulation.

*Week 3:*
This is the final week for simulation and role play exercise. The debriefing session is conducted this week to conclude of simulation. During debriefs, team members reflect upon a recent experience, discuss what went well and identify opportunities for improvement. Debriefing is important session in simulation. Debriefing provides students to discuss individuals and group experiences and instructors able to relate simulation and topics studied in international business. Students are asked about what they have learned; their challenges in simulations and how they encounter the obstacles; engagement; opinion of adopted resolution, opinion of ability to solve problems, their plan and strategies to solve problems and practicality of simulation in International business course and their suggestion to improve simulations.

## Conclusion

The result of this project should be high interest and relevant to BIBM program and other teaching subjects in Management to evaluate the effectiveness teaching and understanding in SPBL. The result of this research will be relevance to IB discipline in analysing the effectiveness of simulated SPBL in developing and assessing students' problem solving skills in complex international business scenarios. The BIBM student is able to comprehend and apply the contextual knowledge of international business and eventually, student of BIBM able to produce solutions (problem-solving) to matters concerning complex international business issues accordingly. However, the analytic, synthesis and evaluation skills among students have to be improved. The process of analytic in the simulation, students has to be improved in separating and detailed examination of data collected, into smaller elements for decision-making or interpretation. Subsequently, it will help to enhance the combination or composition of small parts to form a whole idea, a new solution in the synthesis and evaluation process.

The introduction of decision making and critical thinking as sub-topic in international business strategies chapter (Chapter 8) is proposed to improve both skills for problem solving. While simulation exercises have the potential to serve as the problem for a PBL designed course, there are a number of factors an instructor should consider in implementing this approach. These include the scope of the simulation, the students' level of preparation as they begin the course, and the instructor's objective in using the simulation. Researchers have identified many possible objectives for using a simulation. Instructors believe if this can be achieved, it will reinforce the students' efforts at analysis and application, and consequently provide them with the motivation to go beyond simple knowledge and comprehension of course materials (Chernikova et al., 2020). That is, once students see the relationship between the application of concepts and performance, they will embrace the value those concepts bring to a business activity (Jorre de St Jorre & Oliver, 2018).

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## References


Allen, D. E., Donham, R. S., & Bernhardt, S. A. (2011). Problem-based learning. *New directions for teaching and learning, 2011*(128), 21-29.

Bardach, E., & Patashnik, E. M. (2019). *A practical guide for policy analysis: The eightfold path to more effective problem solving*: CQ press.

Benešová, A., & Tupa, J. (2017). Requirements for education and qualification of people in Industry 4.0. *Procedia manufacturing, 11*, 2195-2202.

Bryman, A., & Bell, E. (2007). *Business Research Methods*. New york: Oxford University Press.

Chernikova, O., Heitzmann, N., Fink, M. C., Timothy, V., Seidel, T., & Fischer, F. (2020). Facilitating diagnostic competences in higher education—a meta-analysis in medical and teacher education. *Educational Psychology Review, 32*(1), 157-196.

Denzin, N. K., & Lincoln, Y. S. (2011). *The Handbook of Qualitative Research*: SAGE Publications.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research, 2*(163-194).

Jorre de St Jorre, T., & Oliver, B. (2018). Want students to engage? Contextualise graduate learning outcomes and assess for employability. *Higher Education Research & Development, 37*(1), 44-57.

Knowles, J. G., & Cole, A. L. (2008). *Handbook of the arts in qualitative research: Perspectives, methodologies, examples, and issues*: Sage.

Ng, A. (2017). The Times They Are A-Changin': Technology, Employment, and the Malaysian Economy. *Research Articles*. http://www.krinstitute.org/Discussion_Papers-%40-The_Times_They_Are_A-Changin%E2%80%99-%3B_Technology%2C_Employment%2C_and_the_Malaysian_Economy.aspx

Schmidt, H. G., Rotgans, J. I., & Yew, E. H. (2011). The process of problem-based learning: what works and why. *Medical education, 45*(8), 792-806.

Symons, D., & Pierce, R. (2018). Aligning Online Mathematical Problem Solving with the Australian Curriculum. *Mathematics Education Research Group of Australasia*.

Tan, S., & Ng, C. F. (2006). A problem-based learning approach to entrepreneurship education. *Education+ Training*.

Torp, L., & Sage, S. (1998). *Problems as possibilities: Problem-based learning for K-12 education*: Ascd.

Weaver, K., & Olson, J. K. (2006). Understanding paradigms used for nursing research. *Journal of advanced nursing, 53*(4), 459-469.

# A BLENDED LEARNING FOR UUM ENGLISH PROFICIENCY COURSE: LEARNERS' SATISFACTION AND TECHNOLOGY USAGE

Mohan Rathakrishnan[a*], Nurul Imtiaz Abd Gani[b], Hariharan Krishnasamy[c],
Arumugam Raman[d], Muhammad Noor Abdul Aziz[e]
[ade]School of Education, Universiti Utara Malaysia,
UUM Sintok, Malaysia
[bc]School of Language Centre and Philosophy, Universiti Utara Malaysia,
UUM Sintok, Malaysia
*Corresponding Author: rmohan@uum.edu.my

## Abstract

UUM uses the blended learning (BL) method to help students in its English proficiency course. Most students struggle to finish project assignments and graduate to later advanced English classes because of their lack of proficiency. This study looks into the relationships between course design, student involvement, learner autonomy and learner satisfaction in blended English proficiency course. This study aims to ascertain whether the amount of technology used by students and their satisfaction with their blended learning English sessions are related. A questionnaire was used to collect data for the quantitative research strategy. Focus groups and questionnaire design were all taken into account throughout data collection. Three hundred forty students made up the random sampling for this study from the population of 2930 students who were enrolled in Semesters A161 through A181. The correlation between the respondents' Technology Usage (TU) and Learner Satisfaction (LS) levels was established using cross-tabulation and Chi-Square. Most respondents who reported having excellent computer skills (n=19) or good computer skills (n=99) stated high levels of satisfaction with the BL method of learning English. The outcome is significant since the Pearson Chi-Square value was below or equal to the set alpha criterion (0.001). (usually 0.05). Thus, there was a link between computer proficiency and student satisfaction. It is reasonable to presume that students today use technology extensively and are proficient with computers and the internet. The relationship between students' satisfaction and computer and internet literacy demonstrates the significance of technology use in today's society. For most students, blended learning is an innovative strategy.

Keywords: Blended Learning, Technology usage, Learners satisfaction, English Proficiency course

## Introduction

Since 2015, a policy has been in place requiring that the minimum band necessary for enrolment in and graduation from a given course be based on the MUET result (Rozana Sani, 2020). Universiti Utara Malaysia (UUM) further requires the MUET for specific course prerequisites, with students enrolling in particular courses based on their MUET grades. According to UUM, MUET scores or bands serve as a crucial barometer of a learner's readiness to undertake academic programmes offered in English. Therefore, students must graduate from the university with a high level of English proficiency before moving on to further English-language courses.

For pupils to learn the language fluently, one aspect that must discuss is the manner of instruction. Simply increasing the number of English contact hours won't do this. Learners' proficiency cannot be increased by face-to-face (FTF) or online learning (OL) methods. The learning

strategy must be changed as a result. Additionally, the outdated educational model, which centres around the instructor, is thought to no longer benefit students. In the twenty-first century, teaching and learning have found value in blended learning (BL), which combines online and in-person instruction.

The use of technology by students to develop their English language skills is quickly becoming the norm. The higher education market has been profoundly impacted by the global usage of technology (Afsharian, Sivapalan, and Nordin, 2017). As a result, Malaysia's Higher Education Institutions (HEIs) are converting to electronic universities and using technology in their teaching and learning (T&L) activities (Omar, Hussein, Mara, & Alam, 2017). Students now have more options to use interactive learning strategies thanks to the growth of technology in higher education, especially when learning a language like English.

**Problem Statement**

Although BL is useful for learning English, not all students are successful in doing so at the end of the semester. As a result, they have trouble finishing the project and moving on to the subsequent advanced English courses due to their lack of ability. The reason is that the more difficult disciplines would immerse learners in activities that emphasise using interpretive abilities when addressing problems. Prior studies at Universiti Utara Malaysia (UUM) found that students with poor English proficiency struggled with challenging topics (Hamzah et al., 2015).

Students failed to pass exams and performed poorly in other courses that required English. This situation can affect their performance depending on their degree of proficiency and level of satisfaction with their English learning. Because of this, English language learners are growing more worried about it, which suggests that the best approach to teaching English would be to use the BL method, particularly during the pandemic era.

This study looked at how several factors relating to the use of technology in BL-based English proficiency courses to students' satisfaction (computer skills and internet skills). The factors are interactions, learner autonomy, and course structure. This study takes a more extensive range of insignificant factors into account. Davis' Technology Acceptance Model (TAM) and Moore's Transactional Distance Theory, which produced significant results in the earlier literature, are combined to develop a new structural model that aims to close the gap by combining the most thorough external components (TDT).

The primary purpose of this study is to examine the relationships between learner satisfaction in blended English proficiency courses and the course design, student involvement, and learner autonomy using technology. Given the importance of the components mentioned earlier in learner satisfaction, this study would aid in creating, implementing, and improving BL practices. Assessing the variables affecting student satisfaction is critical since they may reveal how successfully the HEI's services are delivered.

The purpose of this research was to examine students' satisfaction with blended learning English proficiency classes and their technology usage? This study tries to answer the research question “What relationship exists between students' use of technology and their satisfaction with English proficiency classes using blended learning?

## Literature Review

A blended learning strategy (BL), which uses tactics that cater to many types of learners' learning styles, can help people become fluent in English. Due to its conventional and digital media use, BL is regarded as the most acceptable method for increasing learners' English competence (Ahmedi, 2018; Ghavifekr & Rosdy, 2015). BL is developing into a successful teaching strategy in

Higher Education Institutions (HEIs) as a result of the steadily growing student population and the switch from F-t-F to OL as a learning methodology.

The use of blended learning (BL) in educational institutions across the globe is growing in popularity. Due to an exponential increase in recent years in the number of studies using BL models in various academic situations (Yang, Sun, & Liu, 2017). The BL approach is chosen because it will use technology to improve student's learning and consider their various learning preferences. To make the same transition, Universiti Utara Malaysia (UUM) has incorporated BL into several of the courses it offers, such as the English Proficiency 1 (EP1) course.

At Universiti Utara Malaysia (UUM), the English Proficiency 1 (EP1) course is a requirement for all undergraduates. It is tailored specifically for students who scored in Bands 1 and 2 on the Malaysian University Examination Test (MUET). These students were categorised as having poor proficiency since UUM demands a specified MUET band for particular courses, and EP1 is also considered. Based on their MUET results before entering UUM, this is a result of their limited or weak command of the English language. A banding system from Band 1 to Band 6, with Band 1 representing the lowest achievement and Band 6 representing the highest achievement, is used to correlate the MUET scores. The former breakdown of the MUET's overall score and groupings are shown in Table 1.

Table 1
*The Old Description of Aggregated Score of MUET*

| Aggregated Score | Band | User | Command of language | Group |
|---|---|---|---|---|
| 260 - 300 | 6 | Very good user | Very good command of the language | Higher proficiency learners (HP) |
| 220 - 259 | 5 | Good user | Good command of the language | |
| 180 - 219 | 4 | Competent user | Satisfactory command of the language | Average proficiency learners (AP) |
| 140 - 179 | 3 | Modest user | Fair command of the language | |
| 100 - 139 | 2 | Limited user | Limited command of the language | Low proficiency learners (LP) |
| Below 100 | 1 | Extremely limited user | Poor command of the language | |

**Note: Adapted from MUET band description in MPM Portal*

Table 1 indicates that EP1 students fall between MUET bands 1 and 2. However, in 2020, the Cambridge English Language Assessment (CELA), a division of the University of Cambridge in the United Kingdom, will update the band score and format of the MUET and align them with the Common European Framework of Reference (CEFR). The brand-new MUET complied with a global standard and complimented the European framework. The modifications to the exam specification concern learners' abilities at six levels of competency in speaking, listening, reading, and writing. The revised CEFR-aligned MUET is shown in Table 2

Table 2
*The New CEFR aligned MUET*

| Aggregated Score | MUET Band | CEFR language proficiency | User |
|---|---|---|---|
| 331 - 360 | 5+ | C1, C2 | Advanced – Proficient user |
| 294 - 330 | 5.0 | | |
| 258 - 293 | 4.5 | B1, B2 | Intermediate – Independent user |
| 211 - 257 | 4.0 | | |
| 164 - 210 | 3.5 | | |
| 123 - 163 | 3.0 | | |
| 82 - 122 | 2.5 | A1, A2 | Beginner - Basic user |
| 36 - 81 | 2.0 | | |

| | |
|---|---|
| 1- 35 | 1.0 |

The CEFR language competency level divides language proficiency into three groups: basic (A1 and A2), intermediate (B1 and B2), and advanced (C1 and C2) (see Table 2). Students in the EP1 course in this subject area at the A1 and A2 levels of the CEFR, making it a pre-intermediate proficiency course.

This course provides students with an integrated introduction to fundamental communication skills through the four English language abilities speaking, listening, reading, and writing. Before enrolling in subsequent English courses at UUM, students must complete the institution's mandatory English language course. The students' experiences significantly impact how technology is used in the classroom. The students' use of computers revealed they favoured the BL programme (Ho, 2017; Wong et al., 2014). Experience with computer technology and learner satisfaction are related. Davis (1989) asserts that pupils' adept at using a computer system will find it helpful, increasing learner satisfaction.

Because motivation is a crucial psychological component affecting students' learning, students' pleasure in their education is vital (Bolliger & Martindale, 2004). In traditional university learning environments ( Lenton, 2015; Sutherland et al., 2018), as well as in distance education (Gleason, 2021), learner satisfaction is thought to have a robust positive relationship.

Interactions, learner autonomy, and course design all have an impact on how satisfied students are utilising BL-based English proficiency programmes. Transactional Distance Theory (TDT) claims that interaction is the second factor influencing learning (TDT). Moore (1997) first described the transactional distance learning theory as interaction or discussion in regular classroom settings. The INT covers interactions between students as well as two-way interactions between students and instructors (one responds to instruction) (Moore, 1997). According to Hu & Du, learner autonomy is referred to as the capacity for self-directed learning (2013). Students gained self-awareness and subject consciousness, which stoked their enthusiasm in their studies and motivated them to put their all into the learning process. Learners can set their own learning objectives by choosing an alternate teaching strategy and controlling what is taught where and how. For students to master a language, they must be capable of making their own decisions.

The course structure (CS), also referred to as instructional management, determines how rigid or flexible a course is. It refers to how different elements of a complex system interact or are arranged, including learning objectives, teaching methods, evaluation protocols, exercises, tests, prerequisites, instructional purposes, syllabus, course resources being created and designed, text to be used for learner evaluation or assessment, schedule, and course environment (Moore & Kearsley, 1996). (Garrison, Anderson, & Archer, 2000). Instructors often provide information about the CS, including assignments, due dates, evaluation criteria, recommendations, and resources, to support students' academic performance and ongoing learning (Gray & DiLoreto, 2016). It is the thorough planning done by instructors before, during, and after a course is delivered.

## Methodology

This study used quantitative methods to examine the research issue from the viewpoint of the English language students at Universiti Utara Malaysia (UUM) who are using blended learning. The primary purpose of this study was to use quantitative methods to demonstrate the relationship between students' satisfaction with using blended learning English proficiency classes and their usage of technology (computer and internet abilities). This study examines objectives, observable events, and subjective meanings in accordance with the main research topics. It is combined with well-known theoretical frameworks from Transactional Distance Theory (TDT) to investigate the variables influencing learner satisfaction in English language acquisition through BL (Moore, 1993).

Statistics that show correlations between the variables are the main problem in the quantitative phase. The study's second phase—a qualitative investigation—was then conducted based on the quantitative study's findings to further develop and triangulate the results from the first phase.

The original method for gathering research data for the quantitative research strategy was a questionnaire. The baseline data for factors relating to learner satisfaction were taken from the blended learning English proficiency course. To gather demographic data on the respondents, questionnaires are distributed to large groups of students. This research took into account the questionnaire design, a pre-test consisting of expert validation, focus groups, a pilot survey, and considerations for the study's demographic and sample.

The eight sections of the study's questionnaire, totalling 108 initial items, were made. But after the pre-test, 94 items were added to the list of items. Table 3 displays the questionnaire's summary and total number of items.

Table 3
*Description and Number of Items in the Questionnaire*

| Parts and Component (Abbreviation) | Description | No. of Items |
|---|---|---|
| Part One - Demographic profile (DP) | Respondents were requested for their background information such as age, gender, ethnicity, education level, school, and experience in a blended learning course. | 6 |
| Part Two - Technology Usage (TU) | Respondents were requested to provide information about their technology used mainly on computer and internet use, such as computer-level skills, duration of using the computer, internet level skills, and duration in accessing the internet. This section aims to answer **RQ** "What relationship exists between students' use of technology and their satisfaction with English proficiency classes using blended learning? | 4 |

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The built-in materials are appropriate for the learners doing the mixed English proficiency 1 course. The researcher initially established the dimensions and constructs used in the study before creating the questionnaire items. The pertinent items were extracted from the items and categorised to create a preliminary version of the questionnaire.

The present study created a five-point interval Likert scale with 94 items across six dimensions, ranging from 1 (strongly disagree) to 5 (strongly agree), from part 3 to part 8. Given that 5-point scales are more valid and trustworthy than shorter or longer scales, an effort was made to develop a better grading system that would allow students to reflect honestly on their thoughts (Krosnick & Fabrigar, 1997).

First, the questionnaire for the current study was examined by experts. Specialists knowledgeable with the questionnaire design serve as expert reviewers (i.e., provide vivid reviews for correct wording and question construction). They assess the things to ensure that they fulfil the requirements of the study objectives (Gani, Rathakrishnan, & Krishnasamy, 2020). Lecturers were chosen as the best expert reviewers to confirm the validity of the instrument because they actively participate in learners' supervision. In essence, the precise number of expert reviewers is unspecified; they could range from 3 to 10 reviewers as long as they help with item agreement management (Zamanzadeh et al., 2015). Consequently, five qualified reviewers were chosen for this study's instrument's content validity.

The questionnaire that evaluates the study's construct also included a space for experts to provide comments on the additional questions they would suggest being added. The researcher took note of every suggestion and feedback and modified the work. The researcher then documented the opinions of the domain experts in an excel spreadsheet, quantified the data, and decided whether to keep, change, or remove elements from the instrument before testing it. Cross Tabulation and Chi-

Square determined the association between the respondents' Technology Usage (TU) and the Learner Satisfaction (LS) level.

In this work, the Content Validity Index (CVI) is calculated using both I-CVIs and Content Validity Index for Scales (S-CVIs) to determine the amount of representativeness. The I-CVIs are computed for clarity to acquire the content validity, and the Content Validity Ratio (CVR) is determined for essentiality.

The Content Validity Index (CVI) is calculated in two ways: The Content Validity Index for Scales and the Content Validity Index for Items (S-CVIs). Similar to this, the Content Validity Index for Scales (S-CVIs) is generated using the average of the item-level CVI and the Universal Agreement (UA) among experts (S-CVI/UA).

Before the experiential analysis, the result for S-CVI/Ave and S-CVI/UA was .929; after removing the extra items based on that expert reviewers' analysis, the result was .992. S-CVI/UA was 1.027 before the experiential analysis and 1.013 following it. The calculation, as mentioned earlier, leads to the conclusion that the I-CVI, S-CVI/Ave, and S-CVI/UA values are satisfactory. As a result, the questionnaire's scale accurately represented its excellent content validity. Pilot samples were subjected to the principal component model utilising the Principal Component Analysis (PCA) extraction method. Additionally, PCA is a superior choice because this study planned to use PLS-SEM Composite Component Analysis (CCA) in the actual survey. As a follow-up study, CCA is a PCA modification that can be utilised in construct validation procedures (Hair, Risher, Sarstedt, & Ringle, 2019). Following Carpenter's recommended scale development best practice, this study employed the Promax rotational approach. Table 4 provides a summary of the factor analysis findings.

Table 4
*Factor Analysis Results*

| No | Constructs | Items | Factor Loading | KMO | Bartlett's Test p-value | Eigen-Value | % of Variance explained |
|---|---|---|---|---|---|---|---|
| 1 | **Learner Autonomy (LA)** | LA1 | .644 | .777 | <.001 | 5.826 | 58.257 |
| | | LA2 | .824 | | | | |
| | | LA3 | .850 | | | | |
| | | LA4 | .761 | | | | |
| | | LA5 | .565 | | | | |
| | | LA6 | .618 | | | | |
| | | LA7 | .776 | | | | |
| | | LA8 | .750 | | | | |
| | | LA9 | .970 | | | | |
| | | LA10 | .887 | | | | |
| 2 | **Perceived Ease of Use (PEU)** | PEU1 | .574 | .841 | <.001 | 4.594 | 51.046 |
| | | PEU2 | .768 | | | | |
| | | PEU3 | .630 | | | | |
| | | PEU4 | .762 | | | | |
| | | PEU5 | .744 | | | | |
| | | PEU6 | .765 | | | | |
| | | PEU7 | .666 | | | | |
| | | PEU8 | .791 | | | | |
| | | PEU9 | .698 | | | | |
| 3 | **Perceived Usefulness (PU)** | PU1 | .693 | .867 | <.001 | 5.164 | 57.383 |
| | | PU2 | .698 | | | | |
| | | PU3 | .723 | | | | |
| | | PU4 | .778 | | | | |
| | | PU5 | .824 | | | | |

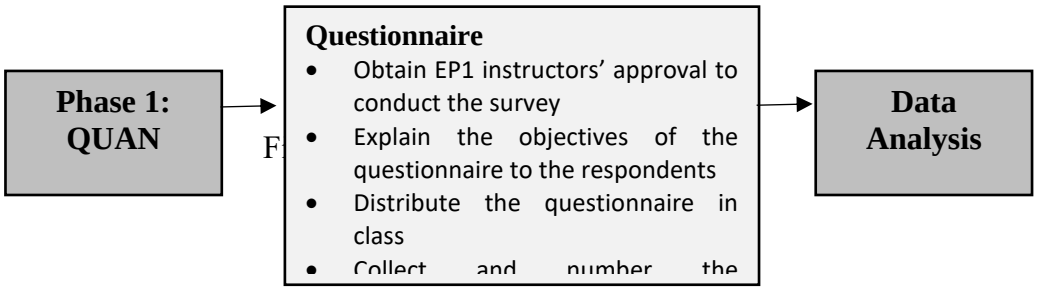
| | | |
|---|---|---|
| | PU6 | .752 |
| | PU7 | .756 |
| | PU8 | .803 |
| | PU9 | .781 |

A total of 2930 students from Semesters A161 to A181 made up the population, and 340 students made up the sample for this study. The next section explains how the sample size was determined.

Table 5
*Records of EP1 Courses and Learners from Semester A161 to A181*

| Session | Semester | No. of EP1 Courses | No. of Learners | | Total of learners | School in UUM | | |
|---|---|---|---|---|---|---|---|---|
| | | | Band 1 | Band 2 | | CAS | COB | COLGIS |
| **2016 - 2017** | **A161** | 28 | 21 | 817 | 838 | 324 | 320 | 194 |
| | **A162** | 6 | 0 | 172 | 172 | 85 | 54 | 33 |
| **2017 - 2018** | **A171** | 31 | 29 | 831 | 860 | 488 | 300 | 72 |
| | **A172** | 7 | 0 | 178 | 178 | 82 | 56 | 40 |
| **2018 - 2019** | **A181** | 33 | 28 | 854 | 882 | 400 | 335 | 147 |
| **Total** | | **105** | **78** | **2852** | **2930** | **1379** | **1065** | **486** |

To ensure that every participant in the study was chosen equally, a straightforward random sampling procedure was used for the questionnaire. The term "sample size" refers to the ideal number of selected cases as a sample to accurately reflect the characteristics of the intended population (Saunders et al., 2016). The researcher used Krejcie and Morgan's technique for calculating sample size to conclude that the population of 2930 to reflect its characteristics accurately would need 340 samples. Quantitative data were collected using a survey questionnaire. The quantitative data collection utilizing a survey questionnaire.




## Analysis and finding

This study employed the following statistical techniques for the quantitative data (questionnaires) to analyse them: The following procedures are used: Descriptive Statistics, and Cross Tabulation and Chi-Square Test.

The correlation between the respondents' Technology Usage (TU) (computer and internet abilities) and Learner Satisfaction (LS) level was established in this study using cross-tabulation and Chi-Square. The items chosen to indicate the TU of respondents were based on the respondents' level of computer abilities, experience using a computer (managing tools), level of online skills, and duration of internet use (time consumed). Table 6 depicts the connection between Learner Satisfaction (LS) and Technology Usage (TU) (LS).

Table 6
*Cross Tabulation between Technology Usage and Learner Satisfaction*

| Technology Usage | Subgroups | Learner Satisfaction | | | Chi-square ($\chi^2$) | p-value |
|---|---|---|---|---|---|---|
| | | Low | High | Total | | |
| Computer Skill | Excellent | 4 | 19 | 23 | 23.682 | <.001 |
| | Good | 48 | 99 | 147 | | |
| | Moderate | 59 | 44 | 103 | | |
| | Poor | 2 | 0 | 2 | | |
| | TOTAL | 113 | 162 | 275 | | |
| Experience in using computer | Less than 1 year | 0 | 2 | 2 | 2.877 | .411 |
| | 1 to 2 years | 13 | 12 | 25 | | |
| | 3 to 5 years | 24 | 32 | 56 | | |
| | More than 5 years | 76 | 116 | 192 | | |
| | TOTAL | 113 | 162 | 275 | | |
| Internet Skill | Excellent | 7 | 24 | 31 | 16.570 | <.001 |
| | Good | 58 | 104 | 162 | | |
| | Moderate | 48 | 34 | 82 | | |
| | Poor | 0 | 0 | 0 | | |
| | TOTAL | 113 | 162 | 275 | | |
| Duration of accessing the internet | Less than 1 hour | 0 | 0 | 0 | 1.161 | .558 |
| | 1 to 2 hours | 12 | 13 | 25 | | |
| | 3 to 5 hours | 43 | 56 | 99 | | |
| | More than 5 hours | 58 | 93 | 151 | | |
| | TOTAL | 113 | 162 | 275 | | |

**Note: chi-square (χ2) value, degree of freedom (df)*

Table 6 shows that the majority of respondents with outstanding (n=19) or good (n=99) computer abilities expressed high levels of satisfaction with the BL approach to learning English. However, respondents with inadequate computer abilities reported lower levels of satisfaction (n=2). Given that the Pearson Chi-Square value is less than or equal to the specified alpha threshold (0.001), the result is noteworthy (usually 0.05). Thus, there was a connection between student satisfaction and computer skills or technology usage.

Like the respondents' internet capabilities, most students with good internet skills (n=24) reported high satisfaction levels. In contrast, only seven of those with excellent internet skills reported low levels of satisfaction. Good internet users (n=104) who responded expressed great satisfaction with the BL approach to learning English. Additionally, the Pearson Chi-Square value is 0.001, indicating that the outcome is significant. Therefore, there was a connection between student happiness and these internet skills.

In comparison, respondents with a high degree of satisfaction had more than five years of computer usage experience, while those with a low level of satisfaction only had one to two years. Comparable to how respondents with a high degree of contentment use the internet for more than five hours per day as opposed to respondents with a low level of satisfaction who only uses it for one to two hours per day. In both cases, the Pearson Chi-Square value is 0.411, indicating that the outcome is either non-significant or independent. As a result, there was no correlation between these two factors. These findings have addressed the relationship between technology use and students' satisfaction in blended learning English proficiency courses.

## Discussion

High computer or internet competence learners shows students are able to overcome any challenge to their learning goals. It is reasonable to assume that students today have a high technology usage (computer and internet literacy) prevalence. In contrast, students with poor

computer or internet abilities will be less confident in their ability to use the system. They will struggle more with any challenges they meet while studying. The study's findings showed that these students have no trouble adjusting to computers and the internet in the university's BL of EP course. This study's conclusion is different compared to other research that discovered that students who are comfortable utilising a computer and the internet (McCarthy & Murphy, 2010).) might be content with the method of instruction they are receiving. Research further corroborates with the conclusion by Arbaugh & Duray (2002), which found a correlation between learners' satisfaction and computer and internet literacy. Although the study's participants are young adults from the millennial generation (first-semester students), it is crucial to address the participants' proficiency with computers and the internet and understand their expectations of BL before enrolling in an English course.

On the other hand, there was no correlation between learners' pleasure and their experience using the computer or the length of time they spent online. The results are either non-significant or independent based on the Pearson Chi-Square values of 0.411 and 0.558, respectively. The non-significant results would impact the positive effects of BL adoption in universities on education (Ho, 2017). This non-significant result conflicts with Davis' (1989) finding that learners' pleasure would rise as they gained expertise with computer programmes.

UUM students with high satisfaction levels had been using computers for an average of more than five years. Others with low levels of contentment had only been using them for one to two years. It seemed that learners with five years or more of experience were better able to control their learning pace and achieve high levels of satisfaction with the BL method than learners with fewer than five years of experience. Rushing through the course material may have allowed students with fewer than five years of expertise to complete the required assignment in the permitted time.

## Conclusion

Blended learning is a novel approach for the majority of students. Face-to-face instruction in English content and themes does not guarantee that all students will acquire knowledge rapidly. The ability to construct teaching and learning methods is contingent upon the instructor's proficiency in face-to-face or online methods.

When utilising technology to study English, students' English learning is influenced by several aspects, including interactions, course structure, and learner autonomy. The study's findings indicate that the factor has little effect on student satisfaction in Blended learning. However, students are interested in online technology use and face-to-face interactions with instructors. This study can theoretically and practically contribute to HEIs worldwide with the essential and required competitive advantages.

## Reference

Afsharian, A., Sivapalan, S., Nordin, S. (2017). Blended Learning & The Higher Education Classroom: A Critical Review Of Developments Within Engineering Education. *Education*, 182–187. https://doi.org/10.1109/WEEF.2017.8467021

Ahmedi, M. R (2018). The Use of Technology in English Language Learning: Literature Review. *International Journal of Research in English Education*, 3 (2), 115-125. doi: 10.29252/ijree.3.2.115.

Arbaugh, J. B., & Duray, R. (2002). Technological and structural characteristics, student learning and satisfaction with web-based courses: An exploratory study of two on-line MBA programs. *Management learning*, *33*(3), 331-347.

Bolliger, D. U., & Martindale, T. (2004). Key factors influencing student satisfaction with online courses. *International Journal on E-Learning,* 32(1), 61-67.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management science*, *35*(8), 982-1003.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*. https://doi.org/10.2307/249008.

Gani, N. I. A., Rathakrishnan, M., & Krishnasamy, H. N. (2020). A pilot test for establishing validity and reliability of qualitative interview in the blended learning English proficiency courses. *Journal of Critical Reviews*. https://doi.org/10.31838/jcr.07.05.23

Garrison, D.R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education,* 2(2-3), 87-105.

Ghavifekr, S. & Rosdy, W.A.W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science (IJRES)*, 1(2), 175-191.

Ginns, P., Prosser, M., & Barrie, S. (2007). Students' perceptions of teaching quality in higher education: The perspective of currently enrolled students. *Studies in higher education*, *32*(5), 603-615.

Gleason, B. (2021). Expanding interaction in online courses: integrating critical humanizing pedagogy for learner success. *Educational Technology Research and Development*, *69*(1), 51-54.

Gray, J. A., & Diloreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. Int. J. Educ. Leaders. Prep. 11, 1–20.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24.

Hamzah, Muhammad Sodbir and Abdullah, Hussin and Ahmad, Mazida. (2015). Effect of English proficiency on social capital and academic achievement among economic students. I*nternational Journal of Business and Society,* 16 (3). pp. 453-469. ISSN 1511-6670.

Ho, W. Y. (2017). A review of blended synchronous learning. *International Journal of Social Media and Interactive Learning Environments,* 5(4), 278–291.

Hu, H., & Du, Z. (2013). Web-based Inquiry of Autonomy in Foreign Language Learning as an English Major in Higher Vocational College. In *Advanced Technology in Teaching,* 163, 45-48.

Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*. https://doi.org/10.1177/001316447003000308.

Krosnick, J. A., & Fabrigar, L. R. (1997). Designing rating scales for effective measurement in surveys. *Survey measurement and process quality*, 141-164.

Lenton, P. (2015) Determining student satisfaction: An economic analysis of the National Student Survey. *Economics Of Education Review*, 47. pp. 118-127. ISSN 0272-7757.

McCarthy, M. A., & Murphy, E. A. (2010). Blended learning: beyond initial uses to helping to solve real-world academic problems. *Journal of College Teaching Learning*, 7(5), 67–70

Moore, M. G. (1997). s-Theory of transactional distance. In *Theoretical Principles of Distance Education*. https://doi.org/10.1037/0022-3514.90.4.644.

Moore, M. G. (1997). Theory of transactional distance: theoretical principles of distance education. *Moore, M. (1997). Theory of Transactional Distance: Theoretical Principles of Distance Education. In D. Keegan (Ed.), Theoretical Principles of Distance Education (Pp. 22-38). London, England: Routledge.* https://doi.org/10.2307/3121685.

Omar, M. K., Hussein, N., Mara, U. T., & Alam, B. P. (2017). Factors Influencing E-Learning Satisfaction Among Students : A Study of a Public University in Malaysia. *35*(4), 568–573. https://doi.org/10.5829/idosi.wasj.2017.568.573.

Rozana Sani (2020, March 18). Meeting university requirements. *New Straits Times.* https://www.nst.com.my/education/2020/03/575837/meeting-university-requirements.

Saunders, M. N. K., & Townsend, K. (2016). Reporting and Justifying the Number of Interview Participants in Organization and Workplace Research. *British Journal of Management*. https://doi.org/10.1111/1467-8551.12182.

Sutherland, K., Davis, C., Terton, U., & Visser, I. (2018). University student social media use and its influence on offline engagement in higher educational communities. *Student Success*, *9*(2), 13-24.

Yang, L., Sun, T., & Liu, Y. (2017). A bibliometric investigation of flipped classroom research during 2000-2015. *International Journal of Emerging Technologies in Learning*. https://doi.org/10.3991/ijet.v12i06.7095.

Wong, L., Tatnall, A., & Burgess, S. (2014). A framework for investigating blended learning effectiveness. *Education and Training*. https://doi.org/10.1108/ET-04-2013-0049.

Zamanzadeh, V., Ghahramanian, A., Rassouli, M., Abbaszadeh, A., Alavi-Majd, H., & Nikanfar, A. R. (2015). Design and implementation content validity study: development of an instrument for measuring patient-centered communication. *Journal of caring sciences*, *4*(2), 165.

# The Development of a teaching guideline for incorporating design thinking into the Research Methodology in Computing course

Siti Sakira Kamaruddin*[a], Farzana Kabir Ahmad[b], Alawiyah Abd Wahab[c]
[abc]School of Computing, Universiti Utara Malaysia,
Sintok, Kedah, Malaysia
*Corresponding Author: sakira@uum.edu.my

## Abstract

Teaching research methodology to computing students presents several challenges. One of the common challenges is the students could not grasp the difference between carrying out impactful research to merely completing an information technology software development project. Additionally, students struggle to work on research that can contribute to societal wellbeing. Implementing design thinking in the teaching process can help alleviate some of the challenges however; there is no specific guideline on how design thinking can be incorporated into the delivery of the research methodology lessons. This paper presents the development of a teaching guideline for academicians who are planning on implementing design thinking in their research methodology classes. The guideline was developed based on a critical analysis of literature related to design thinking and research methodology. The produced guideline offers a combination of the 5 phase design thinking phases incorporated in a 6 step research process to achieve 3 learning outcomes of the research methodology in the computing course. The guideline can be beneficial to the faculty in the practical implementation of the design thinking techniques in the delivery of the research methodology in computing course.

*Keywords:* Design Thinking, Teaching guideline, Research Methodology in Computing

## Introduction

The course, Research Methodology in Computing (RMC), is a course offered as part of the Master of Information Technology program at a top-ranked Malaysian university. The course provides the students with the necessary knowledge and skills to develop and carry out research. In particular, the course aims at teaching students about research design, strategies, methods, and processes. The important steps in planning a research project, such as problem identification and formulation of the research question, developing the study objective, reviewing related literature and formulating a model are also covered. Additionally, methods for data collection and analysis are included. The course also discusses the preparations involved in writing a research proposal.

The RMC course objectives are to enable the students to apply the research process and use the acquired knowledge to conduct their research. Among the course learning outcomes are; to formulate research problems, research questions and objectives; to produce a critical review of existing literature, and to design appropriate research methods that address the research objectives. These learning outcomes are the fundamental building blocks for conducting high-impact research and producing a good research proposal.

The course applies a project-based learning method where each student is required to work on their research projects. At the end of the class, students will be assessed based on oral presentations and their written research proposal chapters. The assessment itself is divided into 3 parts each part assesses the achievement of each course learning outcome. Certain assessment criteria are used to evaluate the learning outcome of this course.

Currently, students in this course are coached on analytical thinking which can be defined as the process of analysing a topic to develop complex ideas and generate additional new knowledge as a solution to a certain problem (Sternberg & Spear-Swerling, 1996). It is based on breaking down complex problems into single and manageable components. A six-step research process is deployed in teaching the RMC course i.e. state-of-the-art analysis, formulating problem statement, research question and research objective, reviewing the literature, identifying research gap and proposing solutions, research design and evaluation.

The consequence of employing analytical thinking is; that the majority of the RMC class students struggle to produce a research outcome that is beneficial for the community or industry while also striving to ensure that they are working on high-impact computing research instead of a typical system development project. Considering the emphasis on the human requirements that the design thinking technique has to offer, this study explores the possibility of incorporating the design thinking technique in teaching RMC.

Design thinking is a non-linear, iterative process which seeks to understand users, challenge assumptions, redefine problems and create innovative solutions to prototype and test. The method consists of 5 stages i.e. Empathize, Define, Ideate, Prototype and Test (Hasso Plattner Institute of Design, 2016). A detailed explanation of these phases is given in the subsequent section. In general, this method is most useful when the aim is to tackle problems that are not well-defined or unknown. A design thinking technique has much potential that can benefit the RMC course.

Since novelty is of major concern in scientific inquiries such as in Computing research, design thinking can offer ways to achieve novelty by redefining the problem and exploring a more exhaustive search for solutions. Moreover, design thinking promotes creativity rather than objectivity and it introduces new points of view to the process of reasoning (Dolata & Schwabe, 2016).

Another important characteristic of the design thinking technique is that it emphasizes human-centric character, where one of the five-phase in the design thinking technique is 'empathy' which results in an intensive user needs analysis (Dolata & Schwabe, 2016). This characteristic is in line with the research clusters of Malaysia's National Priority Areas such as Social, Economic and Wellbeing, Public Health, Quality Education and others which emphasize that research should be able to contribute to societal wellbeing.

Considering the potential of design thinking, this study intends to explore its applicability in the RMC course by developing a teaching guide for the instructors to improve the student learning outcomes of the course. A teaching guide is needed to ensure that the RMC instructors have a step-by-step guideline in delivering the RMC course with the incorporation of design thinking techniques. The development process of this teaching guideline is explained in this paper. The rest of the paper is organized in the following sections. The next section details the literature and related work. This is followed by a section depicting the methodology used to develop the teaching guideline and a section on results and discussion. The paper ends with a conclusion section.

## Related Works

In this section, we review the main phases of the design thinking technique and how previous researchers have incorporated design thinking in educational settings. The incorporation of the design thinking technique in the computing field is also reviewed in this section. The aim is to highlight the importance of design thinking in education and how it can bring benefits to the course delivery of RMC.

### Design Thinking Technique

The last ten years have seen significant growth in the popularity of the design thinking technique.

One of the reasons for its popularity is its success in solving complicated issues and improving customer experience (Hasso Plattner Institute of Design, 2016). In this paper, we attempt to examine the possibility of incorporating design thinking into the course delivery of RMC by developing a teaching guideline. We adopted the five-phased design thinking technique as proposed by Stanford's Institute of Design (Hasso Plattner Institute of Design, 2016). The five phases are Empathize, Define, Ideate, Prototype and Test.

**Empathize.** Empathy is regarded as the core of the human-centred design process. The effort in understanding humans is known as the "empathise" mode. In this mode, one should attempt to comprehend how and why one does things, as well as their bodily and emotional requirements. By definition, empathy is the intellectual identification or empathetically experiencing another person's emotions, thoughts, or attitudes. In the empathy phase, the design thinkers should be able to identify complex and important user requirements through a variety of strategies. Interviewing, observation, and immersion are the three basic strategies for developing empathy. Finding discrepancies between what people do and what they say they do is the aim of the Empathize phase.

**Define.** The define phase is concerned with bringing emphasis and clarity to the design environment. As a design thinker, it is important to define the issue on hand based on what was discovered from the Empathize phase. This phase is about making sense of the extensive information that was gathered from the previous phase. It can also be viewed as a step to narrow the discovered problem; therefore, the objective of this phase is to develop at least one actionable problem statement often known as a point of view (POV) that centres on the insights that were learned from actual users.

**Ideate.** The Ideate design thinking phase focuses on idea generating. It symbolises an approach that is "going broad" in terms of concepts and outcomes. Ideation gives the source material and the fuel for creating prototypes and delivering creative solutions to the users. This phase involves the process of brainstorming ideas to move beyond figuring out problems to coming up with solutions for the users. During ideation, the design thinkers have the opportunity to combine their creative thinking with their knowledge of the problem domain and the target users to produce potential solutions.

**Prototype.** The Prototype phase is an iterative process for creating artefacts that are meant to provide answers to problems. This process can be general in the early stages of a project. This phase usually involves the construction of a low-resolution prototype that is simple to develop and inexpensive, yet can elicit helpful input from users during the early stages. The prototype may become a little more refined in later stages. The iterative creation of artefacts, whether digital, tangible, or sensory, intending to elicit qualitative or quantitative feedback is essential in this phase.

**Test.** In the test phase, the design thinkers can request users for feedback about the prototypes that were constructed in the previous phase. This can be viewed as another chance to develop empathy for the target users, however, one should not limit themselves to simply asking the user if they like the presented solution, instead concentrating on what can be discovered about the individual, the issue, and the potential solutions.

Given the above step, it is important to note that design thinking, according to Brown (2008), does not include following a rigid, predetermined sequence of the above steps. Looping back through prior steps where concepts are refined is typically beneficial for all kinds of projects.

**Design Thinking in Teaching**

Panke (2019) investigated the answer to the question of what are the characteristics of design thinking that make it particularly fruitful for education and pointed out that the reasons are;

encouraging tacit experiences, increased empathy, reduced cognitive bias, promoting playful learning, creating flow, fostering collaboration, inducing productive failure, producing surprising solutions and nurturing creative confidence. A review of the literature has revealed increasing numbers of scholars promoted the application of design thinking in reforming teaching and learning methods. For example, design thinking has been applied in Business courses (Ching, 2014), marketing courses (Yang, 2018), and design education (Tu, et al., 2018).

In business education, Ching (2014) introduced and applied design thinking to 36 students attending the Entrepreneurship course at a Brazilian university. The students were instructed to work on the problem of redesigning a course to increase student engagement, motivation and interest. The five-phase of design thinking techniques were embedded in the course design. The study revealed three important findings with regards to the design thinking process; 1) it fosters students' creativity to think outside the existing alternatives, 2) it encourages students to integrate knowledge acquired through their research and 3) it encourages students to apply design thinking to solve the problem in their working environment.

In the marketing discipline, Yang (2018) applied the design thinking method in a course named packaging design. The course aims to guide students to identify problems from the perspectives of product packaging, brand image, spatial structure and marketing. Instead of theory-based lectures, the course was designed to include talks from the design industry to share their packaging design cases. In addition to the talks, the course also integrated in-class practices and group discussions. Furthermore, the 5-phase design thinking technique was embedded in the course structure. The results showed that design thinking enhances students' practical experiences, increases their learning motivation and fosters teamwork.

In design education, design thinking has been applied to students of integrated design education from the Design Institute of National Yunlin University of Science and Technology, Taiwan (Tu, et al., 2018). To study the effect of the application of design thinking to the course, a questionnaire was used to measure the students' learning effectiveness. The analysis of the questionnaire reveals that the student's learning productivity has improved, their problem identification ability has enhanced, and their creative thinking was encouraged.

The above review suggests that the incorporation of the design thinking technique in the existing course structure results in improvement of the course learning outcome.

**Design Thinking in Teaching Computing Courses**

In the computing field, researchers have ventured into improving the delivery of programming (Salleh et al., 2018) and software project management (Alaidaros et al., 2019) classes with the employment of various tools. Similarly, various works have incorporated design thinking as a tool in Software development projects (Steinke et al, 2017; Kenney et al., 2021) and information system research (Dolata, & Schwabe, 2016). However, there is not enough work that emphasizes teaching design thinking in computing courses.

Valentim et al. (2017) argued that it is crucial to teach design thinking in courses for computer science and software engineering as a method for analysis and creativity since it offers the design of technical artefacts with a focus on the human being. As a result, it enables teachers to better prepare the students for the software development industry. They carried out an empirical investigation where 17 postgraduate students participated in the design context for mobile applications. Overall, the students thought that design thinking might benefit their mobile application-related projects. Bosman (2019) taught a course for 10 students studying transdisciplinary technology. The aim of deploying the design thinking technique in the class was to inspire an entrepreneurial mentality. Result of the pre- and post-surveys, the author noticed that participants' learning moved from a "weakness-focused" to a "strengths-focused".

The review provided in this section shows the importance of the design thinking technique and the benefits that can be obtained by incorporating the design thinking technique into computing

courses. It has motivated the goal to incorporate the design thinking technique in teaching the RMC course. The next section presents the method of developing the teaching guideline as an initial step to achieving this goal.

## Method

There is no standard method for developing teaching guidelines. Various researchers proposed a variety of methods ranging from observation to survey and document analysis. In this study, we have employed a structured method to develop the teaching guideline as shown in Figure 1. As depicted in Figure 1, the method for developing the teaching guideline involves 5 steps namely; reviewing the existing teaching guide and lesson plan to structure the existing problem; reviewing existing literature in incorporating design thinking phases to the RMC course; identifying key elements to be included in the teaching guideline; construct the teaching guideline and evaluate the constructed teaching guideline.

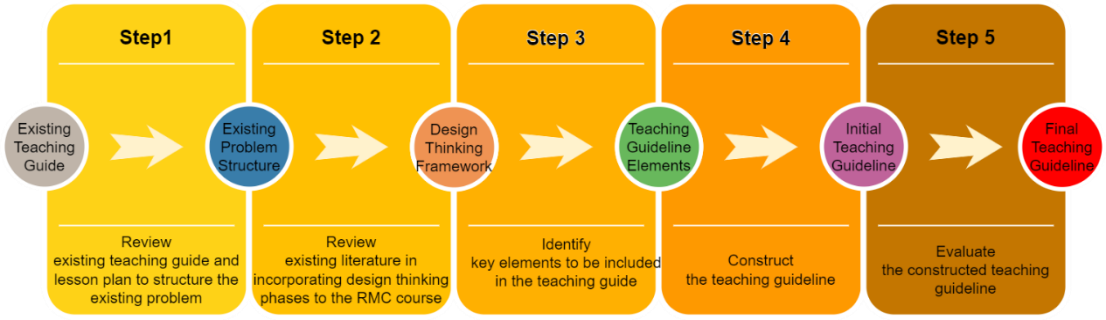



*Figure 1.* Teaching Guideline development method

The next subsection will detail the activities and outcomes of each step.

**Review the existing teaching guide and lesson plan to structure the existing problem**
It is crucial to examine current teacher manuals and lesson plans to identify the problem pertinent to the situation. This step involves the proses of recognizing that there is a problem in the teaching and learning of the RMC course. This step also includes the formal definition of the identified problem. The problem regarding the current practice of analytical thinking will be identified and structured to devise the solution using the design thinking technique.

**Review existing literature in incorporating design thinking phases into the RMC course**
This step involves collecting materials from the literature and past experiences to plan the possible solution to the problem. Information regarding design thinking techniques was collected. Detailed steps include analysing the nature of the problem by looking into all inter-related factors to develop the problem definition and to plan the actions that can be undertaken to alleviate the identified problem. This step is the process of exploring and developing the design thinking technique for the RMC course. At the end of this step, a framework was developed to illustrate the link between the research process and the design thinking phases. In other words, the framework will depict where exactly will the design thinking phases be incorporated in the research process deployed in the RMC course.

**Review existing literature to identify key elements to be included in the teaching guide**
A good teaching guide should provide detailed information regarding the content of lessons, the concepts and skills to be acquired by learners and the activities to be performed (UNESCO

International Bureau of Education, 2014). A good teaching guide should provide answers to questions such as; What is the learning outcome of the lesson?; What resources are required to properly teach this lesson?; and What activity will help the students to learn this subject most effectively? (UNESCO International Bureau of Education, 2014). In this section, we outline the key elements that were consolidated in our teaching guideline i.e. a clear learning outcome of the lesson; a description of the procedure or activities that are involved; resources that are needed, outcome and assessments. Next, we provide a detailed explanation of each of these elements:

**Learning Outcome.** The cornerstone of any teaching guide is the learning outcome. It should clearly describe the skills, knowledge, or understanding that students are anticipated to acquire as a result of the lesson. A simple example of a learning outcome is "At the end of this lesson, students will be able to formulate the research problem". Additionally, it is crucial to ensure that the established learning outcomes are appropriate, attainable, measurable, and in line with the course requirements.

**Procedures and activities.** Document a detailed procedure on how the lesson or activity should be done as well as how instructions should be presented. Perhaps some materials need to be withheld up front; instead, they should be revealed as the lecture progresses. The teaching guide should be written in such a way that everyone who reads it will possess all the necessary knowledge and skills to deliver the lesson successfully.

**Needed Resources.** List all the resources that are needed to deliver the lessons and ensure all are prepared before delivering the lesson. It would also be a good idea to keep all of your resources in one safe location, labelled for your class, and with backup. Prepare all links to websites, electronic materials and media that are required for the lesson, along with other required documents either electronic or printed in advance.

**Outcome.** Outcomes or deliverables should also be specified in the teaching guideline. This is to highlight the tangible outcome of each phase. It includes written reports or any other concrete deliverables such as figures, tables, maps and reports and assignments pertinent to the course.

**Assessments.** A good teaching plan should also include a description of the assessment strategy (oral presentations, quizzes, assignments, projects, etc.). A decision needs to be made on the criteria that will be used to judge the success of the assessment.

**Constructing the teaching guideline**

The teaching guideline needs to be well-written, brief, and simple to understand and apply. The guideline should act as a roadmap for anyone to follow when delivering the design thinking-based RMC course. The outcome of this phase is an initial version of the RMC course design thinking teaching guideline.

**Evaluate the constructed teaching guideline**

In this step, an expert who has more than 5 years of experience being an RMC instructor was chosen to evaluate the developed teaching guideline. The result of this step is the verified final teaching guideline that can be used in class for instructors who would like to incorporate design thinking in the delivery of the RMC course. The next section will discuss in detail the result of this study.

## Result and Discussion

This section details the results which are the framework of incorporating the design thinking phases

in the RMC course and the produced teaching guideline.

**Framework for incorporating design thinking in RMC course**

This is the result obtained at the end of step 2 of the method discussed in the method section. A framework was developed as a guide to constructing the teaching guideline. Figure 2 shows the framework for incorporating design thinking phases in the research process. It illustrates the learning outcome of the RMC course, the six-step research process and where in the steps can the design thinking phases be incorporated.

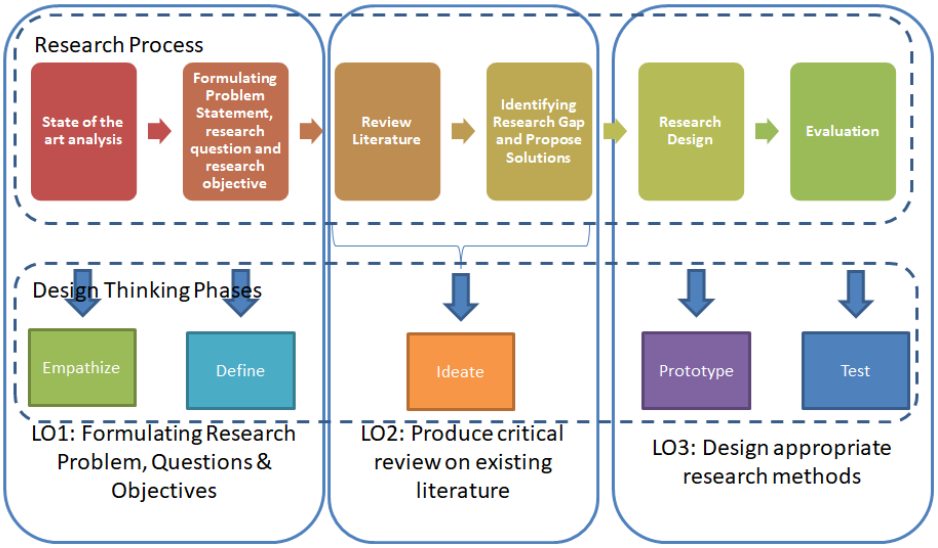



*Figure 2*. A framework for incorporating the design thinking phases in the research process

As can be seen in Figure 2, to achieve learning outcome 1, i.e. formulating a research problem, questions and objective, two research processes are typically executed which are 1) state-of-the-art analysis and 2) formulating a research problem, research questions and objectives. We suggest that the Empathize and Define design thinking phases be incorporated into these research processes.

The Ideate phase can be incorporated to achieve learning outcome 2, i.e. produce a critical review of existing literature. Here, two research processes are employed 1) reviewing the literature; and 2) identifying the research gap and proposing a solution. We advocate that both of these research processes can benefit from the Ideate design thinking phase.

For learning outcome 3, i.e. design appropriate research method, usually, two research processes are implemented which are research design and evaluation. We suggest that the Prototype design thinking phase be incorporated into the research design process while the Test design thinking phase is incorporated in the evaluation phase. The reasons behind the suggestions will be clarified in the next section where the details of the developed teaching guideline are discussed.

**Teaching Guideline for incorporating design thinking in RMC course**

The produced teaching guide presented in this paper is the first step in integrating the design thinking technique into instructional topics of the RMC course. As was mentioned in the method section, a five-step process was executed in developing the teaching guideline. In this section, we briefly discuss the produced teaching guideline based on its key elements for each of the learning outcomes of the RMC course.

**Learning outcome 1: Formulate the research problem, research questions and objectives.** To achieve this learning outcome the students are coached to perform two research processes which are; 1) performing a state-of-the-art analysis of the literature; and 2) formulating a research problem,

questions and objectives. For each of these processes, two design thinking phases are identified to be suitable for incorporation i.e. Empathize and Define which can be incorporated in research processes 1 and 2 respectively.

Empathize phase allows students to gain an empathetic understanding of the problem that they are trying to solve, typically through a user approach. The activities that can be utilised during this phase include; encouraging students to look for problems in the real world in accordance with their motivation and preference, then asking them to immerse themselves in the user's world to empathize user's problem and document the user's needs. This can be followed by requesting them to perform a preliminary state-of-the-art analysis of the literature to identify whether the problem has been solved previously. Regarding the resources that are needed to accomplish these activities; the instructor can request the students to gather pieces of evidence on the user's problem for empathy such as documents, pictures, videos, interview recordings, preliminary surveys etc. Other resources that are needed are evidence of research articles to frame the state of the art of the related literature. The deliverables of this phase are initial exploratory findings on the user's problem resulting in empathy for the user and initial findings on the state-of-the-art.

The Define phase allows students to analyse the information gathered from the Empathize phase and synthesize them to define the core problems. The activities that can be performed during this phase include; requesting students to identify and define two or three problem statements and align each problem to the research questions and objectives. The possible resources that are needed for these activities are; examples of a problem statement, research questions and research objectives in the computing field. The deliverables of this phase are the alignment of the problem statement, research questions and objectives and write-up of Chapter 1 (introduction chapter of the proposal). Learning outcome 1 can be assessed by an oral presentation of the problem statement, research questions and objectives and written assignment 1 (Chapter 1 of a research proposal).

**Learning outcome 2: Produce a critical review of existing literature.** To achieve this learning outcome the students are coached to perform two research processes which are; 1) critically reviewing the literature; and 2) Identifying the research gap and proposing solutions. Both of these processes can benefit from the Ideate design thinking phase. In this phase, students can generate ideas by "thinking outside the box", looking for alternative ways to view the problem and identifying innovative solutions to the problem statement that have been formulated.

Among the activities that can be performed during this phase are; ensuring that students can differentiate between summarizing and synthesizing the literature; requesting students to display findings on a literature map or table; encouraging students to brainstorm ideas and organize insights based on the synthesized literature review and requesting them to document the research gap. The resources required for these activities are examples of visual display of literature review (literature map or table); examples of possible solutions to problems and examples of a good research gap explanation. The deliverables of this phase are a literature map or table, documentation on the research gap and a write-up of Chapter 2 (Literature Review). Learning outcome 2 can be assessed by an oral presentation of the literature review and research gap and written assignment 2 (Chapter 2 of a research proposal).

**Learning outcome 3: Design appropriate research methods.** To achieve this learning outcome the students are coached to perform two research processes which are; 1) constructing research design; and 2) planning the evaluation. The Prototype design thinking phase can be incorporated into the research design construction process while the Test design thinking phase can be performed in the evaluation process.

The Prototype design thinking phase is an experimental phase, and the aim is to identify the best possible solution for each of the problems identified during the first three stages. The activities that can be included during this phase are; requesting the students to design the research according to

the idea from the previous phase and plan how the research will be executed (plan on the prototype). Regarding the resources that are needed to accomplish these activities; the instructor can provide the students with some examples of research design diagrams. The deliverables of this phase are the definition of the conceptual solution to the problem.

The Test design thinking phase allows the researchers to rigorously test the complete product using the best solutions identified in the Prototype phase. Since it is still in the proposal stage, the activities that can be performed during this phase include; encouraging the students to plan how the result will be evaluated (validation and verification of the results); requesting them to revisit the user need documentation and plan on how to provide evidence that the need has been fulfilled, and to revisit the research gap and plan on how to provide evidence to show that the research gap has been fulfilled. Regarding the resources that are needed to accomplish these activities; the instructors can provide the students with some examples of performance evaluation measures. The deliverables of this phase are the research performance measure plan and write-up of Chapter 3 (Research methodology). Learning outcome 3 can be assessed by an oral presentation of the research design and written assignment 3 (Chapter 3 of a research proposal).

Although Brown (2008) suggested that looping to the previous phases and refining is important in design thinking, this was not implemented in the produced teaching guideline for the RMC course due to time limitation where the delivery of the course need to be completed within 12 weeks and the course itself is focused on producing a research proposal not the actual implementation of the research. However, for the implementation of the research, it is advised to loop back to the previous phases and make refinements to produce a better solution. Appendix 1 provides a more structured view of the teaching guideline discussed in this section.

## Conclusion

The goal of this study is to develop a teaching guideline to illustrate how the design thinking technique phases can be incorporated into the teaching of the Research Methodology in Computing course. The key contribution of this study is how each of the design thinking phases has been mapped to the learning outcome of the course. The guideline depicted a clear alignment of the five-phase design thinking technique into the three learning outcomes of the RMC course. The guideline also provided information on the activities or procedures that the instructor needs to do in each phase and the resources to include, deliverables and assessments that should be carried out. The guideline is aimed to enable the instructor to teach design thinking following the existing lessons that exist in the course syllabus. The ultimate goal is to enable the students to produce research outcome that meets the requirements and solves the problems of the potential target users hence producing more benefits to society. The future work of this study is to test the constructed teaching guideline in the actual RMC course and gather evidence and reflections from both instructors and students on the effectiveness of this teaching guideline in incorporating design thinking in the RMC course.

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## References

Alaidaros, H., Omar, M., Romli, R., & Hussein, A. 2019. The development and evaluation of a progress monitoring prototype tool for software project management. In 2019 First

International Conference of Intelligent Computing and Engineering (ICOICE) (pp. 1-9). IEEE.

Bosman, L. 2019. From Doing to Thinking: Developing the Entrepreneurial Mindset through Scaffold Assignments and Self-Regulated Learning Reflection. *Open Education Studies*, 1(1), 106–121.

Brown, T. 2008. Design thinking. *Harvard Business Review*, 86(6), 84e92.

Dolata, M., and Schwabe, G. 2016. Design thinking in IS research projects. *Design thinking for innovation*, 67-83.

Hasso Plattner Institute of Design. An Introduction to Design Thinking PROCESS GUIDE 2016. https://web.stanford.edu/~mshanks/MichaelShanks/files/509554.pdf.

Henriksen, D., Richardson, C., and Mehta, R. 2017. Design thinking: A creative approach to educational problems of practice. *Thinking skills and Creativity*, 26, 140-153.

IBE-UNESCO (UNESCO International Bureau of Education). Training Tools for Curriculum Development: A Resource Pack. Geneva: IBE-UNESCO. 2014. http://www.ibe.unesco.org/fileadmin/user_upload/Publications/Training_tools/IBE-CRP-2014_eng.pdf

Kenny, U., Regan, Á., Hearne, D., and O'Meara, C. 2021. Empathising, defining and ideating with the farming community to develop a geotagged photo app for smart devices: A design thinking approach. *Agricultural Systems*, *194*, 103248.

Panke, S. 2019. Design thinking in education: Perspectives, opportunities and challenges. *Open Education Studies*, 1(1), 281-306.

Salleh, N., Abdullahi, M. S. I., Nordin, A., & Alwan, A. A. (2018). Cloud-Based Learning System For Improving Students' programming Skills And Self-Efficacy. Journal of Information and Communication Technology, 17(4), 629-651.

Steinke, G., Al-Deen, M., and LaBrie, R., Innovating information system development methodologies with design thinking. In *Proceedings of International Conference on Applied Innovation in IT* (Vol. 5, No. 1, pp. 51-55). Anhalt University of Applied Sciences, March, 2017.

Sternberg, R. J., Spear-Swerling, L.: Teaching for thinking. Washington, DC: American Psychological Association, 1996.

Valentim, N. M. C., Silva, W., & Conte, T., The students' perspectives on applying design thinking for the design of mobile applications. *In Proceedings of the 39th International Conference on Software Engineering: Software Engineering and Education Track* (pp. 77–86). IEEE Press. 2017.

## Appendix 1: The final teaching guideline for design thinking based RMC

| Learning Outcome (LO) | LO1- Formulate problem, questions & objectives | | LO2 - Produce a critical review of existing literature | | LO3 - Design appropriate research methods | |
|---|---|---|---|---|---|---|
| Design Thinking Phases | 1. Empathize | 2. Define | 3. Ideate | | 4. Prototype | 5. Test |
| **Research Process** | **1. State-of-the-art analysis** | **2. Formulating Problem Statement, research questions and research objectives** | **3. Review Literature** | **4. Identifying Research Gaps and Propose Solutions** | **5. Research Design** | **6. Evaluation** |
| **Procedure/Activity** | Lecture on Design Thinking and how it can be incorporated into research methodology | Lecture on formulation of the research problem, research questions, and research objectives. | Lecture on conducting a critical literature review. | Lecture on research gap identification and ideate on potential solutions | Lecture on Research design, data collection and data analysis | Lecture on performance evaluation |
| | Encourage students to look for problems in the real world in accordance with their motivation and preference of their research area | Require students to identify and define two or three problem statements | Explain the difference between summarizing and synthesizing the literature | Require students to brainstorm ideas and organize their insights based on the synthesized literature review | Require the student to design their research according to the idea from the previous phase | Require the student to plan how the result will be evaluated (Validation and verification of the results) |
| | Encourage them to Immerse themselves in the user's world to empathize user's problem and document the user's needs | Require students to align each problem to the research questions and objectives | Require students to display findings on a literature map/ table. | Require students to document the research gap | Require students to plan how the research will be executed (plan on the prototype) | Require students to revisit the user need documentation and plan on how to provide evidence that the need has been fulfilled |
| | Instruct students to perform a preliminary state-of-the-art analysis of the literature | | | | | Require the student to revisit the research gap and plan on how to provide evidence that the research gap has been fulfilled |
| Needed Resources | Students provide evidence of user's problem for empathy (documents, pictures, videos, interview recordings, preliminary survey etc.) | Lecturer provide examples of problem statements, research questions and research objectives in the computing field | Lecturer provide examples of visual display of literature review (literature map or table)<br><br>At this stage, it may be helpful to give a partial | Lecturer provide example of a possible solution to problems may be provided<br><br>Example of a good research gap explanation can be provided | Lecturer provide example of research design diagrams | Lecturer provide example of performance evaluation measures |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Students gather evidence of research articles to frame the state of the art of the related literature. | | grade for the comprehensiveness of the literature review | | | |
| **Outcomes/ Deliverables** | Initial exploratory findings on the user's problem resulting in empathy for the user.<br><br>Initial findings of the state of the art. | Alignment of the Problem Statement, Research Questions and Objectives<br><br>Write-up of Chapter 1 | Literature-Map/ Table | Research gap<br><br>Write-up of Chapter 2 | Definition of the conceptual solution to the problem | Research performance measure plan.<br><br>Write-up of Chapter 3 |
| **Assessments** | Oral presentation of the problem statement, research questions and objectives.<br><br>Written Assignment 1 (Chapter 1 of a research proposal | | Oral presentation of the literature review and research gap.<br><br>Written Assignment 2 (Chapter 2 of a research proposal | | Oral presentation of the research design<br><br>Written Assignment 3 (Chapter 3 of a research proposal | |

# Children Preferred Environment in Engaging Play-Based Learning (PBL): Indoor or Outdoor

Marina Abdullah*[a], Mohd Zulhaili Teh[b], Wan Noor Anira Wan Ali[c], Helmi Hamzah[d]
[a]Department of Built Environment Studies & Technology, Faculty of Architecture, Planning & Surveying, Universiti Teknologi Mara (UiTM) Perak Branch
[bcd]School of Graduate Studies, Universiti Putra Malaysia (UPM)
*Corresponding Author: marina84@uitm.edu.my

## Abstract

Children are human beings who can liven up the atmosphere in an environment. Play learning is good for children's health and education especially at school. Therefore, the study highlighted the character of indoor and outdoor environments as important in finding the most preferred play learning space that is close to children at school. Moreover, both environments have strengths that can influence children in engaging play-based learning (PBL). 5 themes of elements in the environment found in the setting have been highlighted for indoor and outdoor, which consist of a playground, plants, water, soils, and animals. This study focuses on the analysis of preferred tendencies by children (n=128) aged 5 to 6 years old more likely indoor or outdoor environments for engagement in play-based learning (PBL). Pictorial studies and interviews have been carried out at kindergartens around Seri Iskandar, Perak. Analysis using the R-software to obtain a mean comparison will be done to see the tendency of the choice. Future studies can be expanded to see the spatial characters need to have in school so that children feel a sense of belonging and happiness when they have their play-based learning (PBL) activities at school.

*Keywords:* children, environment, indoor, outdoor, preferred

## Introduction

Playing is the most enjoyable activity for everyone. Playing is divided into functional play, constructive play, symbolic play, non-play (self-focused and talking), dramatic play, and manipulative play (Dyment & O'Connell, 2013).These types of play greatly help in shaping the formation of an early stage of mental development, social interaction, initial communication, and physical health for children in education. Rationally at this stage, they are in the process of starting to learn to recognize, identify, communicate, and be creative to achieve a high level of satisfaction within themselves and at the same time gain new knowledge in school.

However, every activity they want to run needs to choose a suitable environment space. It is very important in helping to strengthen the relationship between children, teachers, and its sphere. It assists to provide details strengths of each game during play learning (PL). Therefore, the study highlighted identifying the preferences environment of children aged 5 to 6 years old whether indoor or outdoor for their play-based learning (PBL) in preschool through analysis using R-Software. This indoor and outdoor environment can help in seeing the patterns of play, behavior, and movement of children as well as reduce the feeling of nervousness about going to school. Ellen Beate et al., (2022) argue that the more mobility licenses the children have to explore and play, the more likely they will actualize affordances in their surroundings. This informs that children can adapt to the environment when they enjoy playing and having activities.

The preferences between the indoor and outdoor environment that children desire will be seen through the results of analysis using the R-Software application. Children need to choose the

environment space they like the most for play-based learning (PBL) when they are in preschool. At the initial stage, researchers will explain to children and teachers basically about the types of environment spaces and elements found around them. All the process of groundwork study data will be recorded and documented.

**The characteristics and elements of indoors and outdoors for children learning**

Learning is essential to help the children identify and organize their visual information, performance, and skills. The good quality of learning space can provide opportunities for children to expand their thinking and enhance their desire to learn and know (Ladd et al., 1999). In early education for children, play learning environment can divide into indoor and outdoor. According to an indoor learning space is under the roof and inside a building where children learn and having activities. It's often called an indoor learning environment. Outdoor learning can define as active learning of the outsides of a building with the natural environment and surroundings. Outdoor importance for children because they can learn through what they do, encounter, and discover with guidance. They also learn about the items of nature like sands, grass, and plants to develop their outdoor learning skills (Cooper, 2015; Leggett & Newman, 2017).

The differences between the indoor and outdoor learning are that the ample outdoor space permits a more fantastic range of movements for students to learn through play-based activities. Ata et al., (2012) stated that sensory learning experiences are also readily available in the outdoors environment. In contrast, the indoors were limited by the size of the classroom (Tanwattanakul et al., 2020).

For many children living in rural and urban regions, the opportunity to play and learn indoors and outdoors gradually dwindles. Children's learning environments are significantly more constrained in space and need a more specific character and element to ensure their safety. An unprecedented rise in concern for children's safety, referred to as a 'culture of fear,' has coincided with a loss in access to indoor and outdoor places for play and learning. To build an environment that supports strong development and fosters optimum learning experiences, specific characteristics and elements must be present in children's learning indoor and outdoor environments.

Numerous characteristics can be considered a learning environment. It is a place where children feel comfortable and secure there, and all learning experiences happen there. The characteristics and elements of indoor and outdoor child preferences learning space need a comfort and friendly environment. According to a previous study by Björklid and Nordström (2007) , a supportive learning and pleasant space are healthy, safe, inclusive, and protective. The United Nations International Children's Emergency Fund (UNICEF) stated that child-friendly education must promote inclusiveness, gender sensitivity, tolerance, dignity, and personal empowerment.

The space and activities of indoor learning for the child also need to feel like home. When a child's learning environment resembles their home, they are more likely to feel comfortable being themselves and belonging. "Filling classrooms with students is not the best, connected strategy. Instead, it aims to develop a setting that matters to children (Abdullah et al., 2022). Therefore, the indoor child learning needs to improve with the kind of structures, quality of architectonic design and quality of organization of space.

In Malaysia, the study of indoor and outdoor learning environment for preschool remains scarce due to the Malaysian education system's focus on developing curricula and delivering knowledge (Saleh et al., 2018). Therefore, understanding these perspectives' characteristics and elements needs to be studied to improve and identify the children preferences in learning either in indoor and outdoor Malaysian preschools. Table 1 shows there are three (3) characteristics of the indoor and outdoor learning environment, which are: (i) space and activities, (ii) engagement, and (iii) safety and freedom. Meanwhile, 3 elements of indoor and outdoor learning are (i) features and materials, (ii) a conducive environment, and (iii) creativity and innovation.

Table 1: The Characteristics and Elements of Indoor and Outdoor for Child Preferences Learning

| Environment | **Characteristic** | | | **Elements** | | |
|---|---|---|---|---|---|---|
| | *Space and Activities* | *Engagement* | *Safety and Freedom* | *Features and Materials* | *Conducive Environment* | *Creativity and Innovation* |
| Indoor | -personal and group space<br>-Feels like home | open ended material | -space and boundaries<br>-traffic patterns/ accessibility | -windows<br>-colour of classroom<br>-nature of graphic | -natural lighting<br>-fresh air<br>-plants | -dependence<br>-improve academic and social performance |
| Outdoor | -learning through play<br>sensory learning | skills and communication development | | -turf<br>-sand<br>-grass<br>-vegetation | | -independence<br>-promote cognitive development |

## The significance of indoor and outdoor space in learning

Early childhood learning is to establish a setting, offer stimulation, and deliver high-quality support for the growth of various potential children. The environment can be prepared based on children's interests as one of the ways to develop and optimize these developments. The indoor and outdoor learning reflect children in various engaging ways. The most excellent way to assist each child's particular needs and problems is to provide indoor and outdoor physical surroundings that give diverse settings for diverse learning opportunities.

Children can enhance their learning in specific spaces called learning centers. They strengthen their academic skills through diverse learning activities that allow them to use the materials available to create, explore, and learn new ideas. The learning center setting is a vital determinant of success in creating children's abilities and behaviors. It is essential to consider how children learn and behave in their environment. indicated that providing a learning center environment for children should be prioritized to create a systematic and organized indoor and outdoor learning environment and get a positive response from the children.

The learning center must design an appropriate and balanced system between indoor and outdoor learning environment to fulfill the children's needs. According to Spalie et al. (2011) the indoor learning system is employed in most preschool curricula in Malaysia. The method emphasizes the memorization of all the data. It caused a lack of lifelong learning and self-learning in children. Thus, the design of indoor classrooms and materials provided need to afford more defined education and play space for children. The specified area in the indoor can increase the length of engagement in education and play among the children. Play should have the proper amount of space. It should be large enough to accommodate a child's free activities under her age and stage of development. The children play space should be secure and conducive to their discovery and research. Therefore, the indoor learning environment not only focuses on curricula but needs to encounter symbolic play with a multitude of materials with enough for children to play to appear, continue and develop their skills. The context of the outdoor learning also plays an essential role in the child's perspective. Exposure to the natural elements in an outdoor area can enrich children's experience and enhance their perceived competence for environmental learning. However, the outdoor learning system is still new, and the lack of outdoor spaces and amenities for environmental learning in Malaysian preschools (Saleh et al., 2018; Spalie et al., 2011). According to Sandseter et al. (2022) children's exposure to nature is significant, and this has long been understood. Froebel, Dewey, Montessori, and Steiner were early educational theorists who highlighted the importance of outdoor activities for children's growth and well-being.

The outdoor physical environment settings offer the variety, diversity and open-endedness needed to engage and challenge children, extending the quality sensory and play experiences that support learning and child development (Ata et al., 2012; Ladd et al., 1999). This requirement takes

on a lot more significance when we consider how important a positive environment is for children's future investments and development as individuals. Children are sensitive to receiving all stimuli, which means that their physical and psychological processes are prepared to react to any environmental stimulation. A suitable physical environment in preschool can help advance the educational and developmental processes and potentially be a place where children can learn about the environment. Consequently, the environment as an element that provides stimulus needs to receive serious attention in the preschool area.

In conclusion, the children learning ways and habits in their environment should be considered well. Appropriate physical environments either indoor or outdoor learning settings support children's development needs and promote learning through play. The learning center setting and physical environment should accommodate various materials and equipment, and the physical environment should provide varying levels of challenge. In addition, there should be clear physical and visual connections between the indoor and outdoor learning environment.

## Methodology

### Respondent

This study uses quantitative approaches. The study explores the early development stage of learning focusing on children between the ages of five and six years old. A total of 128 respondents (children) from three selected preschools around Seri Iskandar, Perak.

### Procedures

This study starts with familiarization sessions in a small group with children and teachers to provide comfort in communicating with them. Observations were made through children actions, communication, and interactions among them while in class according to age and gender.

A photo storytelling session was conducted to gain interest among the children. The sessions were conducted in small groups exploring the elements in the environment and interesting landscape places around Malaysia. A photo-elicitation technique consisting of 5 themes (10 photos) photographs representing the theme of the surrounding landscape elements was used to determine the outdoor and indoor landscape space that was preferred or desired by the children. Each theme arranged 2 photos in one A4 size sheet. For each theme, the top part is outdoor, the bottom is indoor. Children need to choose either the top or bottom picture. They need to hands up if they love that pictorial environment. All five sheets of A4 have been displayed to them. Children need to respond on each sheet. This part is important in creating engagement between students and their imaginary environment for making a selection. Their responses such as communication, behavioral action, and movement have been captured and recorded.

### Design

The themes released were outdoor-indoor environments consisting of 1. playground, 2. pet animals, 3. plants, 4. water, and 5. stone. Every themed picture has been labeled. The photo has been arranged in a4 size consist the top being indoors, and the bottom being outdoors. The justification of this research is to obtain preferences environment chosen by children aged 5 to 6 years old.


*Figure 2.* The theme picture of an outdoor environment

This research is using a normal distribution test for each indoor and outdoor area with the replication is the age of the children. The experimental material is they are chosen the preferred space they are happy to visit and do their activities either in the indoor or outdoor area (with 5 different themes). The experimental unit of this research is preschool students aged 5 years old to 6 years old.

## Result and discussion

This study involved a sample size of 128 respondents obtained from three selected preschools in Seri Iskandar, Perak. Thus, this respondent (n) calculated with a 99% confidence level (1% margin of error). Of the 128 children, 100 students were five years old (78.125%) and 28 students were six years old (21.875%).

### Normality Test- Indoor and Outdoor

Table 2: Summary of Value of Normality Test- Indoor and Outdoor

| **Analysis Descriptive** | **Indoor** | **Outdoor** |
|---|---|---|
| Sample of respondent (n) | 128 | 128 |
| **Mean** | **3.195** | **1.789** |
| Variance | 25.52741256 | 8.1635 |
| Standard Deviation | 1.0428 | 1.0397 |
| Standard Error | 0.0921 | 0.0919 |
| p-Value | 2.814e-08 | 2.269e-08 |
| Hypothesis | less than alpha value = 0.05. the hypothesis is an alternative hypothesis (Ha) is accepted at a 99% confidence level (alpha = 0.05). Therefore, the data is not normally distributed. | less than alpha value = 0.05. the hypothesis is an alternative hypothesis (Ha) is accepted at a 99% confidence level (alpha = 0.05). Therefore, the data is not normally distributed. |

Table 2 shows that calculation of the normality test, the respondents preferred indoor space rather than outdoor space. It is clear by the number's calculation of the mean for indoors is 3.195 compared

with outdoors is 1.789. The higher mean value of indoor space is considered to be the choice of preschool children compared to outdoor space.

**Split Plot Test**

From the ANOVA, the preferred indoor themes analysis result from aged 5 years old and 6 years old considering two factors, A and B need to be considered. Factor A is the strongest factor in the normality test indoor space (5 themes; Playground, Plants, Water, Animal, and Stone), and Factor B is the gender of students (Boys and girls).

Table 3: Summary of Value of Split Plot for 5 Themes Indoor

| Group | Year 5 | Year 6 | Theme |
|---|---|---|---|
| a | 4.000 | | Playground |
| b | 3.000 | | Plants |
| c | | 2.667 | Playground |
| d | 2.000 | | Water |
| d | | 2.000 | Stone |
| e | 1.000 | | Animal |
| e | | 1.000 | Plants |
| f | 0.000 | | Stone |
| f | | 0.000 | Animal |
| f | | 0.000 | Water |

Table 3 show that the test of mean separation needs to be reported according to the alphabetical grouping scale of preferred value named a, b, c d, e, and f. a is referring to the highest value (first preferred most), b is second preferred, c is the 3rd choice of preferred until f is the lowest value (less preferred). For the most preferred theme aged 5 years old, the highest value is a 4.0000-playground at a 99% confidence level, secondly is plants, b, 3.000-preferred, moderately preferred is water (2.000), then followed by the animal (1.000-less preferred) and stone (0.000-not preferred). Children aged 6 years old preferred most a playground (c, 2.667), secondly is stone (d, 2.000-moderately preferred), then plants (1.00-less preferred) and animal and water (0.000-not preferred). This concludes that children love free play indoors in a playground environment with lots of colors and under the roof with less heat space.

Children start changing their pattern style more towards indoor environment conditions rather than outdoor because it is more comfortable and safer.

Hence, indoor space is a child's preference in school for learning activities. Curricula should engage children's interests by engaging curricula with playing activities that suit the early learning needs and syllabus.

## Conclusion and recommendations

Overall, the study successfully produced findings related to the objective to identify the most preferred play learning space that is close to children at school that forms the basis of the study. First, by collecting and analysing a quantitative photo-elicitation data from preschool children aged 5 to 6 years, this study has successfully highlighted children's most preferred environments been indoor as

compared to outdoor play-based learning (PBL) spaces. The average response from children stated that the indoor environment is more fun, less hot and safer than outdoors. Secondly, this study identifies environmental themes of elements that children love most. Indoor playground with colourful features is most likely chosen by them, followed by plants, water, animals and stone.

The findings of the study also provide the necessary guidance to school management in providing a most preferred early education environment needs from children's point of view for early learning. Theoretically, this study contributes deeply to the body of knowledge in children's growth development and early education studies by identifying preferred environment and themes of elements related to children's preferences.

Respondents in this study were limited to children at preschool around Seri Iskandar. This limits any generalizations that can be made to the local context. Future studies should investigate and include preschool children in other regions in different states to allow for generalization in a local context. Generally, this may help in educating educational bodies in creating a conducive safe space for preschool and fully utilize comprehensively with preschool children.

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## References

Abdullah, M., Teh, M. Z., Hamzah, H., & Hassan, K. (2022). Exploring children preferred outdoor landscape elements for education. *2nd International Conference on Design Industries & Creative Culture, DESIGN DECODED 2021*. EAI. https://doi.org/10.4108/eai.24-8-2021.2315049

Acer, D., Gözen, G., Fırat, Z. S., Kefeli, H., & Aslan, B. (2016). Effects of a Redesigned Classroom on Play Behaviour Among Preschool Children. *Early Child Development and Care*, *186*(12), 1–18. https://doi.org/10.1080/03004430.2015.1136999

Ata, S., Deniz, A., & Akman, B. (2012). The Physical Environment Factors in Preschools in Terms of Environmental Psychology: A Review. *Procedia - Social and Behavioral Sciences*, *46*(December), 2034–2039. https://doi.org/10.1016/j.sbspro.2012.05.424

Beate, E., Sandseter, H., Storli, R., Sando, O. J., Storli, R., & Sando, O. J. (2022). *The Relationship Between Indoor Environments and Children ' s Play - Confined Spaces and Materials*. *50*, 551–563. https://doi.org/10.1080/03004279.2020.1869798

Björklid, P., & Nordström, M. (2007). Environmental Child-Friendliness : Collaboration and Future Research. *Children, Youth and Environments, 17*(4), 388–401.

Cooper, A. (2015). Nature and the Outdoor Learning Environment: The Forgotten Resource in Early Childhood Education. *International Journal of Early Childhood Environmental Education*, *3*(1), 85–97.

Dyment, J., & O'Connell, T. S. (2013). The Impact of Playground Design on Play Choices and Behaviors of Pre-School Children. *Children's Geographies*, *11*(3), 263–280. https://doi.org/10.1080/14733285.2013.812272

Ladd, G. W., Birch, S. H., & Buhs, E. S. (1999). Children's Social and Scholastic Lives in Kindergarten: Related Spheres of Influence? *Child Development*, *70*(6), 1373–1400. https://doi.org/10.1111/1467-8624.00101

Leggett, N., & Newman, L. (2017). Play: Challenging educators' beliefs about play in the indoor and outdoor environment. *Australasian Journal of Early Childhood*, *42*(1), 24–32. https://doi.org/10.23965/AJEC.42.1.03

Putri, F. R. (2018). Analysis Indoor and Outdoor Setting of the Learning Process in Kindergarten. *Proceeding of International Conference On Child-Friendly Education*, 17–21.

Saleh, S. F., Latip, N. S. A., & Rahim, A. A. (2018). Assessment of learning with nature in preschool.

*Planning Malaysia*, *16*(3), 46–56. https://doi.org/10.21837/pmjournal.v16.i7.499

Sandseter, E. B. H., Storli, R., & Sando, O. J. (2022). The dynamic relationship between outdoor environments and children's play. *Education 3-13*, *50*(1), 97–110. https://doi.org/10.1080/03004279.2020.1833063

Spalie, N., Utaberta, Abdullah, Tahir, M., & Che, A. (2011). Reconstructing sustainable outdoor learning environment in Malaysia from the understanding of natural school design and approaches in Indonesia. *Procedia - Social and Behavioral Sciences*, *15*(November), 3310–3315. https://doi.org/10.1016/j.sbspro.2011.04.291

Tanwattanakul, J., Tangpukdee, J., Angsupakorn, N., & Santiboon, T. T. (2020). Approval integrating the indoor and outdoor physical environments for enhancing early childhoods toward their learning consonances in the child development centers (cdcs) in thailand. *Systematic Reviews in Pharmacy*, *11*(11), 880–890. https://embase.com/search/results?subaction=viewrecord&id=L2010613006&from=export%0A http://dx.doi.org/10.31838/srp.2020.11.128

# Conducting Group Discussions through Webex Breakout Sessions: Enhancing Diverse Postgraduate Students Engagement

Nur Rasyidah Mohd Nordin*[a], Wafa Omar[b]
[ab]School of Languages, Civilisation and Philosophy, Universiti Utara Malaysia,
Sintok, Kedah, Malaysia
*Corresponding Author: nurrasyidah@uum.edu.my

## Abstract

Cisco WebEx is a video conferencing application used by universities all around the world as a medium to connect students and educators through virtual classrooms. One of the features in Webex is the Breakout sessions, where the host can create smaller groups that are split off from the main online meeting or classroom. Previous research has shown that in order for online learning to be successful, student engagement is crucial. This case study seeks to explore the role of the WebEx Breakout sessions in facilitating student engagement among diverse postgraduate students at Universiti Utara Malaysia. This study employs a mixed method approach. Quantitative research was conducted to find out the perception of postgraduate students on the use of WebEx Breakout sessions during class discussions. While qualitative research was used to explore the process on how the discussion could enhance student engagement. The findings from the quantitative research demonstrated students enjoy using the WebEx breakout sessions for online discussion with a diverse group of students, however, it is important to understand cultural differences for better discussion. Moreover, there is still room for improvement to enhance student engagement during online discussions. Whereas, the findings from the qualitative research presented 3 major themes, namely Engaging and relaxing atmosphere, Exchanging opinions/views and Student participation, which are all important elements in student engagement. The implications of the study suggest that classrooms that support students' psychological needs, namely Autonomy, Competence and Relatedness are more likely to engage students in learning.

*Keywords:* WebEx breakout session, Diversity, Postgraduate students, Student engagement

## Introduction

There has long been a focus on promoting diversity in university settings, and there is an increasing need to make sure that all views are included and heard (Booker & Campbell-Whatley, 2018). By fostering acceptance to all students of different backgrounds, students are more prone to retain in their studies and avoid dropping out. The literature shows that retention is influenced by a variety of social, motivational, and academic elements, not the least of which is how connected students feel to their lecturers and classmates in the classroom (Tinto, 1993). The foundation of inclusion is the calibre of connections between educators and students (Kim & Sax, 2017). Thus, this case study research aims to examine the view of diverse postgraduate students of different race and background on the use of Cisco WebEx Breakout sessions in conducting group discussions and its relation to student engagement in the classroom. Based on the objectives, the following research questions were formulated:

1. What is the perception of diverse postgraduate students towards the use of WebEx Breakout sessions for classroom discussions?
2. How can WebEx Breakout sessions enhance engagement during classroom discussions?

The macro-level theory of human motivation known as Self-determination theory (SDT), put forth by Deci and Ryan in 1985, tries to explain the dynamics of human need, motivation, and well-being

in a social setting. According to the theory, every human possesses three psychological demands that influence whether or not they take action: relatedness (feeling linked, loved, and interacted with), competence (feeling competent and effective), and autonomy (feeling self-governed and self-endorsed). When these three psychological requirements are met, people feel more psychologically healthy and, on the other hand, when their needs are not met, they feel very fragmented, alone, and receptive. Learners are actively motivated to engage in learning tasks when these psychological demands are satisfactorily met by pedagogical design (Hsu et al., 2019). Learners are more likely to be engaged in learning in classrooms that satisfy these three psychological demands (Reeve, 2013). This theory can thereby explain how needs-based support affects student motivation, engagement, and learning in the classroom.

In classroom practice of SDT, there are three different types of instructor assistance: autonomy support, structure, and engagement (Lietaert et al., 2015; Roorda et al., 2011). Given the difficulties of online learning, attempting to satisfy learners' psychological requirements through these dimensions, such as encouraging constructive learning, could be a successful teaching technique, and increase student engagement during activities.

## Methodology

In this case study, the researchers explored the use of WebEx breakout sessions for online classroom discussions, in one postgraduate Academic Writing course in Universiti Utara Malaysia. During the 12 weeks of online learning, 1 hour from each 3 hours lesson per week would be allocated for the students to discuss in small groups via the WebEx breakout sessions. The aim is to encourage students of different backgrounds, ethnicities, gender, and religions to discuss and exchange views in academic settings. The population of the class included a mixed diverse group of postgraduate students from China, Pakistan, Iraq and Malaysia.

This case study employs a mixed method approach. Quantitative research was conducted to find out the perception of postgraduate students on the use of WebEx Breakout sessions during class discussions. While qualitative research was used to explore the process on how the discussion could enhance student engagement. In the quantitative research, Google form surveys were administered to the participant, during the middle and end of the semester. Students were asked to answer honestly regarding their perception of the use of WebEx breakout sessions as a means of discussion during online class. For the qualitative research, students were asked to upload their reflections on their experience using the WebEx breakout sessions, which included what they did, what they discussed, what they felt, what they liked and disliked, etc. The reflections were analysed using thematic analysis (Brown & Clarke, 2012) to identify the codes inductively. When the codes appeared repetitious, the researchers realised the data had reached its point of inductive thematic saturation (Saunders et al., 2018). By emphasising the repeated phrases and terms in the data, careful coding and categorization were done to spot any patterns that might have emerged (Braun & Clarke, 2019). Five themes were initially developed, but after expert raters' approval and comments, they were condensed into three significant themes.

## Literature Review

### Online learning at tertiary level

The global education system has undergone a great deal of upheaval as a result of the COVID-19 epidemic. The decision to switch traditional face-to-face classes to an online format was made promptly by many educational organisations (Hodges et al. 2020). It was decided that urgent online education was required to stop the new coronavirus from spreading (Murphy, 2020). Under the direction of the Ministry of Education, Malaysia's universities made the decision to establish a

completely online learning system in March of 2020. Some colleges have chosen to run their courses entirely online, while others monitor the situation on a regular basis to decide when to switch back to conventional on-campus classrooms. For the evolution of online classes, universities have developed standards and rules. Numerous colleges and universities started to provide video conferencing as a standard form of instruction.

To host synchronous sessions during the epidemic, many educators used the video conferencing applications (Lederman, 2020). Programs for synchronous videoconferencing learning, such as Cisco WebEx, Zoom, Google meet or Microsoft teams, give educators a platform to run classes in real-time. Asynchronous learning activities allow students to finish tasks at their own pace, whereas synchronous learning activities allow participants to connect in real-time via videoconferencing, mobile apps, and instant messaging platforms.

**Webex Breakout session.**

WebEx, a video conferencing platform, is used by numerous universities. A breakout session is one of the functions offered by WebEx. Breakout sessions are useful for facilitating small group discussions. Numerous research have documented the positive and negative aspects of utilising this function. Aziz et al. (2021), discovered that when students used breakout sessions, the participants in the study could discuss in much smaller groups and instructors managed to facilitate each group by asking questions to the students. During the breakout sessions, students actively listened and discussed with their friends, which prompted them to use the "Raise Hand" feature when they returned to the main room. Hence, the activity of breakout sessions enables virtual two-way communication. Naik and Govindu (2022), supports the previous finding, which discovered that breakout sessions have a positive impact on students. Students can communicate virtually and collaborate with their friends. Furthermore, the breakout session is an excellent way to break the continuous of watching and listening to a lecture.

However, a different conclusion was reached by Angelone, Warner, and Zydney (2020) in their study. They investigated the usage of Webex to facilitate blended synchronous learning. Their research participants had trouble using their webcams throughout the breakout sessions. In addition, they experienced problems with both timing and communication. Still, teachers complained that they had trouble staying connected with their students during breakout sessions, so some resorted to using the chat feature instead. It was challenging to maintain concentration while simultaneously teaching and reading the chat.

**Enhancing student engagement**

Online learning is not a new teaching method, but it was not yet widely accepted and exploited to its full potential. Nearly every institution adopted online learning when the pandemic struck to carry on the teaching and learning while some nations had to impose lockdown and stay at home. Despite the widespread implementation of teaching and learning, students' engagement is still a concern. Martin and Bolliger (2018) discovered that students' engagement boosts students' satisfaction, motivates students to learn, reduces loneliness, and improves students' achievement in online courses. Their research indicates that participating in online discussions is crucial for their engagement. The students suggested that teachers should assist students in forming small groups for conversations and should provide questions that encourage in-depth thought and participation. They also commented that teachers must also provide them with explicit instructions.

Another study by You (2022) points out that students' e-learning input has a major impact on students' learning outcomes (behavioural investment, cognitive input, and emotional input). You discovered that students' learning tends to improve when they participate more. Moreover, when students interact frequently with their teachers and friends and have a positive attitude, they are able to perform exceptionally well. Furthermore, when students are more involved and have a positive attitude, they will excel in their learning. Interestingly, he discovered a significant correlation

between students' emotion and learning performance. When students have a good emotional experience, their learning performance will be improved. This is related to the learners' curiosity, pleasure, and sense of belonging to the course.

However, a contrast finding by Wilczewski et al. (2022) revealed that their participants in the study missed contacts and arguments with their friends, which resulted in ineffective studying, impeded adjustment, and unhappiness among the participants. A research conducted by Szopinski and Bachnik (2021) revealed that online learning makes students more passive. Online learning encourages students who are disengaged to do something else when classes are conducted. Their respondent mentioned that they could work and attend class at the same time since it was an online class. Students also provided excuses like technical difficulties (power failures, laptop problems) as excuses for not attending classes.

**Diversity in the classroom**

Online learning allows learning institutions to attract a broad range of students. Students may come from various parts of the world. Online education has eliminated barriers between local and international students. It increases the opportunities for studying abroad. Is there, however, an issue with such diversity? The effect of online education on international students is significant. Abubakari, Nurkhamid, and Priyanto (2022) discovered that university support, students' motivation, and students' own technological skills all contributed to international students' online learning engagement. A social-psychological theory supported the stated conclusion on university support. Additionally, the theory helped to describe the experience of international students adjusting to unfamiliar circumstances, such as new government rules that may impact the educational system and social life routines. Besides, these international students would be more engaged if they were surrounded by students from the same country. Additionally, students were more engaged when their friends shared the same social status and had similar family backgrounds.

Wilczewski et al. (2022) carried out a mixed-method study involving 362 international students at the Polish University. The students reported having excellent experiences with online learning. Previously, before online learning was fully implemented, in order for students to consult their lecturers, they had to schedule an appointment and find a time when the lecturers were available; however, now everything is more convenient, as consultations can be conducted online. Another interesting finding was that a Chinese student who had difficulty understanding face-to-face lectures felt positive about online learning because he could watch the recording lecture if he missed any information. Szopinski and Bachnik (2021) discovered similar results, with one respondent stating that learning statistics made learning the subject easier because he could watch recordings whenever he wanted.This was an interesting finding because it shows that online learning can be beneficial for students who struggle with face-to-face learning.

## Findings and Discussion

The data collected using Google Form survey among Academic Writing postgraduate students presented the students' perceptions of the WebEx breakout session as an online discussion platform. From 19 students, only 13 students answered the survey, where 69.2% were female, and 30.8% were male. In terms of age, most of the students were between 31-40 years old (38.5%), and 30.8% were between 20-30 years old, and 30.8% were between 41-50 years old. The nationality of the students were Chinese (9 students), Iraqi (1 student), Malaysian (2 students) and Pakistani (1 student). Additionally, the students' mother tongues were Mandarin, Arabic, Bahasa Melayu and Urdu.

The major findings from the survey (See Appendix) demonstrated that the students enjoy having discussions with their peers via the Webex breakout sessions. A majority of students noted to enjoy having discussions with their classmates through the WebEx Breakout session (10 out of 13

students). Ten out of thirteen students said they enjoy having discussions with students from other countries and most of the students disagree with only having discussions with students from the same country (11 out of 13 students). They concur that having a diverse group of students of different nationalities is stimulating, however, it is important to understand cultural differences for better discussion (10 out of 13 students). Two thirds of the students were more motivated to learn using the WebEx Breakout session (9 out of 13 students). Most of the students gave full cooperation during the discussion, and look forward to it each class. Only a few students did not participate in the discussion due to low English proficiency and shyness. More than half of the students appreciate having a space for the students to interact without the lecturer present (7 students agree, 6 students disagree). Based on the data, although the students feel welcomed (10 out of 13 students) and feel that they can share anything with their classmates on the Webex Breakout session (8 out of 13 students), they still encountered problems during the Webex Breakout session (8 out of 13 students). Overall, based on the quantitative findings, students liked the use of WebEx breakout sessions, however, there is still room for improvement to enhance student engagement during online discussions, as more than half of the students have encountered problems during the Webex Breakout session (7 out of 12 students).

Subsequently, the data from the students' reflections from the qualitative research presented 3 major themes, namely Engaging and relaxing atmosphere, Exchanging opinions/views and Student participation.

**Theme 1: Engaging and Relaxing Atmosphere**

The students demonstrated in their reflections that the discussions conducted through the WebEx breakout sessions were highly engaging due to the relaxing atmosphere, where the students were divided into small groups of 4-5 students to freely discuss a topic assigned by the lecturer. The students also felt at ease without the presence of the lecturer to speak freely, without considering any consequences.

> "I feel relatively relaxed when talking in a small group" (Participant 3)

> "Discussion allows us to speak freely and share our ideas without considering right or wrong" (Participant 6)

> "I obviously feel relaxed and my anxiety is reduced. I can speak out what I think, not being afraid of making mistakes" (Participant 7)

> "Without the presence of the lecturer, my group members and I felt comfortable to interact especially for those who have low level of English proficiency" (Participant 8)

> "At the end of a tense and exciting class, the break (WebEx breakout session) cannot only relax, but also review with classmates what the teacher has just been said" (Participant 10)

The implementation of the features through the WebEx breakout sessions improved the effectiveness and engagement of the course delivery. The engaging and relaxing atmosphere was able to support each group's discussion by lowering their anxiety levels as the students spoke in smaller groups. The groups' problems and strategic considerations might be discussed on this medium. From an observational perspective, the students look forward to a safe place for them to share and listen to their peers during online lessons. This enables students to interact actively and continuously,

fostering two-way online interaction, which fulfils the first universal psychological needs of the students, "Autonomy" from the Self-determination theory. Through the WebEx breakout sessions, students were able to control the discussions, which provided them with the feeling of self-governed and self-endorsed.

**Theme 2: Exchanging Opinions/Views**

Another recurring theme that was observed from the students' reflections on the WebEx breakout sessions, was that it was a platform where students were able to exchange their opinions and views. The students felt that their opinion matters and that they were also able to learn from other students of different age, ethnicity, and economic/educational background.

> "I personally enjoy the WebEx breakout sessions since I will know my classmates better, especially those who are in other countries. By doing so, we can share and exchange opinions and views, and also learn from each others' experience" (Participant 1)

> "the sessions provide me good opportunities to communicate with other classmates from different nationalities, to learn from their views towards knowledge of academic writing, and to get their valuable suggestions toward my research" (Participant 2)

> "This arrangement is very good, which made us further understand the knowledge spoken by our teacher, and also promoted the communication between the students in the class" (Participant 4)

> "Not only did I get to practice my verbal expressions, but I also got to learn about other students' views and opinions" (Participant 5)

> "I can also get other students' ideas in the discussion and gradually reach a consensus from the differences" (Participant 6)

> "I can discuss with my friends, make comments and give suggestions on how to improve something. And my critical thinking ability and communication skills are enhanced, for that I can exchange thoughts, learn from others, know some expressions about how to discuss with others to make the dialogue continue and go deeper" (Participant 7)

> "In the discussion session, most of our group members would exchange our research directions and discuss the contents related to the theme/topic assigned by the instructor. Therefore, we can learn from each other and benefit a lot. It is especially helpful to have a group discussion, especially when some problems cannot be solved" (Participant 11)

The WebEx breakout sessions presented a platform for the students to exchange their opinions and views, which fulfils the need for "Competence" from the Self-determination theory. In this view, the students needed to feel competent and effective, which could be achieved through the sharing of knowledge. The exchange of opinions and views between the group helps create a sense of fulfilment that can enhance the student engagement in completing a certain activity or task during online learning.

**Theme 3: Student Participation**

Another theme that stemmed from the students' reflection was the importance of student participation in the discussions during the WebEx breakout sessions. The students felt that to have a successful discussion, all students should give their full participation, without which the discussion can be *boring and not beneficial* (Participant 1), *not lively* (Participant 8), and *so quiet and embarrassing* (Participant 9). Most of the students concurred that having participation and involvement from all parties are necessary to increase engagement during the discussions.

> "The discussion in the Webex Breakout sessions will be interesting and enjoyable if everyone contributes to the discussion. However, it will be boring and not beneficial if only one or two students participate. Usually, students who are proficient in English language participate well in the Breakout Sessions as compared to those who are not" (Participant 1)
> "However, it is a pity that not everyone in the session gets involved in the discussion actively, and this situation has been improved a lot after Dr. Rasyidah arranged a group leader in charge of the session" (Participant 2)
>
> "But sometimes there is no one to organise the discussion" (Participant 3)
>
> "The ones with good English proficiency would usually volunteer to navigate the session and become the interlocutor to ensure the smooth running of the session. Undeniably, the breakout online session were not lively unlike the physical interaction where students can communicate in a real life settings and engage with non verbal signs (laughter, smile etc)" (Participant 8)
>
> "It is necessary to have a person who is of high enthusiasm and talkative, so that the discussion will go on smoothly. Sometimes time flies. But sometimes if there is no such a person to lead us continue the discussion" (Participant 9)
>
> "Occasionally a few students will not participate for personal reasons, but overall it (WebEx breakout sessions) is of great help" (Participant 11)

As the class is conducted online, it is crucial that everyone involved is always present, whereby they give their full participation and involvement. Having this sense of togetherness fulfils the need of "Relatedness" in the Self-determination theory, which allows the students to feel connected, loved or interacted.

## Limitations

As the case study focuses on one particular classroom in one public university in Malaysia, the small number of respondents involved for data collection was considered a limitation in this study. The sample was primarily based on voluntary considerations or willingness of participants to be part of this study. The main concern with the small sample size is the effect on the outcome of the findings due to the lack of detailed explanations from respondents. Furthermore, due to the small sample size, the findings cannot be generalised to all learners. Although it was not the aim of this study to make generalisations, but instead the purpose of this study was merely to understand the situation as it is in the natural setting.

## Recommendation

Based on the limitations and findings of the study, some suggestions can be made for further research. Particularly, it would be beneficial for researchers to replicate this study with a much larger sample of respondents, as well as a more varied population to be able to receive a more holistic point of view on the use of WebEx breakout sessions for online classroom discussions among postgraduate students. Interviews could also be done to acquire a better understanding from both the student and educator's point of views.

## Conclusion

To conclude, the breakout sessions were successful in assisting the students in honing their communication abilities, which served as an alternate platform for online learning. The thematic analysis reveals that breakout sessions have had a variety of functions. It presents a relaxing atmosphere for discussion, makes lessons more meaningful through exchanges of ideas, as well as embedding interesting discussions through participation with the rest of the group members.

It is evident from the data that educators may design engaging lessons with WebEx breakout sessions as an online teaching and learning platform. According to Hsu et al. (2019), students are actively motivated to engage in learning tasks when pedagogical design appropriately fulfils their psychological demands. As seen in this case study, almost all students reported feeling elevated while taking part in WebEx activities during the lesson, which enhanced student motivation. Thus, the inclusion of breakout sessions has demonstrated its value in raising students' affective and behavioural engagement.

Additionally, there are many options to engage students during WebEx breakout sessions. Educators should take full advantage of the online platform to create lessons that are fascinating and engaging. This study revealed that breakout sessions were useful as students developed their confidence and felt at ease within their small groups. The implications of the study suggest that classrooms that support students' psychological needs, namely Autonomy, Competence and Relatedness are more likely to engage students in learning. When these three psychological requirements are met, students feel more emotionally stable, however, when their needs are not met, they may feel very fragmented, disconnected, and reactive.

## References

Abubakari, M. S., Nurkhamid, N., & Priyanto, P. (2022). Factors Influencing Online Learning Engagement: International Students'perspective And The Role Of Institutional Support. Turkish Online Journal Of Distance Education, 23(3), 118-136.

Angelone, L., Warner, Z., & Zydney, J. M. (2020). Optimizing the Technological Design of a Blended Synchronous Learning Environment. *Online Learning*, *24*(3), 222-240.

Aziz, M. N. A., Ganasan, M. J., & Yusoff, N. M. (2021). WebEx Breakout Sessions: Enhancing Student Engagement during Remote Learning. International Journal of Academic Research in Progressive Education and Development, 10(3), 1002–1014.

Booker, K. C., & Campbell-Whatley, G. D. (2018). How faculty create learning environments for diversity and inclusion. *InSight: A Journal of Scholarly Teaching, 14*, 14-27.

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), Research designs: Quantitative, qualitative, neuropsychological, and biological: vol. 2. APA handbook of research methods in psychology (pp. 57–71). American Psychological Association. https://doi. org/10.1037/13620-004.

Braun, V., & Clarke, V. (2019). Successful qualitative research : A practical guide for beginners. SAGE Publications.

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Plenum Press.

Hodges, C., S. Moore, B. Lockee, T. Trust and A. Bond. (2020). The difference between emergency remote teaching and online learning. EDUCAUSE Review. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Hsu, H. C. K., Wang, C. V., & Levesque-Bristol, C. (2019). Reexamining the impact of self-determination theory on learning outcomes in the online learning environment. Education and Information Technologies, 24(3), 2159–2174. https://doi.org/10.1007/s10639-019-09863-w

Kim, Y. K., & Sax, L. J. (2017). The impact of college students' interactions with faculty: A review of general and conditional effects. In M. B. Paulsen (Ed.), Higher education: Handbook of theory and research (pp. 85-139). Springer International Publishing. doi: 10.1007/978-3-319-48983-4

Lederman, D. 2020, March 25. The shift to remote learning: The human element. InsideHigherEd. https://www.insidehighered.com/digital-learning/article/2020/03/25/how-shift-remote-learning-mightaffect-students-instructors-and

Lietaert, S., Roorda, D., Laevers, F., Verschueren, K., & De Fraine, B. (2015). The gender gap in student engagement: The role of teachers' autonomy support, structure, and involvement. British Journal of Educational Psychology, 85(4), 498–518. https://doi.org/10.1111/bjep.12095

Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning*, *22*(1), 205-222.

Murphy, M. P. A. 2020. COVID-19 and emergency elearning: Consequences of the securitization of higher education for post-pandemic pedagogy. Contemporary Security Policy 41(3), 492-505. https://doi.org/10. 1080/13523260.2020.1761749

Naik, V., & Govindu, A. (2022). Enriching and Energizing the Virtual Classroom using Breakout Sessions: A better experience of Active Learning during Covid-19 Pandemic. *Journal of Engineering Education Transformations*, *35*(Special Issue 1).

Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. Journal of Educational Psychology, 105(3), 579–595. https://doi.org/10.1037/a0032690

Roorda, D. L., Koomen, H. M., Spilt, J. L., & Oort, F. J. (2011). The influence of affective teacher–student relationships on students' school engagement and achievement: A meta-analytic approach. Review of Educational Research, 81(4), 493–529. https://doi.org/10.3102/0034654311421793

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: exploring its conceptualization and operationalization. Quality and Quantity, 52(4), 1893–1907. https://doi.org/10.1007/s11135-017-0574-8

Szopiński, T., & Bachnik, K. (2022). Student evaluation of online learning during the COVID-19 pandemic. *Technological Forecasting and Social Change*, *174*, 121203.

Tinto, V. (1993). Leaving college: Rethinking the causes and cures of student attrition (2nd ed.). Chicago, IL: University of Chicago Press. doi: 10.3102/00346543045001089

Wilczewski, M., Gorbaniuk, O., Mughan, T., & Wilczewska, E. (2022). The effects of online learning experience during the COVID-19 pandemic on students' satisfaction, adjustment, performance, and loyalty: evidence from Poland. *Journal of International Students*, *12*(3), 694-715.

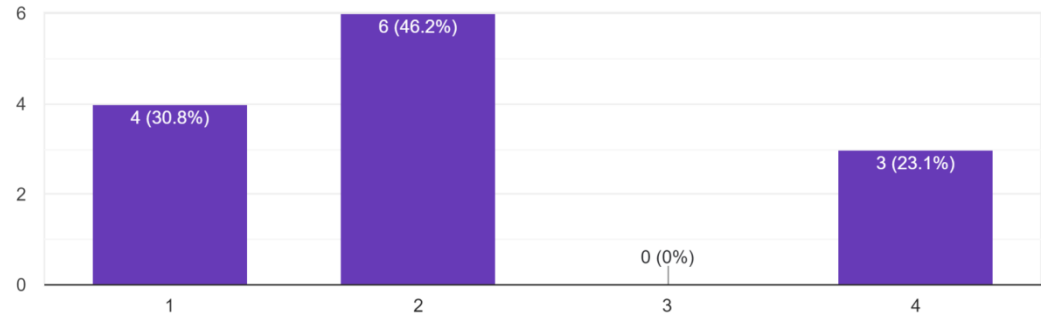
You, W. (2022). Research on the relationship between learning engagement and learning completion of online learning students. *International Journal of Emerging Technologies in Learning (iJET)*, *17*(1), 102-117.

# Appendix

The Likert scale is ranked on a scale from 1-Strongly Agree, 2-Agree, 3-Disagree and 4-Strongly Disagree.

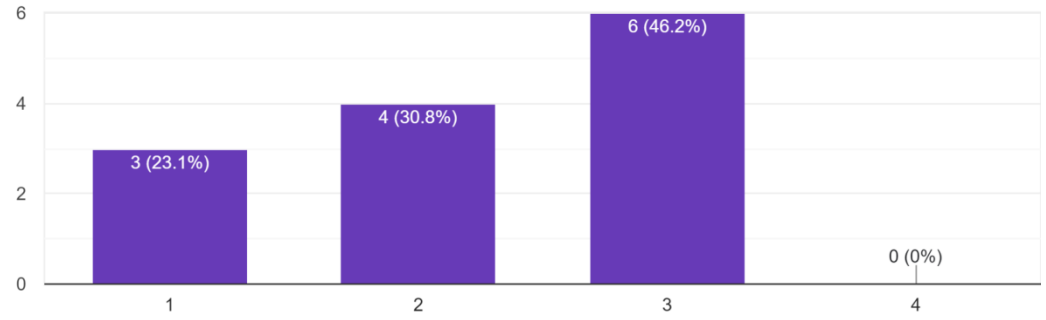
1. I like having discussions with my friends/classmates through Webex Breakout Sessions

13 responses



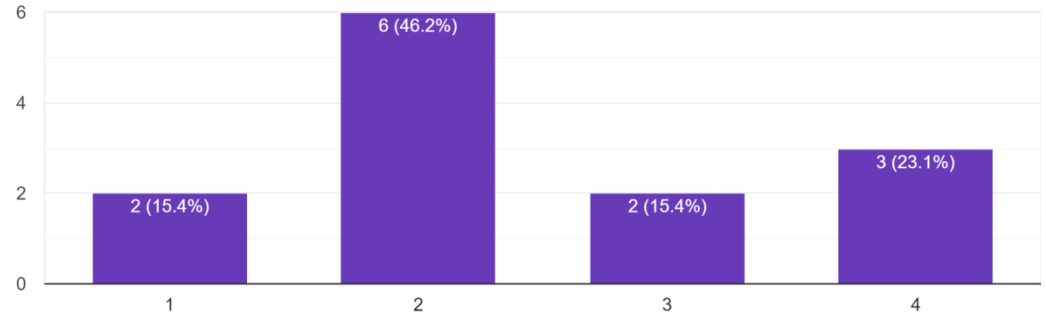

2. I prefer to have discussions with my friends/classmates without the lecturer present

13 responses



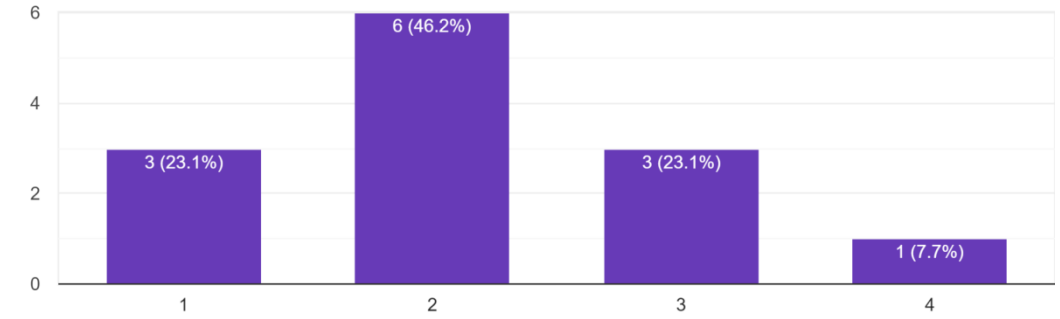

3. I have not encountered any problems during the Webex Breakout Sessions

13 responses



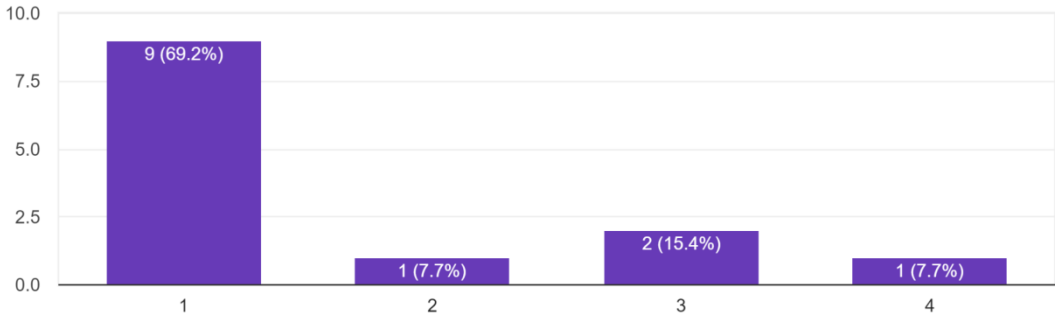
4. I feel more motivated when I get to discuss with my friends/classmates through Webex Breakout Sessions

13 responses



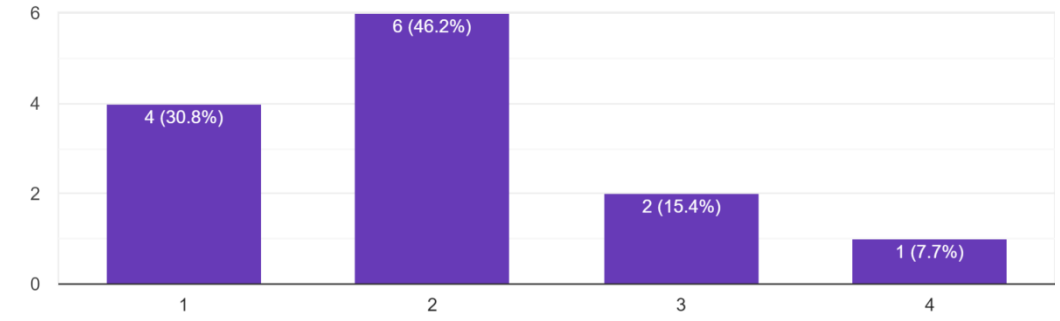

5. I like having discussions with other students from different countries

13 responses



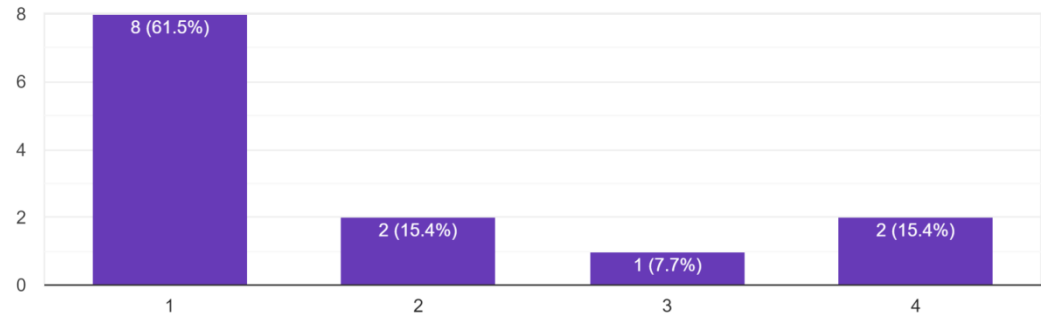

6. I always feel welcomed in the discussion through Webex Breakout Sessions

13 responses



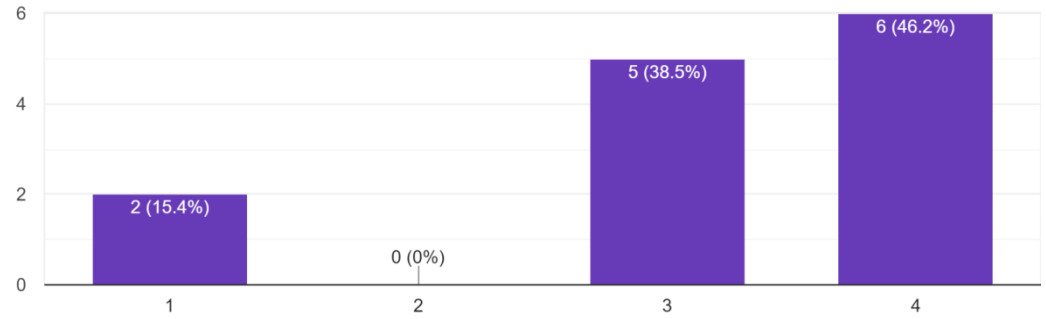
7. I think it is important to understand culture differences for better group discussions

13 responses



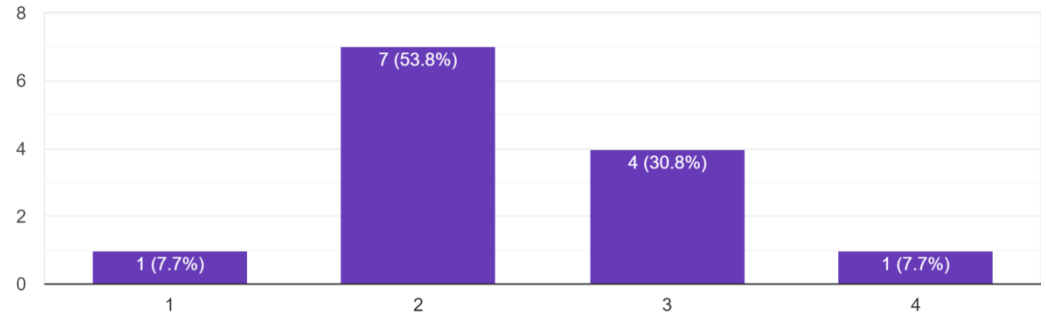

8. I prefer to have discussions only with students from the same country I am from

13 responses




9. I feel that I can share anything with my friends/classmates on the Webex Breakout Session

13 responses



# Youtube Videos: The Use Of Online Learning Tools To Improve Student Engagement

Azrina abdul Razak
School of Creative Industry Management and Performing Arts,
Universiti Utara Malaysia,
06010, Sintok, Kedah, Malaysia.
Corresponding Author: azrina@uum.edu.my

## Abstract

It is common practice for educators to design or structure their classes based on the dominant learning style of their students so that effective student learning in the classroom would take place and the course learning outcomes would be achieved. This case study investigated student engagement by aligning the dominant student learning style of the class with appropriate online learning tools that would ensure effective content and delivery of the course. The research was carried out during lockdown on Bachelor of Creative Industry Management (BCIM) students in the online class of SCIM1053 Malaysian Cultural Communication and Arts Appreciation. The data collection method for this study was a survey. Besides personal background details, students were also required to assess their general approach to learning by completing a learning style survey. YouTube videos were used to reinforce the lessons since results of the learning style survey showed that most students were found to be Visual learners (65.6%) followed by Auditory (24.6%) and Tactile (9.8%). MUET test scores were also recorded. The selection of YouTube videos took into account students' English proficiency, where most were basic users of English with only 8 students (13.1%) obtaining MUET Band 4 (Independent User). The findings led to the understanding that for students, the viewing of YouTube videos reinforced a better understanding of the content delivered in the lecture. The study also highlighted the implications on teaching and learning and the potential of using online tools such as YouTube videos by instructors in institutes of higher learning in Malaysia.

*Keywords:* Learning styles, teaching approaches, student engagement, authentic materials, YouTube videos

## Introduction

The Covid-19 pandemic forced instructors and students to go online, thus distancing us from the normalcy of face-to-face interaction in classroom meetings. Although there are many benefits of online learning, it does have some major drawbacks. Feedback is one of them. Students hardly gave any immediate feedback online as opposed to traditional classroom meetings and this hindered instructors from knowing whether students were experiencing any problems. Feedback, in particular personalized feedback, is important in enrichening the learning process and acts as a motivating factor for students too.

The number of students per class also increased during the pandemic as the replacement of face-to-face classes with Online Learning as the mainstream way of learning allowed for the participation of a much larger group of students. Hu et. al (2018) state, " The essence of online learning is the continuous development of student's cognitive level," and further add that for effective learning to take place, students would need to participate actively in the process. Student engagement, in larger group sizes, becomes more challenging. Observation from my online class

revealed many students lacked interaction and some hardly even communicated their thoughts and opinions when asked. Some students failed to communicate anything at all during class and this may mean that they were experiencing signs of social isolation. Therefore, there was a need to find ways to promote student interaction by utilizing blended learning environments.
However, to do that, instructors must first understand who their students are and which approach to learning would best be prescribed to their class. By conducting a survey, the dominant student learning style of the class would be known and this would assist instructors in choosing the best methods and approaches to be used to promote a more conducive learning environment that encourages active participation and student engagement.

## Literature Review

This study looks at the construct of student learning style, student engagement in online learning, and its positive association with student learning outcomes. Zhang & Hyland (2018) posit that tapping into student engagement is essential for improving student learning. This study looks at the importance of aligning the dominant student learning style of the class with materials and learning experiences that match students' learning preferences. When educators fail to bridge learning and teaching styles, students can become disengaged in class and this may lead to underperformance among them. While the literature recognises its importance abroad, there is little research on pedagogical approaches in higher learning institutions that can facilitate this engagement in a Malaysian context.

### Online learning and student engagement

In online learning, the way students learn is through utilising online learning platforms. It can be done both synchronously and asynchronously. Online learning platforms create a space or online learning environment which is composed of a variety of text materials, audio and video, multimedia courseware and other learning resources. According to Hu et al. (2017), Student Engagement in online learning occurs when students go on online learning platforms to learn and includes behavioural engagement, cognitive engagement, and emotional engagement. Behavioural engagement is the basic form of engagement. It is explicit and observable, and mainly includes students' specific behaviours in the learning process. Cognitive engagement mainly refers to the use of learning strategies, that is, students grasp and control mental effort in learning, and the use of different learning strategies will lead to different levels of thinking. Emotional engagement primarily refers to students' emotional reactions, including interest, boredom, happiness, sadness, and anxiety. Some researchers also include sense of belonging and values as emotional engagement too.

Student engagement is considered the ''holy grail of online learning,'' by many researchers and educators in education (Ding et al., 2018; Dunn & Kennedy, 2019). Student Engagement encompasses the physical and psychological work that students perform in organized educational activities. Engaged students are described by Luo et al. (2021) as those who "devote participation in learning tasks, exert effort in learning activities, and exhibit interest in learning content". These features can then be linked positively with important learning outcomes like academic achievement (Datu, 2018; Reyes et al., 2012).

### Identifying student learning styles

The term learning styles is used in psychology to mean a learner's favoured approach to learning, which includes the process of receiving, collecting, processing, and interpreting to become knowledgeable (Chetty, N. et al., 2018).

Student learning styles fall into three categories: Visual Learners, Auditory Learners and Kinesthetic Learners. Simplified as VARK, the acronym refers to the four types of learning styles: Visual, Auditory, Reading/Writing Preference, and Kinesthetic. (Fleming & Baume, 2006) and that

students have different approaches to how they process information, referred to as "preferred learning modes." Fleming and Mills (1992) in Zaidi, A. et al. (2018) claimed that "visual learners have a preference of seeing visual aids that represented ideas using methods other than words, such as graphs, charts, diagrams, symbols and others. Auditory learners learn better through lectures, discussions and using tapes whereas tactile or kinesthetic learners prefer to learn via experiences such as moving, touching example through science projects and experiments."

According to Fleming & Baume (2006), it is essential to know about students' learning modes as it will have a significant influence on their behaviour and learning and to match with appropriate learning strategies. This match is seen to increase students' levels of comprehension, motivation, and metacognition. By identifying students as visual, auditory, reading/writing, and kinesthetic, learners, educators can then align the most suitable teaching approaches that would be most beneficial for the entire class.

**YouTube Videos for visual learners**

YouTube as an educational tool has received a great deal of attention from researchers and teachers. A simple search on the internet will reveal that YouTube is the second most visited website in the world, behind Google. It comes as no surprise that videos about education, entertainment, marketing, and science are constantly being uploaded to YouTube since 2005. Its usage in a classroom setting especially in tertiary and higher education has also gained traction (Alon & Herath, 2014; Torres-Ramírez et. al, 2014; Tugrul, 2012). More and more educators are using video and visual objects for teaching, and even some universities utilize YouTube as a complementary teaching tool for blended teaching. This is the case in Universiti Utara Malaysia as well. Visual learners prefer seeing and observing. They seem to understand information better when it's presented visually. Therefore, visual learners naturally do well with pictures, diagrams, and videos.

The use of images attracts their attention and engages visual learners on a deeper level. Visual learners do well when words are illustrated by colours and pictures, and that is essentially what YouTube videos do. Through storytelling, Visual learners are prompted to the imagery and this enhances the explanation further as they are viewing. Because of this, videos with even very basic or limited images are beneficial for the visual learner.

## Methodology

**Instrument and sampling**

In this case study, intervention using YouTube video viewing was carried out. A quantitative approach was used and the data collection method was a survey administered to students of SCIM1043 Malaysian Cultural Communication and Arts Appreciation. The questionnaire was distributed using Google Forms. The survey consisted of three parts. The first part of the questionnaire requested demographic information of the respondent including gender, age, ethnicity, where they come from, levels of language proficiency and year of study. In the second part, students were required to assess their general approach to learning by completing an online learning style survey at www. Educationplanner.org. They were then asked to mark whether they are Visual, Auditory, Reading/Writing or Kinesthetics learners. Lastly, in the third part, using a Likert scale, students were asked their opinion regarding how the videos they viewed on YouTube at the end of each class assisted them in better understanding and describing the various cultures and art of the multi-ethnic communities in Malaysia.

The SCIM1053 subject covers the introduction to the culture and art history of Malaysia. It is a compulsory subject to take for all first-year Bachelor of Creative Industry Management students to take. The course introduces students to the visual and performing arts within the vast cultural history of Malaysia. Exposure is given to various perspectives in the appreciation of Malaysian culture and

arts. This research looked into the influence of YouTubes videos on one of the course learning outcomes, vis-à-vis students are expected to know how to describe the various cultures and art of the many communities of the people of Malaysia.

**Procedure and data collection**

Participation was made compulsory for all students enrolled in the SCIM1053 Malaysian Cultural Communication and Arts Appreciation class (n. =61). The questionnaire was distributed using the class WhatsApp group. Students were given brief instructions and assurance that their data would be kept confidential. The instructor made the students understand that their answers should reflect their beliefs, thoughts and feelings.

## Results and Discussion

From the findings, the data was analyzed, and the responses to the questions were tabulated and are now discussed. A total of 61 students answered the survey (100%). 67.2% were female (n=41) and 32.8%, male (n. =20). Most students were aged between 21-23 years (95.1%, n.=58) followed by 18-20 years (3.3%, n.= 2) and only one student aged 24-26 (1.6%). In terms of ethnicity, the largest group 60.7%, were Malay/ Bumiputera (n. =37), followed by Chinese at 34.4% (n= 21) and Indian 4.9% (n=3). Majority of students are from suburban areas at 36.1% (n=22) followed by 32.8% from rural areas (n=20) and 31.1% from urban areas (n=9).

In terms of English proficiency, most were basic users of English with only 8 students (13.1%) obtaining MUET Band 4 (Independent User).

Apart from personal background details, students were also required to assess their general approach to learning by completing a learning style survey. Majority of the students were found to be Visual learners at 65.6% (n= 40) followed by Auditory at 24.6% (n= 15) and Tactile at 9.8% (n=6).

Students' reflections regarding the viewing of YouTube videos at the end of each lecture were also recorded whereby the majority were in agreement that the videos reinforced a better understanding of the content delivered in the lecture at 95.1% (n=58).

The findings from the questionnaire allowed me to get to know who my students were and to know more about their backgrounds. This allowed me to better understand their family, language, culture and home environment. These are factors that help shape their learning experiences. Students were also asked to identify their learning styles. Knowing their learning styles allowed me to look for ways to not just improve their understanding of the course content but also improve their communication skills in English. Since results of the survey revealed that these BCIM students were neither proficient nor independent users of English, this information was indeed instrumental in the selection of the materials to be used in class and when choosing videos from YouTube. It also assisted me to explore more entertaining methods for promoting English use not only in the classroom setting but also in more informal settings such as during group discussions. With all this in mind and considering how the majority of the students were visual learners, the decision made to use videos to reinforce my lessons for better student engagement and to improve learning outcomes was lauded by the students as they too expressed that the footages they watched on YouTube had indeed helped them to better understand the cultures and art of the various communities in Malaysia.

## References


Alon, I., & Herath, R. K. (2014). Teaching international business via social media projects. *Journal of Teaching in International Business*, *25*(1), 44-59.

Chetty, N. D. S., Handayani, L., Sahabudin, N. A., Ali, Z., Hamzah, N., Rahman, N. S. A., & Kasim, S. (2019). Learning Styles and Teaching Styles Determine Students' Academic Performances. *International Journal of Evaluation and Research in Education*, *8*(4), 610-615.

Datu, J. A. D. (2018). Flourishing is associated with higher academic achievement and engagement in Filipino undergraduate and high school students. *Journal of Happiness Studies*, *19*(1), 27–39.

Ding, L., Er, E., & Orey, M. (2018). An exploratory study of student engagement in gamified online discussions. *Computers & Education, 120*, 213–226.

Dunn, T. J., & Kennedy, M. (2019). Technology-enhanced learning in higher education; motivations, engagement and academic achievement. *Computers & Education, 137*(8), 104–113.

Fleming, N., & Baume, D. (2006) Learning styles again: VARKing up the right tree. Educational Developments, 7 (4), 4 – 7.

Hu, M., & Li, H. (2017, June). Student engagement in online learning: A review. In *2017 International Symposium on Educational Technology (ISET)* (pp. 39-43). IEEE.

Hu, M., Li, H., Deng, W., & Guan, H. (2016, September). Student engagement: one of the necessary conditions for online learning. In *2016 International Conference on Educational Innovation through Technology (EITT)* (pp. 122-126). IEEE.

Luo, N., Li, H., Zhao, L., Wu, Z., & Zhang, J. (2021). Promoting Student Engagement in Online Learning Through Harmonious Classroom Environment. *The Asia-Pacific Education Researcher*, 1-11.

Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., & Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *Journal of Educational Psychology, 104*(3), 700–712.

Torres-Ramírez, M., García-Domingo, B., Aguilera, J., & De La Casa, J. (2014). Video-sharing educational tools applied to the teaching in renewable energy subjects. *Computers & Education*, *73*, 160-177.

Tugrul, T. O. (2012). Student perceptions of an educational technology tool: Video recordings of project presentations. *Procedia-Social and Behavioral Sciences*, *64*, 133-140.

Zaidi, A., Awaludin, F. A., Abd Karim, R., Ghani, N. F. C., Rani, M. S. A., & Ibrahim, N. (2018). University Students' Perceptions of YouTube Usage in (ESL) Classrooms. *INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS AND SOCIAL SCIENCES*, *8*(1).

Zhang, Z. V., & Hyland, K. (2022). Fostering student engagement with feedback: An integrated approach. *Assessing Writing*, *51*, 100586.

# Effect of Socioeconomic Status on Students' Achievement in STEM-Based Learning

Nur Suhaidah Sukor[*a], Mohd Zaki Ishak[b], NurAzidawati Mohammad Arsad[c]
[ab]Faculty of Psychology and Education, University Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia.
[c]STEM Enculturation Research Centre, Faculty of Education, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia.
*Corresponding Author: nursuhaidahsukor@ums.edu.my

## Abstract

This paper discusses the status socio-economy of families that impact students' achievement in STEM-based learning. This study employed a quasi-experiment that used purposive sampling to collect data from 138 Form One students. The collected data was then analyzed using descriptive analysis and two-way ANOVA. The test contains 37 items and the reliability of Cronbach Alpha is 0.64. The findings showed that there was a significant difference in the mean score of Post-test achievement for the treatment group with the control group. However, the mean score of the Post-test achievement for the HSE group was significantly higher than the MSE and LSE groups. In addition, the HSE group given the treatment with the STEM Inspiration Module achieved better than the HSE group that received conventional learning. Thus, to encourage students from Middle socioeconomic status and Lower socioeconomic status families to participate in STEM based-learning the materials and tools used in the module were inexpensive, easy-to-find, and recycled items. By doing these, the teachers can motivate them to join STEM-based learning that is integrated into the science classroom.

*Keywords*: science; achievement; socioeconomic status

## Objectives

The study aimed to:

1) To identify parental education levels between the control group and the treatment group.
2) To identify family income between the control group and the treatment group.
3) Identify the difference in the mean score of the Post-Test achievement between different groups' Socioeconomic status participating in the STEM Inspiration Module.

## Research Questions

Specifically, the study wanted to find answers to the main questions as follows:

1) Is there a difference in the mean score of Post-test achievement for different SSE pupils between the control group and the treatment group?

## Literature Review

The post-industrial and post-globalization eras have been circled with the progress of Science and Technology. Thus, Science-Technology-Engineering-Mathematics (STEM) was introduced and became the focus of the Ministry of Education Malaysia. In 2013, it is reported that the participation of secondary school students in the science stream was low, which is 29% and a small fraction of 4.5% in the vocational stream (Mohamad et al., 2015).

Moreover, the percentage of Malaysian students' Science achievement according to the International Standardization of TIMSS from 1999 to 2019. The percentage of Malaysian Secondary

School students who did not achieve at least the Lower Level (400 points) in Science for TIMSS 2019 is 26%, which is 3% higher than TIMSS 2015 and less by 12% compared to TIMSS 2011. Compared to TIMSS 2015, TIMSS 2019 also shows an increase in the Low Level and a decrease of 2% in the Medium Level and 3% in the High Level. Even so, the percentage of students at the Highest Level is the same for TIMSS 2019 compared to TIMSS 2015, 1% (Laporan Kebangsaan TIMSS, 2020).

Thus, innovation in science teaching is needed to increase participation and improve students' achievement in science. In this study, the STEM Inspiration Module was developed to help promote the integration of STEM in science subjects. The aim is to increase student involvement in inquiry-guided activity-centered learning while implementing STEM Activities.

To study this situation in real life setting, we will look at parents' socioeconomic status. These aspects need to be emphasized because The U.S. National Center for Educations Statistics 2011 reported that students with families of Low Socioeconomic Status lack basic skills in Science, Technology, Engineering, and Mathematics (Christensen, Knezek, & Tyler-Wood, 2014). However, students from families with high socioeconomic status have achieved better academic achievements (Navarro, Flores & Worthington, 2007). Thus, in these studies, we will focus on parents' income and their educational level in impacting students' achievement in STEM-based learning.

Good quality of life ensures the comfort of students to learn and live in their daily lives. However, almost 12% (767 thousand) of households in Malaysia earn RM2000 a month and below (Cahron, 2016). In 2007, the poverty rate in Sabah recorded the highest value of 16 percent compared with Sarawak in second place with 4.2 percent and lastly Peninsular Malaysia with the lowest percentage of 2.3 percent. Understanding family socioeconomic status is important in this study. This is because, the literature on achievement consistently has shown that parents' income is important in predicting children's achievement (Halle, Kurtz-Costes, Mahoney, 1997; Hak, 2004). This proves that the achievement gap exists between different pupils of socio-economic status. Thus, the researchers determine to study the impact of family socioeconomic background on students' achievements.

## Methodology

This study employed a quasi-experiment that used purposive sampling to collect data from 138 Form One students. The sample was divided into a treatment group and a control group. The sample in each group was then labeled based on their family socioeconomic background (High Income, Middle Income, and Lower Income).

The students are grouped according to their family socioeconomic status. Based on Poverty Guidelines issued by Unit Perancangan Ekonomi (2009), poor families in Sabah are those with household incomes lesser than RM1170. Based on these reports, families with a monthly income of RM710 and below are categorized as Lower Socioeconomic Status (LSE) group. Families monthly earned between RM711-RM1170 were categorized under Middle Socioeconomic (MSE) group. While families with monthly earned of RM1171-RM12159 are categorized under Higher Socioeconomic (HSE) group.

The science test contains 37 items and covers six topics in Form One Science subject. The face validity was investigated by getting help from a panel of experts to ensure the readability of the instruments and students' comprehension. The science test was tested on 34 students. Linacre (1994) explained that 30 examinees are sufficient for well-designed pilot studies. The reliability of the Science Test instrument result showed a value of 0.68. The content and face validity of the test were verified by four experts panel consisting of Pedagogical Expert lecturers, and Excellent Science Teachers. The assessment made is important to get feedback and suggestions to improve learning modules and science achievement test instruments. All assessors were contacted by phone or email,

and all of them agreed to evaluate and confirm the functionality of the module to integrate STEM in Form One Science Education.

## Findings

The main factor in the occurrence of dropouts is the socioeconomics of the family. influence of family socioeconomic background consisted of family income, parental occupation, parental education level, and family support (Zakari, Majid, & Hussin, 2022). In this study, the researchers focused on Table 1 parental education level and table 2 family income.

Table 1
*Paternal Level of Education*

| | Treatment | Control | Sum |
|---|---|---|---|
| No | 6 | 0 | 6 |
| No School | 12 | 19 | 31 |
| UPSR | 8 | 15 | 23 |
| PMR | 7 | 7 | 14 |
| SPM | 18 | 22 | 40 |
| Diploma/STPM | 9 | 3 | 12 |
| Bachelor Degree | 8 | 2 | 10 |
| Master Degree | 0 | 2 | 2 |
| Sum | 68 | 70 | 138 |

The results of the analysis of Table 1, the Father's Level of Education, showed that 23 people (16.7%) received the minimum education which is the completion of Ujian Penilaian Sekolah Rendah (UPSR). A total of 14 people (10.1%) obtained the certificate of Penilaian Menengah Rendah (PMR) and a total of 40 people (28.9%) completed the Sijil Pelajaran Malaysia (SPM). Some fathers pursue higher education such as diplomas, Bachelor's Degree, and Master's Degree which are 12 (8.7%), 10 (7.2%), and two (1.4%) respectively. The remaining 31 fathers (26.3%) did not attend school and the remaining six (4.3%) were recorded as missing (divorced or deceased).

Table 2
*Maternal Level of Education*

| | Treatment | Control | Sum |
|---|---|---|---|
| No | 6 | 0 | 6 |
| No School | 8 | 20 | 28 |
| UPSR | 12 | 20 | 32 |
| PMR | 8 | 4 | 12 |
| SPM | 20 | 18 | 38 |
| Diploma/STPM | 1 | 4 | 5 |
| Bachelor Degree | 13 | 3 | 16 |
| Master Degree | 0 | 1 | 1 |
| Sum | 68 | 70 | 138 |

Further, the researchers examined the level of Mothers' Level of Education. The aim is due to the culture in Malaysia which demands that fathers serve as the main source of financial search while the responsibility of educating the child is left to the mother. A total of 32 people (23.2%) received minimum education Ujian Penilaian Sekolah Rendah (UPSR). A total of 12 people (8.7%) successfully obtained the Penilaian Menengah Rendah (PMR) and 32 (23.2%) completed their Sijil Pelajaran Malaysia (SPM) education. Apart from that, some mothers pursue higher education such as

a Diploma of five (3.6%), a Bachelor's Degree of 14 (10.1%), and a Master's Degree of one person (0.7%). The remaining 28 people (20.3%) did not attend school and the remaining six (4.3%) were recorded as missing or divorced.

To investigate the parents' socio-economic status, the researchers profiled parents' income. The goal is to classify the study sample into a group of students with High Socio-economic Status (HSE), Moderate Socio-economic Status (MSE), or Low Socio-economic Status (LSE). The data for the amount of income is obtained in the form of raw data and then converted into scales. The following Table 3 is an analysis of the socioeconomic status of the student's family.

Table 3
*Number of participants by Socio-economic Status*

| | **Treatment** | **Control** | **Total** |
|---|---|---|---|
| LSE | 24 | 21 | 45 |
| MSE | 23 | 29 | 52 |
| HSE | 21 | 20 | 41 |
| Total | 68 | 70 | 138 |

According to Table 3, the results of the analysis showed that 45 (31.6%) of poor families categorized with incomes of RM710 and below were categorized as LSE groups. Subsequently, a total of 52 (46.8%) families earned an income of RM711-RM1170 and were categorized in the MSE group. Moreover, 41 (12.7%) families were categorized as students of the High Socio-economic Status (HSE) group.

The researchers conducted a two-way ANOVA to test two independent variables. The first variable is a type of group consisting of a treatment group that received lessons based on the STEM Inspiration Module and a control group that received traditional method lessons. The second independent variable is socioeconomic status which can be divided into three groups namely High Socio-economic Status (HSE), Moderate Socio-economic Status (MSE), and Low Socio-economic Status (LSE). The mean score of the Post Science Test achievement is shown in Table 4.

Table 4
*The mean score of Post Science Test Achievement by Socio-economic Status*

| **Socio-economic** | **Group** | **x** | **p** | **n** |
|---|---|---|---|---|
| LSE | Treatment | 32.84 | 12.51 | 24 |
| | Control | 22.97 | 8.39 | 21 |
| | Sum | 28.24 | 11.78 | 45 |
| MSE | Treatment | 38.96 | 13.77 | 23 |
| | Control | 31.10 | 13.44 | 29 |
| | Sum | 34.58 | 14.02 | 52 |
| HSE | Treatment | 37.17 | 16.07 | 21 |
| | Control | 35.49 | 12.25 | 20 |
| | Sum | 36.35 | 14.18 | 41 |
| Total | Treatment | 36.25 | 14.14 | 68 |
| | Control | 29.92 | 12.62 | 70 |
| | Total | 33.04 | 13.72 | 138 |

Before the two-way ANOVA analysis, the researchers conducted a Levene test to test the variance homogeneity in the dependent variable (Post Science Test) against independent variables (group and SSE). Analysis of the Levene Test is shown in Table 5.

Table 5
*Levene Test for Post-Science Test*

| F | df1 | df2 | *p* |
|---|---|---|---|
| 2.65 | 5 | 132 | .03 |

The Levene test in Table 5 shows, that the Post-Science Test is insignificant to the group and SSE [F (5,132) = 2.65, p>0.01]. According to Field (2010), the assumption of variance homogeneity is observed because the value of the significance is above 0.01. Thus, the conditions of variance homogeneity are met and the bilateral ANOVA analysis can be continued.

Table 6
*Bilateral ANOVA Test Results for Difference in Post Science Test Mean Score Between Treatment Group and Control Group Based on SSE Factor*

| Enabler Change | Sum squared Type III | min | Min squared | F | Itself. | *Partial Eta Squared* |
|---|---|---|---|---|---|---|
| Group | 1421.40 | 1 | 1421.40 | 8.43 | .004 | .06 |
| SSE | 1826.23 | 2 | 913.11 | 5.42 | .005 | .08 |
| Group* SSE | 389.03 | 2 | 194.52 | 1.15 | .320 | .02 |

The results of the analysis in Table 6, show that there is a significant major effect (p<.01) on group-based variables on the mean score of the Post Science Test achievement, F (1, 137) =8.43, p<.01; with a small size effect (*partial eta squared*= .06). Based on Cohen's report (1988) effect values size 0.2=small, 0.5=medium and 0.8=large.

When the effect of the SSE variable was ignored, the total mean score of the Post Science Test in the treatment group (min=36.25, σ = 14.14) and controls (min= 29.92, σ=12.62) showed significant differences. Analysis of these main effects found that Post Science Test scores increased when pupils were involved with the intervention. Thus, it can be concluded that students who engage in teaching and learning activities using the STEM Inspiration Module can increase science achievement higher than students who are exposed to conventional teaching approaches even though the effect is small.

Further, there was a significant major effect (p<.01) on variables based on SSE on the mean score of the Post Science Test achievement, F (2, 136) =5.42, p<.01; with a small size effect (*partial eta squared* =.08). Based on the findings when not involving the group, the main effects of SSE showed significant differences. These findings show that HSE students will always achieve better science than MSE and LSE students regardless of the teaching approach implemented.

While the findings relating to the effects of the interaction between the Group and SSE in Table 5.14 were found to be no significant difference F (2, 136) = 1.15, p>.01; with a very small size effect (*partial eta squared*=.02). It is concluded that the $Ho_2$ hypothesis failed to be rejected, thus there was no significant interaction effect of the mean score of the Post Science Test between the group and SSE. These findings explain that the effect of the interaction of the two independent variables based on Group and SSE affects the individualized science achievement score. This means that the value of the pupil's science achievement score does not depend on the SSE of the different pupils in the group. Further, the researchers examined Figure 5.1 of the line graph for the mean score of the Post Science Test achievement for the control and treatment group students.

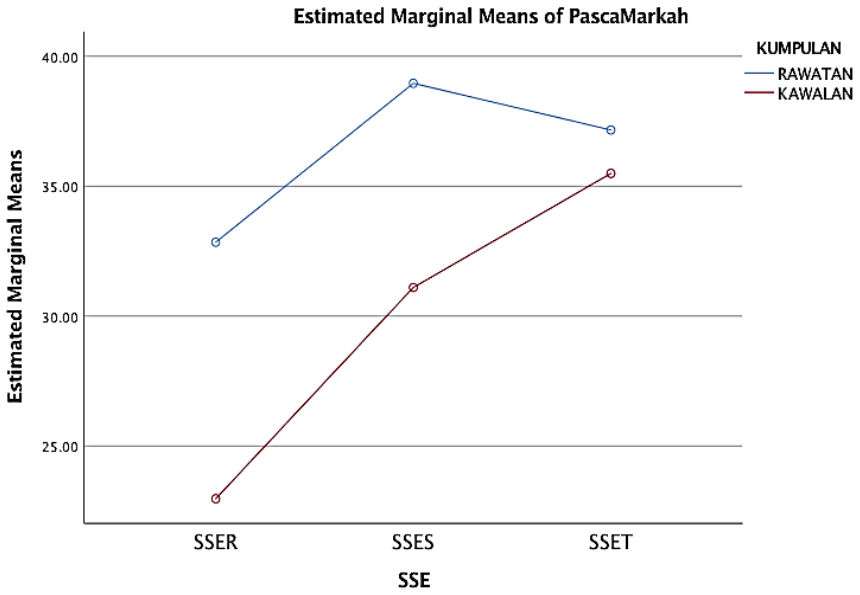



*Figure 1*. Graph of the achievement mean score line for the treatment group and control group

Analysis of the line graph Figure 1 showed that pupils involved with the teaching and learning activities intervention using the STEM Inspiration Module achieved better science achievement than their peers who remained exposed to conventional teaching approaches. Thus, the STEM Inspiration module is more effective in improving science achievement than conventional methods. In addition, students with HSE backgrounds achieved higher and more significant science achievements compared to MSE and LSE students. Finally, the group's influence on the level of scientific achievement is not due to SSE or vice versa.

## Discussion

The results of the analysis showed that 97 (70.29%) families earned below RM1170 and were categorized in the MSE group and LSE. Due to money constraints, the parents have to allocate money for more important basic needs for continued survival. Thus, some parents are unable to send their children to school and do not care about their children's learning needs (Ganesan, 2013). This led to majorities of students' absence from school days and dropout students from low-income families (Institut Hal Ehwal Ekonomi dan Demokrasi Malaysia, IDEAS, 2017).

This result is in line with a report by Unit Perancangan Ekonomi (2009) state that 39.6% of Malaysians living in urban areas only have SPM certificates, 11% have a diploma and 37% have advanced degrees. A previous study by Hascoët, Giaconi, & Jamain (2021) shows that mathematics achievement was influenced by the family socioeconomic and educational context and parental expectations regarding their children's academic achievement. This is because, low household income and uneducated parents may not be able to guide their children to get a better education (Zakari, Majid, & Hussin, 2022).

The findings showed that pupils from the treatment group involved with the intervention using the STEM Inspiration Module achieved better science than peers who remained exposed to conventional teaching approaches. Thus, the STEM Inspiration module is more effective in improving science achievement than conventional methods.

The findings showed that the mean score of the science achievement for the HSE group was significantly higher than the MSE and LSE groups. The findings of this study are in line with the reports of Stewart (2008), Navarro, Flores, and Worthington (2007), and Hak (2004) which found that pupils from HSE families achieved high academic achievement. This statement is also supported by Arshat et al. (2002) who claimed that students from the low SSE group did not excel in school

and had cognitive problems compared to students from the medium and high SSE group. This is because the family has the potential as a foundation for the development of cognitive, affective, and psychomotor aspects of children through the parenting process (Erdamar & Demirel, 2014). This proves that the children are relating to their family education more operationally (Tiwery, 2021).

Following the above discussion, it was found that the LSE group that received intervention using the STEM Inspiration Module achieved better than the LSE group that received conventional learning. This learning module is developed based on the Guided Inquiry Approach. These findings support past studies that have found that investigative activities can improve pupil achievement and reduce the attainment gap for pupils from Low Socioeconomic Status families (Degenhart, 2010). Through material manipulation activities, students can remember concepts and facts related to the material more effectively (Kamarudin, 2010). This, in turn, indicates that financial resources influence student achievement in school (Hak, 2004).

To encourage the participation of students from Middle Income and Lower Income families, the materials and tools used in the Inspirational STEM module were inexpensive and easy to find. This is to ensure that students can easily find and prepared the materials, thus encouraging them to participate in STEM-based activities. Thus, it is also suitable for application in rural areas that have limitations in findings material resources for STEM activities.

## Implications of the study

The implications of this study involve students, teachers, and school administrators. The findings of the study showed that the SSER group that received treatment with the STEM Inspiration Module achieved better than the SSER group that received conventional learning. Thus, it can be seen that inquiry activities can increase student achievement and reduce the achievement gap for students from low socioeconomic status families (Degenhart, 2010). Moreover, parents are expected to put more effort into building a positive situation at home that supports their child's learning.

The goal of national education is to improve STEM education and prepare students for careers in fields involving STEM. Thus, it becomes a necessity for teachers to involve students in STEM integration learning situations so that students build meaningful knowledge. Through the application of the STEM Inspiration module, science teachers are given guidance on the Lesson Plan and also the implementation of the Engineering Thinking Process Chart.

## Limitations

In this context, the researchers discussed some limitations that affect internal validity and external validity throughout the study. Ideally, the experiment is one with high internal and external validity. Internal validity matters much more than external validity because it can be assumed that the hypotheses are expected to be tested under highly specific and all-other-things-being-equal conditions (Guala & Mittone, 2005).

Among the threats identified was the exclusion of study participants. Pupils are excluded from this study if they do not attend all the tests, namely the Pre-Science Test, and the Post-Science Test. These threats are known as mortality, which refers to the effects caused by the circumstances in which the study participants withdrew from continuing the study before the completion date of the study (Nasirun, Muhamad Noor, Yusoff & Othman, 2016). This is due to some of the students participating in studies at the beginning of the school semester and then transferring to a different school at the second of the school semester.

In addition, pupils need to state their parental information such as education level, type of employment, and salary filled by pupils in the survey form. This also caused problems when five pupils were unable to provide accurate information about the parents' demographics and caused their set of answers to be isolated and not analyzed. The reduction in this sample of participants may

affect the validity of the study (Kutch, 2011). This problem is solved by taking a large number of samples.

The Pre-test and Post-test are conducted by teachers who teach science subjects in those classes. This led to a threat to the collection of data by different teachers for each class involved in the study. In addition, the duration of the implementation of the Pre-test and the Post-test also affected the findings of the study. The Pre-test is implemented at the beginning of the school year compared to the Post-test. The implementation of the Pre-test at the beginning of the year gives teachers the time and space to administer it in an orderly manner. Compared to the post-test at the end of the school year, the teacher needs to finish teaching the syllabus and do revision for the final examination.

This eventually will cause a historical effect which refers to events that arise between the start date and the deadline of the quasi-experimental process (Creswell, 2012). For this study, researchers have designed teaching and learning activities according to the school academic calendar. The academic calendar and schedule of work were presented to the teachers involved in the study. After that, quasi-experimental related procedures are also presented to teachers and the respondents. Since the start date and end date of the experiment are within the same school year, then the effect of the historically caused external factor can be reduced (Nasirun, Muhamad Noor, Yusoff & Othman, 2016).

## Conclusion

This study was carried out to see the impact of STEM integration that applies the 5E Learning Cycle approach through the STEM Inspiration Module to science achievement. The study also has a mission to develop modules that are ready to be used and can help teachers carry out inquiry learning. The implication of this research for teachers is to motivate them to employ the scaffolding method in integrated STEM science classrooms.

The findings showed a significant difference in the mean score of Post Science Test achievement for the treatment group with the control group. However, the mean score of the Post Science Test achievement for the HSE group was significantly higher than the MSE and LSE groups. In addition, the HSE group given the treatment with the STEM Inspiration Module achieved better than the HSE group that received conventional learning. Therefore, module innovation can have a positive impact on the achievement of science. Through the research findings, schools can take effective measures to help and provide students from Lower Income and Middle-Income groups with learning aids at home. In addition, it is hoped that this report will enable parents to be more aware of their children's academic achievement and help them fulfill their learning needs.

## References

Arshat, Zarinah and Baharudin, Rozumah and Juhari, Rumaya and Kahar, Rojanah (2002) Tingkah laku keibubapaan dan penyesuaian tingkah laku anak dalam keluarga berisiko di luar bandar. *Pertanika Journal of Social Sciences & Humanities*, 10 (2). pp. 165-178. ISSN 0128-7702; ESSN: 2231-8534.

Cahron Wardini Mokhzani. 2016. Poverty and Household Income. *Roundtable Conference: Issues and Challenges of Zakat Institutions in Malaysia*. Organized by the International Institute of Islamic Higher Education (IAIS) Malaysia and Lembaga Zakat Selangor (LZS). Khazanah Research Institute. http://www.iais.org.my/e/attach/2016/03NOV2016_zakat_RTD/s1s2.pdf

Christensen, R., Knezek, G., & Tyler-Wood, T. (2014). Student perceptions of Science, Technology, Engineering, and Mathematics (STEM) content and careers. *Computers in Human Behavior*, *34*, 173-186. https://www.researchgate.net/profile/Tandra_Tyler-Wood/publication/260367834

Creswell, J. W. (2012). Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research. *Educational Research* (Vol. 4). http://doi.org/10.1017/CBO9781107415324.004

Degenhart, H. S. (2010). *Relationship of inquiry-based learning elements on changes in middle school students' science, technology, engineering, and mathematics (stem) beliefs and interests*. (Doctoral dissertation, Texas A & M University). https://oaktrust.library.tamu.edu/bitstream/handle/1969.1/ETD-TAMU-1225/DEGENHART-DISSERTATION.pdf?sequence=1&isAllowed=y

Erdamar, G., & Demirel, H. (2014). Investigation of Work-family, Family-work Conflict of the Teachers. Procedia - Social and Behavioral Sciences. https://doi.org/10.1016/j.sbspro.2014.01.1050

Guala, F., & Mittone, L. (2005). Experiments in economics: External validity and the robustness of phenomena. Journal of Economic Methodology, 12(4), 495-515. DOI: 10.1080/13501780500342906

Ganesan Kamoo. (2013), *Pengaruh keluarga terhadap pencapaian akademik murid India di sekolah Menegah Rendah*. Ph.D thesis, University of Malaya. https://studentsrepo.um.edu.my

Halle, T. G., Kurtz-Costes, B., & Mahoney, J. L. (1997). Family influences on school achievement in low-income, African American children. *Journal of Educational Psychology*, 89(3), 527. DOI:10.1037/0022-0663.89.3.527

Hascoët, M., Giaconi, V., & Jamain, L. (2021). Family socioeconomic status and parental expectations affect mathematics achievement in a national sample of Chilean students. *International Journal of Behavioral Development*, 45(2), 122-132. https://doi.org/10.1177%2F0165025420965731

Institut Hal Ehwal Ekonomi dan Demokrasi Malaysia (IDEAS). (2017). *Laporan Keciciran Pelajar*. Kuala Lumpur. Percetakan Nasional Berhad (PNB).

Hak Ju Kim. (2004). Family resources and children academic performance. *Children and Youth Services Review*, Vol 26 (6), 529-536. https://doi.org/10.1016/j.childyouth.2004.02.008

Jabatan Perangkaan Malaysia. (2016). *Laporan penyiasatan pendapatan isi rumah dan kemudahan asas mengikut negeri dan daerah pentadbiran*. Putrajaya: Jabatan Perangkaan Malaysia. https://www.dosm.gov.my/v1

Kamarudin, N. (2010) Pengurusan peralatan amali dalam pengajaran amali fizik. *In: Seminar Kebangsaan Majlis Dekan Pendidikan IPTA 2012, 7-9 Okt. 2012, The Zon Regency by the Sea, Johor Bahru,* (pp.1-6). http://psasir.upm.edu.my/id/eprint/39562

Kutch, M. (2011). *Integrating Science and Mathematics Instruction in a Middle School STEM Course: The Impact on Attitudes, Career Aspirations and Academic Achievement in Science and Mathematics*. Wilmington University (Delaware). http://www.search.proquest.com

Laporan Kebangsaan Laporan Kebangsaan TIMSS 2019 - Trends in International Mathematics and Science Study. 2020. Bahagian Perancangan dan Penyelidikan Dasar Pendidikan Kementerian Pendidikan Malaysia. https://www.moe.gov.my/muat-turun/penerbitan-dan-jurnal/rujukan-akademik/3918-buku-laporan-timss-2019/file

Linacre. JM. (1994). Sample size and item calibration stability. *Rasch Measurement Transactions*. http://www.rasch.org/rmt/rmt74m.htm

Mohamad Sattar Rasul, Lilia Halim, Zanaton Ikhsan, Edy Hafizan Mohd Shahili, Raifana Rosa. Impact Studies of Integrated STEM Program. *International Journal of Technical Research and Applications*. Issue 35.

Nasirun, N., Muhamad Noor, S., Yusoff, R. Z., & Othman, A. A. (2016). Isu kesahan dalaman terhadap kaedah penyelidikan kuasi eksperimen di dalam pendidikan keusahawanan. *ASEAN Entrepreneurship Journal (AEJ)*. 2(2), 90-97. ISSN 2289-2125.

Navarro, R. L., Flores, L. Y., & Worthington, R. L. (2007). Mexican American middle school students' goal intentions in mathematics and science: A test of social cognitive career theory.

*Journal of Counseling Psychology*, *54*(3), 320–335. https://doi.org/10.1037/0022-0167.54.3.320

Stewart, E. B. (2008). School Structural Characteristics, Students' Effort, Peer Associations, and Parental Environment: The Influence of School and Individual Level Factors on Academic Achievement. *Education and Urban City*, Vol 40 (2), 179-204. ISSN-0013-1245.

Tiwery, W. Y. (2021). Role of Family for Children's Education During a Pandemic in Eastern Indonesia. Turkish Journal of Computer and Mathematics Education (TURCOMAT), 12(7), 1522-1527.

Unit Perancangan Ekonomi. (2009). Teras Tiga: Menangani Ketidaksamaan Sosioekonomi yang Berterusan Secara Membina dan Produktif. Kajian Separuh Penggal Rancangan Malaysia Ke-9 (2006-2010). Jabatan Perdana Menteri. http://www.epu.gov.my.html

Zakari, N. A., Majid, M. Z. A., & Hussin, M. (2022). Keciciran Murid Sekolah di Malaysia: Suatu Pemerhatian Awal. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *7*(2), https://doi.org/10.47405/mjssh.v7i2.1288

# Examining the Oral Native Language Tests as Alternative Accommodation in Assessing Orang Asli Students' True Mathematics Performance.

Nurliyana Bukhari*[a], S. Kanageswari a/p Suppiah Shanmugam[b]
Arsaythamby a/l Veloo[c], Yus'aiman Jusoh@Yusoff [d],
Mohd. Isha Awang[e],
[abcde]School of Education, Universiti Utara Malaysia,
UUM Sintok, Malaysia
*Corresponding Author: nurliyana@uum.edu.my

## Abstract

Irrelevant linguistic complexity in Mathematics word-problem test questions may cause additional cognitive load, confusion, and distractions, hence becoming a source of threat to the validity of an assessment. This is especially of concern when it hinders the performance of disadvantaged subgroups such as the Orang Asli students in Malaysia. To address this issue, we conducted a comparative study to examine the effects of Semai and Temiar audio tests, which are the oral Orang Asli native language Math tests of respective ethnic groups, on the Math scores of 226 eight- to nine-year-old Semai and Temiar ethnic of Orang Asli children in four Orang Asli primary schools in Malaysia. On average, the Math scores of the Semai and Temiar ethnic group students who answered the audio tests were significantly higher than their peers who answered the Math test in the written the Malay Language (Bahasa Melayu (BM)) test form. In this paper, we present empirical evidence about the effects of the alternative test accommodation for the non-native Bahasa Melayu speaker and provide the postulation of inference about non-native speakers' content-based test performance based on linguistically complex test questions. Previous research findings combined with the preliminary findings from our studies have enlightened us on the profound impact that irrelevant linguistic complexity in Math test items may have on content-based assessments. For students to take a valid and fair assessment, teachers in Orang Asli-populated schools who serve as item writers and developers must provide equitable accommodation that makes the questions comprehensible to many students, particularly the minority Orang Asli students from various ethnic groups. Schools and district administrators must provide the necessary tools for the test administration using such audio-based tests to be conducted effectively. Students with limited Bahasa Melayu proficiency and other students with similar language needs should not be penalized for their lack of national language proficiency in subjects where the target of assessment is not language.
*Keywords:* test accommodation, linguistic complexity, construct irrelevant factor, Mathematics, indigenous people, Orang Asli.

## Introduction

Indigenous peoples characterize the larger part of the world's cultural diversity and have originated and spoken the world's almost 7000 languages (UNESCO, 2022). In Malaysia, indigenous people, commonly known as Orang Asli (OA) consists of eighteen sub-ethnic groups which are subsumed under three major ethnic groups: Senoi, Malay Proto, and Negrito (JAKOA, 2022). Such diversity welcomes rich representation in many aspects of OA's culture and background yet questions the nation's readiness in accommodating its unique needs and reducing inequalities, particularly in education (see also Sustainable Development Goals 4 and 10). It is reported that more than ten per cent of OA children have dropped out of school due to various factors such as

incognizant parents, logistics and health problems as well as unpleasant attitude towards education (MalayMail, October 2022; Murtaza et al., 2019). Difficulties in going to school and lack of hostel facilities have caused serious disengagement issues among the children. The OA students, particularly during the early years of schooling, certainly deserve equal access to education and fair assessment, alongside their mainstream peers. The allocation in the Malaysia Budget 2022 (Ministry of Finance Malaysia, 2022) to transform indigenous education is an effort to ensure that the OA communities master literacy and numeracy and develops positive attitude towards education.

Mathematics plays a vital role especially in the modern society. Mathematical knowledge provides underpinning of the understanding of the contents of other knowledge and school subjects. The use of appropriate language and forms of communication is proven crucial for students to develop mathematical knowledge in the classroom (Gorgorio & Planas, 2002; Niesche, 2009). The influence of language is not only significant during the teaching and learning of mathematics (Suppiah Shanmugam et al., 2022), but also while assessing students. For solving the questions, students need to read and comprehend the math test question, before applying the correct mathematical concept and procedural knowledge required for its successful solution. Hence, one major concern is the extent of the language load within the mathematics items that could significantly affect the students' reading ability, in addition to student's ability to comprehend the item content. For young OA learners, they need to also master the national language used in the math tests which could be challenging and confusing during their early school year experiences.

**Linguistic Complexity as a Construct-Irrelevant Factor**

The Assessments Peer Review Guidance (US Department of Education, 2009) required "strong correlations of test and item scores with relevant measures of academic achievement and weak correlation with irrelevant characteristics, such as demographics" (p. 42). This requirement coincides with the professional guidelines stated by the *Standards* (American Educational Research Association (AERA), American Psychological Association (APA), & National Council on Measurement in Education (NCME), 2014) and the International Test Commission (ITC, 2013a, 2013b). The outcomes of assessment are often confounded with nuisance variables that are not related to the construct being measured. These extraneous variables come from many different sources. The variability of assessment outcomes due to these contaminants is referred to as construct-irrelevant variance (CIV).

Researchers have investigated the relationship between specific types of linguistic features of items that contribute to linguistic complexity non-central/irrelevant to the construct of interests. The impact of such language factor has resulted in increased test difficulty for students from different grade levels in math (e.g., Abedi & Lord, 2001; Martiniello, 2009; Sato et al., 2010), science (Abedi et al., 2005; Abedi et al., 2000; Wolf & Leon, 2009), and various content areas (Abedi, Leon, & Mirocha, 2003; Bukhari, 2017).

**Test Accommodations in Math Test**

Math test items can be linguistically modified to provide accommodation by decreasing the complexity of the language used without modifying the construct being assessed. The content task and content terminology are retained but the language is simplified to make the items more accessible to students, particularly the non-native speaker subgroups (Abedi & Lord, 2001; Martiniello, 2009; Sato et al., 2010; Shaftel et al., 2006)—these studies are primarily on the English Language Learners (ELL) whose first language is not English in the United States (US).

Sato and collaborators (2010) examined the linguistic complexity of math items and compared the performance of seventh- and eighth grade students across levels of English proficiency (ranging from not proficient to proficient English-language users). Specifically, they were interested on the effect of linguistic modification on students' performance on two sets of math items (original

and linguistically modified) across three subgroups of students: ELL students, non-ELL students who were not ELA-proficient students, and non-ELL students who were ELA-proficient. Their findings indicated a consistent trend of better performance on math content test items across all groups with lower linguistic complexity than items with higher linguistic complexity. This difference was most striking for ELL students, compared with students who were no longer considered ELL but were not yet fully proficient in ELA or students who were fully English proficient. Reduction in linguistic complexity appears to give a specific benefit to students who are not yet proficient in English but has no impact on those who are fully proficient.

Martiniello (2009) compared the grade four math performance for both ELL and non-ELL students. The math test assesses five major learning strands: (1) number sense and operations; (2) patterns, relations, and algebra; (3) geometry; (4) measurement; and (5) data analysis, statistics, and probabilities. It consists of a mixture of selected response (similar to the multiple-choice) and constructed response (similar to open ended) math word problem items of varying linguistic complexity, pictorial support, and schematic support. According to Martiniello, [p]ictorial [supports] include concrete images (Presmeg, 1986), sometimes called mental pictures (Andersen, as cited in Johnson, 1987), which depict details of objects described in the math problem (Hegarty & Kozhevnikov, 1999). Schematic [supports] are more abstract than pictorial images. They are more abstract than pictorial images. They are meaning structures representing several elements of parts (i.e., objects, people, events) and their pattern of connections and relationships (i.e., causal, part-whole, temporal sequence relationships) (Johnson, 1987). (p. 166).

The findings supported Martiniello's (2009) hypothesis in which she proposed that items with greater grammatical and lexical complexity were more difficult for ELL students compared to their non-ELL peers. However, her findings also revealed that the inclusion of items which provide nonlinguistic schematic support helped the ELL students to make meaning of the text and thus mitigated the negative effect of increased linguistic complexity in math word items.

Abedi and Lord (2001), using a large-scale math test in the US compared ten original items from the test with items for which, similar to Sato et al. (2010), the content task and terminology were retained but the language was simplified. Their findings revealed small but significant improvements in the scores of 1,031 out of 1,174 grade eight students in low- and average- level math classes using the linguistically modified test items. Among the linguistic features that contributed to the discrepancies were passive voice verb and low-frequency vocabulary. Data from reading aloud interview identified a student who changed the difficult-to-process passive voice form (would be expected) into its active verb form (would you expect to find) which was more familiar to that student.

The use of test accommodations in content-based tests such as math and science in the literature has been focusing on linguistic modification; pictorial supports; schematic representation but rarely in native language oral test. As much research presented on how non-native speakers, the ELL, primarily in the US (e.g., Abedi & Lord, 2001; Martiniello, 2009; Sato et al., 2010) struggled with language complexity and the effort to overcome such barrier with various test accommodations, a study on examining an appropriate means of accommodation for OA students, whose first language is not the Malay Language (BM) is timely and much needed. This study hence aims to examine the use of oral native language tests as an alternative test accommodation in assessing OA math performance.

**Underlying Testing Frameworks and Guidelines**

In this study, the underlying theories (see Figure 1) are based on the works of Kunnan (2004, 2008) and the international testing guidelines by the Educational Testing Standards (ETS) (ETS, 2022). Kunnan (2004) proposed a Test Fairness Framework (TFF) that expands the customary concept of test review to include validity, access, administration, absence of bias, and social consequences. "While this framework provides a micro framework to analyze a test in terms of test fairness, it does

not consider the wider context in which the test is operating" (Kunnan, 2008, p.229), resulting in his additional proposal for an expansion of the TFF. The new framework is a complementary macro framework called the Test Context Framework (TCF) (Kunnan, 2008), intended to analyze the wider context where a test functions. Additional testing guidelines for international users, as delineated in the ETS Guidelines for Developing Fair Test and Communications (ETS, 2022), provides extensive advisory suggestions to remove construct irrelevant knowledge, skills, and abilities, as well as construct irrelevant barriers related to emotions and physical conditions. Kunnan's frameworks, the micro and the macro (2004, 2008); together with the ETS Guidelines (ETS, 2022), offer a comprehensive model for sound testing practices for OA test takers.

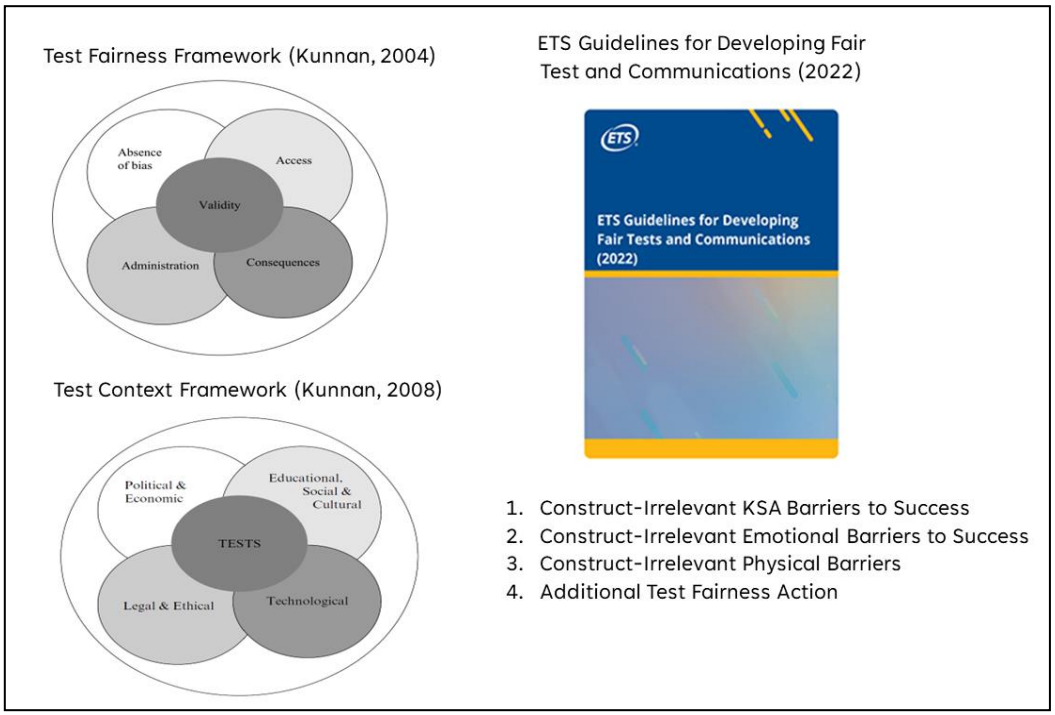



*Figure 1*. Testing Frameworks and Guidelines Useful for Orang Asli (OA) Test Takers.

Essentially, the validity of the OA primary school math test relies on to what extent the content and the construct represent the math syllabus, the Standard-based Math Curriculum and Assessment Documents (DSKP) stipulated by the Ministry of Education Malaysia, as well as the true content being realistically covered in the OA lower primary classroom due to different timelines and challenges faced for completion of topics. As OA's young learners struggle in reading proficiency and as their familiarity with the Malay Language is limited, irrelevant linguistic complexity in math word-problem questions may cause additional cognitive load, confusion, and distractions, hence becoming potential barriers to success and source of bias. These will posit challenges in achieving the government's policies to reduce the achievement gaps and mitigate disengagement. Using an appropriate test accommodation during test administration does not only ensure better access and comprehension but warrants the needs to a more culturally responsive and ethical testing practices.

## Methodology

Upon identifying four schools in three different states, Kelantan, Perak, and Pahang, with OA as dominant population, the researchers approached several teachers in the respective schools for a series of enculturation interviews. The teachers have been teaching mathematics in two of the OA schools, and therefore were able to provide rich information on the teaching strategies in the OA

mathematics classrooms.

After the interviews with the teachers, the researchers created the table of specification based on the Year 2 math DSKP and sampled relevant word problem items that were deemed appropriate to measure the math ability of the OA students. The item development for the written math test in the Malay Language (BM) was conducted with a series of improvement made to ensure the items are age- and culturally relevant for the OA students. Upon completion, we shared the items with the same teachers we initially interviewed who now served as the expert reviews to ensure the readability and comprehensibility of the items.

As the researchers took their comments and feedback into considerations, we noticed that many of the initially prepared items needed to be realistically removed from the test form. Some items were revised to ensure the characters and objects used in the test are familiar names and objects for the OA community. Translation processes were the most challenging part as we need to ensure that each of the words translated by Temiar and Semai speaking math teachers into respective languages could be understood. This is especially important for the Temiar test as the test takers were sampled from two different Temiar-speaking OA schools in two different states.

In this pilot test, we involved 226 eight- to nine-year-old Semai and Temiar ethnic of OA children in four OA primary schools in Malaysia. The BM written test (*N*=109) was taken by Temiar students in a school in Perak and Semai students in a school in Pahang. The Temiar oral test was taken by Temiar-speaking students in two different schools in Perak and Kelantan (N=81), while 36 Semai-speaking students in a school in Pahang sat for the Semai oral test. Table 1 summarises the descriptive information of the test takers for each test forms.

Table 1
*Descriptive Statistics of Orang Asli Test Takers based on Three Test Forms*

| Test Form | Ethnic Group & Location | School | *N* | Mean | *SD* | Std. Error | 95% Confidence Interval for Mean | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower Bound | Upper Bound |
| BM written test | Temiar in Perak & Semai in Pahang | School 1 & School 4 | 109 | 9.500 | 4.246 | 0.407 | 8.700 | 10.310 |
| Temiar oral test | Temiar in Perak & Kelantan | School 2 & School 3 | 81 | 11.010 | 3.352 | 0.372 | 10.270 | 11.750 |
| Semai oral test | Semai in Pahang | School 4 | 36 | 13.140 | 3.735 | 0.623 | 11.880 | 14.400 |
| | Total | | 226 | 10.620 | 4.061 | 0.270 | 10.090 | 11.160 |

We ensure that important ANOVA assumptions are met prior to proceed with the analysis. The data is independent in which that there is no relationship between the observations in each group or between the groups themselves. Additionally, the test of homogeneity of variances in Table 2 is not statistically significant ($p$ = 0.172). This indicates that we do not have sufficient evidence to say that the variance (i.e., the distribution, or "spread," of test scores around the mean) in OA students' test scores between the three test forms is significantly different, hence we have met the assumption of homogeneity of variance to proceed with one-way ANOVA.

Table2
*Test of Homogeneity of Variances*

| Levene Statistic | *df*1 | *df*2 | *p* |
|---|---|---|---|
| 1.775 | 2 | 223 | 0.172 |

## Findings

A one-way between subjects ANOVA was conducted to compare the effect of different test forms/accommodations on Year 2 OA's Math test scores in BM written test, Temiar oral test, and Semai oral test forms/accommodations. There was a significant effect of test accommodation on OA's Math scores at the $p < .05$ level for the three conditions [$F$ (2, 223) = 12.589, $p < .05$]. On average, the Math scores of the Semai and Temiar ethnic group students who answered the audio tests were significantly higher than their peers who answered the Math test in the written Malay Language test form ($p < .05$). Table 3 provdes the result of ANOVA.

Table 3
*Summary Table for One-Way ANOVA on the Mean of Total Scores*

| | Sum of Squares | *df* | Mean Square | *F* | *p* |
|---|---|---|---|---|---|
| Between Groups | 376.490 | 2 | 188.245 | 12.589 | 0.000 |
| Within Groups | 3334.541 | 223 | 14.953 | | |
| Total | 3711.031 | 225 | | | |

Post hoc comparisons using the Tukey HSD test in Table 4 indicated that there is a statistically significant difference in math test scores between the OA students that took the BM written test and the Temiar oral test ($p = 0.023$), as well as between the BM written test takers and the Semai oral test takers ($p < 0.05$). Similarly, there were also significant difference between OA children that took the Semai oral test and the Temiar oral test ($p < 0.05$). Such a difference between the Semai and Temiar tests is also due to the different nature and academic standing between the two schools, although this is not the main focus of this paper. Essentially, we would like to highlight the significant improvement of the OA children's test scores when they were given fair chance to answer the math test in their respective native languages as compared to the traditional test form in the form of written Malay Language (BM).

Table 4
*Post-Hoc Test (Tukey HSD)*

| (I) Booklet | (J) Booklet | Mean Difference (I-J) | Std. Error | *p* | 95% Confidence Interval |
|---|---|---|---|---|---|
| | | | | | Lower Bound |
| BM written test | Temiar oral test | -1.508* | 0.567 | 0.023 | -2.85 |
| | Semai oral test | -3.634* | 0.743 | 0.000 | -5.39 |
| Temiar oral test | BM written test | 1.508* | 0.567 | 0.023 | 0.17 |
| | Semai oral test | -2.127* | 0.775 | 0.018 | -3.95 |
| Semai oral test | BM written test | 3.634* | 0.743 | 0.000 | 1.88 |
| | Temiar oral test | 2.127* | 0.775 | 0.018 | 0.3 |

* The mean difference is significant at .05 level.

## Conclusion

Our study is based on the preliminary findings of our test accommodation research for the OA lower primary student's population across Malaysia. We understand the need to have more OA students from specific ethnic groups for better representation and generalization purpose. Soon, we hope to extend this testing practice to more OA schools with similar cultural background and learning experiences.

While much effort is needed to attract the OA students to come to school (cf. Bukhari & Muktar, in press.), similar endeavor must take place to ensure the assessment that they take will not be taken for granted by loosely sampling the items commonly used to measure the math knowledge and performance of their Malay Language native speaking peers. The next generation assessment should question more on how assessment helps instructions, boosts student success, and provides equal opportunities for various subgroups of students' population. When there is apparent evidence of discrepancy in learning opportunities and language proficiency to succeed in the test, an alternative must be offered to strive for fairness (e.g., AERA et al., 2014; ETS, 2022; ITC, 2013a, 2013b; Kunnan, 2004) especially for the disadvantaged OA children.

With growing attention given to classroom-based assessment, teachers' role is more crucial than ever to tailor treatment to learning and assessment. Teachers in Orang Asli-populated schools who serve as item writers and developers for their students must provide equitable accommodation that makes the questions comprehensible to many. Schools and district administrators play equal role in providing the necessary tools for the test administration using such audio-based tests to be conducted effectively. Accurate and fair assessment—with relevant aid that is closely aligned with the curriculum—and personalized educational program (Bukhari, 2021) and progress for OA young learners will certainly benefit the children and the OA community. Designing an alternative accommodation for a content-based math test for the OA children will help us inform better and culturally responsive instruction, signal when a student needs additional attention in a particular area, prepare enrichment activity, and differentiate instruction as deemed necessary.

Students with limited Malay Language proficiency and other students with similar language needs should not be penalized for their lack of national language proficiency in subjects where the target of assessment is not language. There is a need for a contextualized test fairness framework specifically cater to the needs and benefits of our Malaysia's diverse indigenous groups that will trigger better learning and assessment opportunities as well as decisions.

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## References

Abedi, J., Courtney, M., Mirocha, J., Leon, S., & Goldberg, J. (2005). Language accommodations for English language learners in large-scale assessments: Bilingual dictionaries and linguistic modification (CSE Tech. Report. No. 666). Los Angeles: University of California, National Center for Research on Evaluation, Standards, and Student Testing (CRESST).

Abedi, J., Courtney, M., & Goldberg, J. (2000). Language modification of reading, science, and mathematics test items. Los Angeles: University of California, National Center for Research on Evaluation, Standards, and Student Testing.

Abedi, J., & Lord, C. (2001). The language factor in mathematics tests. Applied Measurement in Education, 14(3), 219–234.

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). Standards for educational and psychological testing. Washington, DC: American Psychological Association.

Bukhari, N. (2021). Twenty-first century program evaluation: A comparative analysis of three frameworks-based approaches. The International Journal of Assessment and Evaluation, 28(1), 51-66. https://doi.org/10.18848/2327-7920/CGP/v28i01/51-66.

Bukhari, N. (2017). An examination of the impact of residuals and residual covariance structures on scores for next generation, mixed-format, online assessments with the existence of potential irrelevant dimensions under various calibration strategies [Unpublished doctoral dissertation]. The University of North Carolina at Greensboro (UNCG).

Bukhari, N., & Muktar, M. (in press). Disciplinary problems in a secondary school in Northern Malaysia: Factors and the roles of counseling teachers. AIP Conference Proceedings for the ICAMAT 2021, Malaysia.

Educational Testing Standards (ETS). (2022). ETS guidelines for fair tests and communications. Retrieved from https://www.ets.org/about/fairness/review-publications.html

Gorgorio, N. & Planas, N. (2002). Teaching mathematics in multilingual classrooms. *Educational Studies in Mathematics*, 47, 7-33.

International Test Commission (2013a). International Guidelines for Test Use. Retrieved from https://www.intestcom.org/files/guideline_test_use.pdf

International Test Commission (2013b). ITC Guidelines for Quality Control in Scoring, Test Analysis, and Reporting of Test Scores. Retrieved from https://www.intestcom.org/files/guideline_quality_control.pdf

JAKOA. (2022). Ethnic distribution of indigenous people by ethnicity/sub-ethnicity by state [*Taburan etnik orang asli mengikut etnik/sub etnik mengikut negeri*]. Retrieved from https://www.jakoa.gov.my/orang-asli/taburan-etnik-orang-asli-mengikut-etnik-sub-etnik-mengikut-negeri/

Johnson, M. (1987). The body in the mind: The bodily basis of meaning, imagination, and reason. Chicago: University of Chicago Press

Kunnan, A. J. (2004). Test fairness, in Milanovic, M and Weir, C J (Eds) European Language Testing in a Global Context, Cambridge: UCLES/Cambridge University Press, 27–48.

Kunnan, A. J. (2008). Towards a model of test evaluation: Using the test fairness and the test context frameworks, in in Milanovic, M and Weir, C J (Eds) Multilingualism and assessment: Achieving transparency, assuring quality, sustaining diversity, Cambridge: UCLES/Cambridge University Press, 229–254.

MalayMail. (October 2022). Over 10pc of Orang Asli children drop out of school, says Mahdzir. https://www.malaymail.com/news/malaysia/2022/10/03/over-10pc-of-orang-asli-children-drop-out-of-school-says-mahdzir/31414

Martiniello, M. (2009). Linguistic complexity, schematic representations, and differentialitem functioning for English language learners in math tests. Educational Assessment, 14(3-4), 160-179.

Ministry of Finance Malaysia. (2022). 2022 Budget. Transformation of native and indigenous peoples education [*Transformasi pendidikan orang asli dan peribumi*]. Retrieved from https://budget.mof.gov.my/manfaat/faq/kedap.html

Murtaza, S. F., Gan, W. Y., Sulaiman, N., Mohd. Shariff, Z., & Ismail, S. I. F. (2019) Sociodemographic, nutritional, and environmental factors are associated with cognitive performance among Orang Asli children in Malaysia. PLoSONE, 14(7). https://doi.org/10.1371/journal.pone.0219841

Niesche, R. (2009). The use of home language in the mathematics classroom. In R. Hunter, B. Bicknell, & T. Burgess (Eds.), Crossing divides: Proceedings of the 32nd annual conference of the Mathematics Education Research Group of Australasia (Vol. 1). Palmerston North, NZ: MERGA. Available from https://www.researchgate.net/publication/44215829_The_use_of_home_language_in_the_mathematics_classroom [accessed Oct 03 2022].

Sato, E., Rabinowitz, S., Gallagher, C., & Huang, C.-W. (2010). Accommodations for English Language Learner students: The effect of linguistic modification of math test item sets. Washington, DC: National Center for Education Evaluation and Regional Assistance. Retrieved from U.S. Department of Education website: http://ies.ed.gov/ncee/edlabs/regions/west/pdf/REL_20094079.pdf

Suppiah Shanmugam, S. K., Jusoh & Yusoff, Y., Veloo, A., Md Ali, R., & Awang-Hashim, R. (2022). Primary school education of Orang Asli students: Challenges and achievements. [Pendidikan sekolah rendah murid Orang Asli: Cabaran dan pencapaian]. UUM Press.

Sato, E., Rabinowitz, S., Gallagher, C., & Huang, C.-W. (2010). Accommodations for English Language Learner students: The effect of linguistic modification of math test item sets. Washington, DC: National Center for Education Evaluation and Regional Assistance. Retrieved from U.S. Department of Education website: http://ies.ed.gov/ncee/edlabs/regions/west/pdf/REL_20094079.pdf

Shaftel, J., Belton-Kocher, E., Glasnapp, D. & Poggio, J. (2006). The impact of language characteristics in mathematics test items on the performance of test items of English language learners and students with disabilities. *Educational Assessment*, 11(2), 105-126.

UNESCO. (2022). Indigenous people. Retrieved from https://en.unesco.org/indigenous- peoples

Wolf, M., & Leon, S. (2009). An investigation of the language demands in content assessments for English language learners. *Educational Assessment*, 14, 139- 159.

# Students' Reflection on the Effectiveness of DEDICT Method to Enhance Digital Skills in the 'Hands-On' Digital Multimedia Classroom

Subashini Annamalai*[a], Harryizman Harun[b]
[ab] School of Multimedia Technology and Communication, Universiti Utara Malaysia, Sintok, Kedah
*Corresponding Author: subashini@uum.edu.my

## Abstract

The purpose of this paper is to report the reflection of the effectiveness of DEDICT method in a 'hands-on' Computer Graphic and Animation course on improving the student's digital skills in the online classroom. During the COVID-19 pandemic era, all classes was converted to online learning. The classes include both lecture and 'hands-on' sessions. However, teaching practical courses in many programs such as medical, engineering, computer science, and multimedia online without application or practical work pose an evident obstacle to online learning for universities and institutions. This has posed an urgent question for the research; what is the students' reflection on the effectiveness of a teaching method called DEDICT for a 'hands-on' digital multimedia course during the COVID-19 era? In achieving the main research question, the research employed an action research design to implement the teaching method call DEDICT (Demo, Explain, Demo again, Imitate, Call to action, and Task). The students' reflection on the effectiveness of the DEDICT method in the 'hands-on' digital classroom was collected using a 13-item questionnaire which was created and validated before the intervention. The process of teaching and learning was carried out for a duration of 8 weeks involving 32 respondents. The findings from the research suggested that the adoption of the DEDICT method as an aid to engage students and also to overcome the limitations of online learning that involves 'hands-on' practices has been effective.

*Keywords:* DEDICT, hands-on, Multimedia, digital classroom, reflection.

## Introduction

The technology-enabled teaching and learning offer more opportunities for a personalized learning experience to all students. Recently, the impact of Covid-19 on the practical skills of the students of science and social science in universities and higher education was studied (Elhaty, Elhadary, ElElgamil & Kilic, 2020). Most of the educational institutions have taken the steps necessary to transform their teaching, including laboratory workshops into an online or blended mode of delivery. Irrespective of the measures taken, universities must continue to maintain their high academic standards and provide a high-quality student experience as required for the delivery of learning outcomes associated with each degree programme (Gamage, Wijesuriya, Ekanayake, et al., 2020) This has created a challenge across the higher education landscape, where academics had to switch to remote teaching and different approaches to achieving laboratory delivery. As a result, students have not been receiving face-to-face teaching, and access to laboratory facilities has been limited or nearly impossible (Gamage et al., 2020). Many researches has been done regarding this issue and the results showed that the majority of the teachers and students were afraid of missing the practical skills during the crisis because these skills could not be compensated by online learning techniques. However, they preferred live teaching and recording of the practical courses. Teaching 'hands-on' skills online requires very different approaches to teaching face-to-face for obvious reasons (Hurlbut, 2018).

## Background of the study

The teaching and learning of Computer Graphic and Animation (CGA) course is a difficult task. The content of this course revolves around the theories and 'hands-on' practices of graphics, two dimensions (2D), and three dimensions (3D). The students need to apply modelling and animation techniques such as aid motion specification, sweeping, and extrusion from concept to digital production. Tools like camera, lighting, and surface editor are used for the development of 2D and 3D graphic and animation. For a novice student majoring from Entrepreneurship, International Business, Marketing, Communication and Decision Science background, who has no extensive knowledge in the design and development of graphic and animation, the content of this course can be viewed as overwhelming, complicated and it has too much of details to digest. This is an intricate task, that is perceived as hard and rigid by the undergraduates both from Multimedia and other field. Although the content of the subject can be explained using various strategies by the facilitators in the face-to face classroom, it is unknown that they cannot understand the content in the online-based teaching and learning process. Initially, for this course, the students need to attend two hour lectures and two hours of 'hands-on (practical) sessions at the computer lab.

However, during the Covid-19 era, opted online learning was regarded as the best alternative to continue the learning process (Selvanathan, Hussin, & Azazi, 2020). Online learning is an effective alternative learning method for both of students and lecturers, however, there are some issues when it comes to 'hands-on' classes such as medicine, dentistry, engineering, computer science and multimedia (Eze, Chinedu-Eze, Okike, et al., 2020). It required consideration, such as the limited accessibility to the internet. And this becomes even worse as some of the students who do not have the access to the internet or has limited access to the internet due to the inadequate of infrastructure make the online learning process harder for the students (Eze, Chinedu-Eze, Okike, et al., 2020), especially in more rural and isolated areas in Malaysia. Besides the limited accessibility to the internet, the students also experience difficulty in communicating with their lecturers, interaction with their friends, and laboratory access, which affected their studies (Selvanathan, Hussin, & Azazi, 2020).

Nevertheless, 'hands-on' or practical courses such as CGA have significant importance in linking theory with practice and this linking consolidates students' cognitive and digital skills. Through practical and lab classes, students can get 'hands-on' experience related to the 2D and 3D animation more than they did in the lecture hall. But teaching practical courses of multimedia via online without application or practical work created greater challenges for universities and institutions (Elhaty, Elhadary, Elgamil & Kilic, 2020). This transformation from face-to-face classes to home-setting scenarios during the pandemic era and technological challenges affect both the students and the academic staff negatively (Rose, 2020). For example, many of the academic staff working in applied and practical colleges didn't experience teaching 'hands-on' courses in online mode before (Elhaty, Elhadary, Elgamil & Kilic, 2020). Hence, this increased their worries and fears towards the new virtual environment and maintaining a reasonable degree of students' engagement (Zayapragassarazan, 2020). There still remains one urgent question how the student will gain practical experiences in this critical time? And the solutions resorted to moving many practical sessions online, creating virtual cases, engaging the students with teleconference environments (Elhaty, Elhadary, Elgamil & Kilic, 2020). Although, the online simulation can enhance theoretical concepts, but it will not provide the students with the real experiences (Rose, 2020). Therefore, the teaching method should be improvised to cater to the issue of 'hands-on' practices (O˙zadowicz, 2020). Experts suggest that the facilitator could adopt DEDICT (Demo, Explain, Demo again, Imitate, Call to action and Task) method. When teaching learners, a new skill either in person or online, the DEDICT Method is a great step-by-step principle to follow to make your course engaging and impactful (Cordiner, 2017).

## Proposed Solution – DEDICT Method

The DEDICT (Demo, Explain, Demo again, Imitate, Call to action and Task) method is adopted from the initial EDICT (Explain, Demo again, Imitate, Call to action and Task) framework for teaching. EDICT is a framework that was used to teach skills in the face-to-face demonstration of watersports (MarineResources, n.d.). However, the researchers intended to use the same framework to the betterment of online demonstration for CGA classes. This method was used for teaching a new skill to a newbie as it is a step-by-step guide that will make the learning experience impactful and commendable (Kanada, 2017).

The DEDICT method (as shown in Figure 1) suggests that the lecturer or facilitator: -

D: DEMONSTRATE the task at normal speed: This helps the learners get a clear idea of what it is they are trying to achieve; how does the result and outcome look like and ultimately 'what they are going to learn how to do'.

E: EXPLAIN step by step: Now they have seen the skills performed in real time, now break it down into steps, explaining everything each step.

D: DEMONSTRATE again but this time slowly

I: IMITATE – get the viewers to have a go. Encourage them to follow along, do an activity, share their results.

C: COACH – give feedback, further advice, give scenarios where this would apply, or different scenarios where there may be an alternative way of executing the skill

T: TEST them – give them a practical challenge, quiz, assessment or activity.

(Cordiner, 2017)


*Figure 1.* DEDICT teaching method (Source: https://accellier.edu.au/how-to-train-and-coach-skills/)

## Research Questions

This research will be an attempt to answer the following questions:

1. What is the reflection of the students on the effectiveness of the DEDICT method to teach a 'hands-on' digital course?

The research questions will be answered by employing quantitative method to the students' reflection in terms of their transfer of learning and their feedback of using DEDICT method for each leading sessions are collected using a questionnaire that was created by the researchers and validated by three experts.

## Methodology

This research employed an action research design which involves a four-step process made up of identifying of an area of study, taking action, collecting data, analyzing data, and reflecting.

The first process was to identify the area of the research. This research was conducted at the School of Multimedia Technology and Communication, College of Arts and Sciences, Universiti Utara Malaysia. The sample for this research are thirty-two (32) undergraduate students who enrolled in the STIV2023 Computer Graphics and Animation course in A211 (2021/2022) semester.

The second step requires the researchers to take action. For this process, the researchers have implemented the teaching and learning process which was based on the DEDICT method. This

implementation was carried out for the duration of 8 weeks, and involves steps such as demonstrating, explaining, re-demonstrating, letting the students imitate the actions, give feedback to the students and finally test them to see they understand the lesson.

The third and fourth process was to collect data and analyze it. In order to do this, the researchers have used a 13-item with 5 Likert-scale questionnaire to measure the students' reflection on the effectiveness of the DEDICT method in the 'hands-on' digital classroom. The questionnaire was created by the researchers, validated by three experts and revised accordingly prior to the intervention. The data was analyzed quantitatively using statistical analysis.

And the final process involves reflecting. The reflection from the students are analyzed and discussed in the finding section.

## Findings

This section reports the students' reflection summary.

### Students' reflection

A 13 items questionnaire was created to get the feedback from the respondents. This questionnaire was validated prior to its employment in the investigation process. The questionnaire has 5 Likert scales, namely 1-strongly disagree; 2-disagree; 3-neutral; 4-agree; and 5-strongly agree. The scales reflect the students' opinion on the DEDICT method and its effectiveness on the 'hands-on' learning process.

This research involves 32 respondents from various degree background. Table 1 describes the demographical analysis of the respondents. The data analysis shows that there are 13 male respondents and 19 female respondents. 28 of them are from the Multimedia programme while 2 of them from Muamalat Administration, and one each from International Business and Business Administration. 26 of them was in Semester 4, 5 of them was in Semester 6 and one respondent was from Semester 8.

Table 1
*Respondents' Demographic Analysis*

| Construct | Details | No. of respondents | Percentage |
|---|---|---|---|
| Gender | Male | 13 | 40.6 |
| | Female | 19 | 59.4 |
| Programme | BSc. Multimedia | 28 | 87.5 |
| | BMA | 2 | 6.3 |
| | BIBM | 1 | 3.1 |
| | BBA | 1 | 3.1 |
| Semester | 4 | 26 | 81.3 |
| | 6 | 5 | 1.6 |
| | 8 | 1 | 3.1 |

Table 2 describes the descriptive statistical analysis of the respondent's perspective on the effectiveness of the DEDICT method to teach 'hands-on' digital course.

Table 2
*Students' reflection on the effectiveness of the DEDICT method to teach 'hands-on' digital course*

| Item | Strongly Disagree * | Disagree * | Neutral* | Agree* | Strongly Agree* | Mean |
|---|---|---|---|---|---|---|
| The DEDICT method helped me reflect on ways to learn how to do modeling. | - | - | - | 2 | 30 | 4.94 |
| The DEDICT method helped me by teaching me steps to create my 3d animations. | - | - | - | 1 | 31 | 4.97 |
| The DEDICT method provided me with resources (materials, and strategies) that I could use in the future. | - | - | - | 5 | 27 | 4.84 |
| The delivery method using a computer and the method of combining it with demonstrations is much helpful than traditional 'hands-on' classroom. | - | - | - | 1 | 31 | 4.97 |
| The DEDICT method had a positive effect, leading to better understanding of what is the outcome and what is expected from the students. | - | - | 3 | 8 | 21 | 4.56 |
| This demonstration method has increased my interest to learn modelling and animation. | - | - | - | 2 | 30 | 4.94 |
| This DEDICT teaching method makes me feel more comfortable of creating the output. | - | - | - | 2 | 30 | 4.94 |
| I have no serious difficulties when I used this method to create my animations. | - | - | 2 | 1 | 29 | 4.84 |
| My anxiety level increased because I cannot create the same outcome as the demonstration.** | 24 | 8 | - | - | - | 1.25 |
| This method brings a positive effect regarding my motivation leading to more satisfaction in studying this course. | - | - | - | 3 | 29 | 4.91 |
| I understand the steps of creating animations better when I learn using this | - | - | - | 2 | 30 | 4.94 |

| | | | | | | |
|---|---|---|---|---|---|---|
| method. | | | | | | |
| I do not like this teaching method.** | 30 | 2 | - | - | - | 1.06 |
| I prefer YouTube tutorials compared to this teaching method.** | 23 | 7 | 2 | - | - | 1.34 |

* number of respondents ** negative statement

The findings show that positive items (1,2,3,4,5,6,7,8, and10) scored mean values of more than 4.50 indicating that they strongly agree that demonstration of 'hand-on' lesson using DEDICT method are able to helped them to learn the step-by- step technique to create animation. In addition, the DEDICT method also provided the students with resources (materials, and strategies) that I could use in the future. The delivery method using a computer and the DEDICT method of demonstrations is much helpful for them than traditional 'hands-on' classroom. Not only that, the students agree that the DEDICT method had a positive effect, leading to better understanding of what is the outcome and what is expected from them. By using the DEDICT method, the students' interest to learn modelling and animation has also been increased and makes them feel more comfortable of creating the output.

The findings also indicated that students have no serious difficulties when they used this method to create their animation activities as they understand the steps of creating animations better when they learn using this method. Overall, this method brings a positive effect regarding the students' motivation leading to more satisfaction in studying this course.

As for the negative items (9, 11 and 10), the findings indicated that the mean scores are lesser than 1.50. This means that the students disagree that the DEDICT method increases their anxiety level and expectation to create the exact output. Not only that, the students disagree to the 'dislike this teaching method' statement proving that they like the DEDICT method. Although, there might be recording of 'how to' YouTube videos, the student scored lower that 1.50 denoting that they prefer this teaching method compared to YouTube videos.

Based on the students' responses in this questionnaire, it can be concluded that the DEDICT method is effective to teach 'hands-on' digital course. It has affected them very positively, brought the animation subject closer to their hearts, made the practical easier, increased the extent of interest, and elevated the students' level of motivation and satisfaction.

## Discussion

Not many research has been done using the DEDICT method in the field of education as it is a fishing training framework. The researchers have attempted to use this framework in a different context which is in the teaching and learning process to investigate the outcome. Therefore, it is very difficult for the researchers to related the findings with past studies. However, from the students' feedback, it can be concluded that the DEDICT method prompted good attention and focus in the classroom. By using this method in the 'hands-on' classes, the lecturer is allowing to take a break from the lecture and providing a point of distinction. Each step process of modeling and animating in the CGA course are being shown via the DEDICT method and this boosts up a good understanding of that process at the end of each lecture and this give the students a chance to focus more in classroom.

In this DEDICT method, the process of demonstrating the 'hands-on' less teaching was done via Online. For this CGA course, it was conducted via WebEx during the A211 semester. The proses of the DEDICT method is described as follows:-

- D: DEMONSTRATE the task at normal speed: This helps the learners get a clear idea of what it is they are trying to achieve; what the end result and outcome looks like and ultimately

'what they are going to learn how to do'.

- E: EXPLAIN step by step: The learners have seen the skills performed in real time in previous stage, and in this stage, the lecturer or facilitator will break it down into steps, explaining everything each step.
- D: DEMONSTRATE again but this time slowly. The lecturer or facilitator will demonstrate again in a slower pace.
- I: IMITATE. The lecturer or facilitator will encourage them to follow along, do an activity, share their results.
- C: COACH. The lecturer or facilitator will give feedback, further advice, give scenarios where this would apply, or different scenarios where there may be an alternative way of executing the skill
- T: TEST the learners. The lecturer or facilitator will give them a practical challenge, quiz, assessment or activity to evaluate the learning process.

The DEDICT teaching approach has proved valid in this research, effective and beneficial in the teaching of CGA courses with a significant improvement in the learning scores and satisfaction levels of the students even with respect to pre-COVID-19 where the teaching was face-to-face.

## Conclusion

The findings from this research are expected to open up new means for UUM lecturers in particularly those who will be teaching skill-based digital courses such as Graphic and Computer Animation, Game Development, Virtual Reality and such, to adopt the DEDICT method to improve students' digital skills and to enhance their involvement in the classroom. This method is expected to be an aid to engage students and also to overcome the limitations of online learning that involves 'hands-on' practices. Hence, the outcome of this study could also be successfully adapted into different classroom setting or disciplines.

The findings and reflections of this research is also expected to be a guideline of DEDICT approach that can be used for future implementation in digital online courses and other 'hands-on' related courses in UUM. By highlighting the potential of DEDICT method as a strategy to enhance digital classrooms' learning experience, it may answer to several pedagogical principles and learner modality especially in the and emergency or pandemic situation. Therefore, it will be a useful instructional aide to teach technically 'hand-on' subject such as Graphic and Computer Animation and raise standards of teaching achievement more effectively.

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## References

Cordiner, S. (2017). 4 Ways to Increase Practical Participation in Online Learning.

Elhadary, T., Elhaty, I.A., Mohamed, A.A., & Alawna, M. (2020) Evaluation of Academic Performance of Science and Social Science students in Turkish Universities during COVID-19 Crisis. *Journal of Critical Reviews, 7* (11), 1740-1751.

Elhaty, I. A., Elhadary, T., Elgamil, R., & Kilic, H. (2020). Teaching University Practical Courses Online during COVID-19 Crisis: A Challenge for ELearning. *Journal of Critical Reviews, 7*(8), 2865-2873.

Eze, S.C., Chinedu-Eze, V.C.A., Okike, C.K., & Adenika, O.B. (2020). Factors influencing the use of e-learning facilities by students in a private Higher Education Institution (HEI) in a developing economy. *Humanities and Social Science Communication, 7*(133), 1-15.

Gamage, K.A.A.,Wijesuriya, D.I., Ekanayake, S.Y., Rennie, A.E.W., Lambert, C.G., Gunawardhana, N. (2020). Online Delivery of Teaching and Laboratory Practices: Continuity of University Programmes during COVID-19 Pandemic. *Education Science, 10*, 291 -296. https://doi.org/10.3390/educsci10100291

Hurlbut, A.R. (2018). Online vs. Traditional Learning in Teacher Education: A Comparison of Student Progress. *American Journal of Distance Education, 32*(4), 248-266.

Kanada, P. (2017). DEDICT Method for Imparting Mobile App Development Training. Retrieved from https://ceoworld.biz/2017/10/09/dedict-method-for-imparting-mobile-app-development-training/

MarineResources (n.d). E.D.I.C.T.S. - A framework for teaching... Retrieved from https://www.instructortoolkit.co.uk/instructing-skills/teaching-techniques/

O˙zadowicz, A. (2020). Modified Blended Learning in Engineering Higher Education during the COVID-19 Lockdown—Building Automation Courses Case Study. *Education Science*, 1-20.

Selvanathan, M., Hussin, N. A. M., & Azazi, N. A. N. (2020). Students learning experiences during COVID-19: Work from home period in Malaysian Higher Learning Institutions. *Teaching Public Administration*, 1-10.

Zayapragassarazan, Z. (2020). COVID-19: Strategies for Engaging Remote Learners in Medical Education. Education, *F1000 Research, 9* (273), 1-18.

# Continued Use Intention of Distance Learning for Higher Education International Students Staying in Home Country

Huang Weixuan*[a], Intan Soliha Binti Ibrahim[b]
[ab]Faculty of Social Sciences and Humanities, Universiti Malaysia Sabah
88400 Kota Kinabalu, Sabah, Malaysia
*Corresponding Author: sffong@ums.edu.my

## Abstract

During COVID-19, most educational institutions see distance learning as the best option for educational sustainability. Research related to distance learning has sprung up. As a short-lived alternative to face-to-face learning, distance learning shows transient solid prosperity. However, as an inevitable stage in the development of digital technologies in education, little is known about the nuances of distance learning being incorporated into everyday learning. The research points to a group that has not yet received widespread attention, who stay in their own countries to pursue undergraduate, graduate, and doctoral through distance learning. The research aims to identify international students' using perceptions of distance learning about staying in their home country and its continued use intent. Another research objective was to identify differences among different groups of international students (Undergraduate, Postgraduate, PhD) regarding perceptions and continued use intent. In exploratory research, qualitative research is a "frequent visitor" seen as a reasonable way of interpreting research objectives in depth. With the help of snowball sampling, the study obtained 12 respondents with a high willingness to participate. The respondents are 12 Chinese citizens currently staying in china and studying in Malaysia's private, public, and national universities through distance learning (4 undergraduate students, 4 graduate students, and 4 PhD students). Data was collected through semi-structured interviews in video, voice, and telephone calls. The result showed that PhD group is more concerned about the multi-dimensional benefits of staying on their using distance learning, such as course quality, job opportunities, educational opportunities, family responsibilities, co-worker relationships, educational costs, language, culture shock, and time management. They have a very high demand for continuous use. Therefore Undergraduate students will be less affected by the cancellation of distance learning. Distance learning provides educational opportunities for graduate students and PhDs.

*Keywords:* COVID-19, Distance Learning, Educational Opportunities, Pressure

## Introduction

One of the significant changes in education since the birth of COVID-19 is the global rise of the wave of online education, and digital technology has played an active role between educators and education recipients, consolidating the closeness of technology and education integration (Qazi et al., 2020; Hamdan et al., 2021; Paudel, 2021). COVID-19 is a new type of coronavirus with contagious characteristics, and Wuhan, China was the first region to be infected on a large scale (Wu et al., 2020). COVID-19 swept China with an assertive attitude and gave a painful blow to other countries that despised the virus (Zhang et al., 2020). Among the initial preventive measures, reducing or avoiding contact is the consensus policy of most countries, which has stimulated the need for distance work and contactless distance learning (Manca & Delfino, 2021; Mullen, 2021).

Distance learning is a digital form that removes the shackles of the distance between teachers and students (Guilar & Loring, 2008). Distance learning has characteristics of time synchronisation

and time asynchrony, as a credible source of information transmission, are more firmly rooted in specific groups of people than the traditional face-to-face teaching model (Clark & Mayer, 2011). Distance learning is not limited to a particular learning mode and is often associated with lifting "distance" restrictions (Al-Arimi, 2014). Conrad (2006) described it as a complementary account of multiple learning styles, e.g., online, e-learning, technology, mediated, collaborative, virtual, web-based, etc.

Instead of traditional teaching methods, distance education is gradually becoming the mainstream social phenomenon in a specific period, and the well-being of digital technologies extends to the global education field (Paudel, 2020; Adarkwah, 2020; Kim, 2020). 1.6 billion students from more than 150 countries in the world have been affected to varying degrees by COVID-19, and various forms of distance education have been forced to become the only choice for most educational institutions and educators as an emergency measure (The World Bank, 2022). In the past, various information and communications technology (ICT) related to online education was regarded as effective aids, especially in transferring information and resources between students and teachers (Parsons, 2020). Regrettably, few researchers view online education as a formal means of teaching (Jaggars, 2014). Today, distance learning is vital in formal and informal education (Peters & Romero, 2019; McRoy et al., 2020; Chen et al., 2021). A sudden educational paradigm shift has produced mixed outcomes for unprepared students and teachers, and the spotlight created by the rise of distance learning has exposed the research gaps in the approach.

**Related Work**

Former studies have assessed psycho-social behavioral intentions of individual learners, Meyer (2001) analysis on desire to learn, Carr (1999) takes resourcefulness into account, and Ponton (1999) researches on initiative and Derrick (2005) focus on persistence in learning. They draw their conclusion that these are the factors that may contribute to the likelihood an individual will successfully complete a distance learning option.

Sloan's online learning consortium has customised five key performance indicators (KPIs) for online learning: student satisfaction, access, learning effectiveness, faculty satisfaction, scale and cost (Bourne, 2005). These indicators provide a screening basis for identifying valuable research gaps. In a review of the recent literature, some new distance learning problems were found as follows:

Existing research on distance education focuses on the multi-dimensional perception of students and teachers in the staged use process (during COVID-19), Such as satisfaction (El Refae et al., 2021), use intention (Babić et al., 2020), user behaviour (Ploj Virtic et al., 2021), use benefit (Mkwizu & Ngaruko, 2020), use disorder (Dendir & Maxwell, 2020; Balderas & Caballero-Hernández, 2020; Tiong & Lee, 2021), use anxiety (Unger & Meiran, 2020), self-efficacy (Kundu, 2020), less focus the investigation of continuous use intention. Whether students want to continue using distance learning, especially after the impact of COVID-19 on in-person learning is over.

Educational participants gradually return to traditional face-to-face courses as humanity's overall prevention tools improve and pandemic awareness increases (Sawchuk, 2020; Yiu, 2022; Staff, 2022). The wave of reflection on short-term, high-frequency, and worldwide distance education has not ended. Some studies have shown that distance learning and blended learning (including distance learning) are indispensable now and in the future, students have a more significant interest in adopting distance learning (Hebebci et al., 2020; Fidalgo et al., 2020).

Undergraduate students are the leading group examined in distance learning research during COVID-19, with middle and high school distance learning supplemented in limited studies (Kundu et al., 2020; Vogels et al., 2020; Zheng et al., 2021). People pay more attention to specific majors (Saw et al., 2020; Vielma & Brey, 2021) and their visible gender differences (Saw et al., 2020; Chandra, 2020) rather than students at different levels and special groups, such as undergraduate

international students, master's international students and international doctoral students who stay in their home country. COVID-19 has kept them in their own country for distance education (Liu & Shirley, 2021).

As an indispensable component of higher education, undergraduate, master's, and doctoral students show different levels of ability and needs (Catalano, 2013; Feldman et al., 2013). Many doctoral and master's students have established families and have temporary or long-term jobs to support living expenses (Samardzic, 2019). They are disadvantaged among students, playing more roles simultaneously, and do not have enough time and energy to focus on their studies (Levecque et al., 2017). In contrast, undergraduate students feel less burdened by family and work. Distance education in the home country may mean less stress for PhD students, such as less financial burden, more family role-playing (caring for a spouse, caring for elders, caring for children), and more working hours and job opportunities. A plausible hypothesis for continued growth in intention to use distance learning points to the needs of the international student population, and the lesser focus of existing research on this area makes it a long-term research gap, even more, pronounced during COVID-19.

**Research Objectives**

Previous research has identified various distance education outcomes as critical measures of psychological and behaviour use of educational participants during COVID-19. This study aims to understand the continuing use intentions and influencing factors of distance learning among international students in different higher education groups (Undergraduate, Postgraduate, PhD).

Whether international students wish to stay in their home country using distance learning for study opportunities is key to this study. Providing data support for continuously developing distance learning programs that meet specific groups will be beneficial. The research objectives are as follows:

i) Identify the perceptions of higher education international students using distance learning in their home country.

ii) Identify the continued use intent of higher education international students using distance learning in their home country.

iii) Identify differences among different groups of international students (Undergraduate, Postgraduate, PhD) regarding perceptions and continued use intent.

**Relevant Theories**

**Reciprocal determinism.** Albert Bandura believes that personal factors, the environment, and behaviour affect each other; it shows a pattern of cross-influence and deepening of the three (Bandura, 1978). Kundu (2020) confirmed a positive effect of self-efficacy on student behaviour in a study of distance learning adoption, and self-efficacy improved students' distance learning use behaviour by enhancing students' perceptions of technological competence. Lim et al. (2016) and Kuo et al. (2014) agreed that self-efficacy changes the communication climate and knowledge-sharing level in distance classrooms. Lederman (2022) reported that the international students' distance learning duration has been extended again due to ongoing fears of COVID-19. The cross-influence of personal factors, environment and behaviour, was reconfirmed.

**The unified theory of acceptance and use of technology (utaut).** Nistor et al. (2013) adopted the Unified Theory of Acceptance and Use of Technology" (UTAUT) in their research on intercultural learning education, affirming the suitability of UTAUT in the field of transnational education. AL-Adwan et al. (2018) examined The effectiveness of mobile technology as another option to get rid of face-to-face teaching depending on the typical result of social influence, effort expectancy, performance expectancy, and system functionality.

**Expectation confirmation model 期望证实模型(ECM).** The Expectation Confirmation Model (ECM) proposed by Bhattacherjee (2001) is commonly used by researchers to explain users'

continuous intention to use an innovation based upon users' pre and post-adoption perceptions. ECM has been employed to investigate the continuous use intention of people in various technological contexts, including e-learning (Rabaa'i et al., 2021) and digital textbooks (Joo et al., 2017). The ECM has been applied in several e-learning studies to evaluate users' continued intention toward e-learning systems or tools. For example, investigation of the continuous intention of students to use e-books (Baker-Eveleth & Stone, 2015; Joo et al., 2017) and online library resources (Joo & Choi, 2016). Cheng (2014) integrated ECM with external variables such as instructor quality, information quality, quality of the system and support services to study the intention of nurses to adopt blend e-learning in Taiwan. Besides that, continuous intention to use MOOCs is also investigated by extended ECM with perceived reputation and perceived openness (Alraimi et al., 2015), social influence, performance proficiency and knowledge outcomes (Zhou, 2017).

## Methodology

Given the exploratory nature of this study, a qualitative study in the form of in-depth interviews was used. Qualitative studies are more comprehensive in interpreting specific research objectives, often encompassing confirmed or guessed conclusions and individual results beyond the researcher's cognizance (Carminati, 2018). These results are often undiscovered by historical research. It is beneficial for capturing the essence of a phenomenon in a field that has not yet been fully identified (Teddlie & Tashakkori, 2009). China, as the world's largest source of international students (Statista, 2018), and the country with the highest growth in education consumption (12.5%) (educationfair.nl, 2021), has attracted the attention of this study. As one of the countries in Southeast Asia that attaches great importance to education, Malaysia is regarded as the only host country.

### Sample, Procedure, and Data Collection

Non-probability sampling, based on Snowball Sampling, is a way to select a specific group of respondents with a high willingness to participate and was used in selecting respondents for this study. This approach allows initial participants to capture new participants for the study through referrals (Bell et al., 2018). Most participants voluntarily became respondents, reducing the influence of less-intentioned groups on respondents' selection process and data saturation (Streeton et al., 2004). In exploratory studies rather than hypothesis-testing studies, Snowball Sampling reduces access to specific groups of respondents (Ehlers et al., 2001).

Social media software widely used in China is an online way to obtain initial respondents, such as the WeChat group and QQ group of Chinese students in Malaysia. Qualitative research has no specific criteria for data saturation (Hagaman & Wutich, 2017). Francis et al. (2010) believe that more significant than ten interviews are ideal. Guest et al. (2006) proposed a saturation interval for qualitative research data, 10-20 interviews. The study collected the complete data of 12 Chinese respondents with different educational backgrounds, including 4 undergraduates, 4 graduate students and 4 PhD students, all of whom were students in private universities, public universities and national universities in Malaysia.

Data collection is in the form of semi-structured interviews based on the rules of voice communication and video communication provided by WeChat and QQ. When video or voice communication is unstable and the connection is unstable, telephone communication is used to ensure the integrity of the access data. The choice of voice and video communication depends on the respondents' wishes. When the respondents do not meet specific communication requirements, voice communication is prioritized. There have been no significant differences in data collection between telephone and face-to-face interviews (Sturges & Hanrahan, 2004). telephone interviews outperform face-to-face interviews in terms of cost savings, time cost savings, and geographic accessibility (Musselwhite et al., 2007; Ang, 2014). Voice communication reduces the risk of interviewees'

appearance, privacy protection and anonymity (Greenfield et al., 2000). During COVID-19, interviews by voice communication express respect and health protection for respondents.

**Data Analysis**

The data analysis rules provided by Christou et al. (2018) were applied in this study. First of all, the whole process of the interview is conducted in Chinese, and the interviewee can express their thoughts, transmit information and ask questions without barriers. The voice translation adopts the back translation method (PacMan100, 2018). After the voice content is translated into English, it is translated back to Chinese by other qualified scholars. The original content must be free from errors after translation to ensure translation errors. File scripts are sorted after multiple reads. Walls et al. (2011) define this behaviour as an increase in the perception of file content. Respondents and related content are marked as U1, U2, U3, U3 for undergraduates, M1, M2, M3, M4 for graduate students, and P1, P2, P3, P4 for PhD students. Strauss and Corbin (1998) The provided coding procedures for subject identification and categorisation were used to classify the data for this study. The data results are presented by Christou et al. (2018). The demographic information of respondents is shown in Table 1.

Table 1
*Percentage Distribution*

| Profile Factors | Particulars | f | % |
|---|---|---|---|
| Sex | Male | 4 | 33.33 |
| | Female | 8 | 66.67 |
| Civil status | Single | 9 | 75.00 |
| | Married | 3 | 25.00 |
| Age | 18- 22years | 4 | 33.33 |
| | 23-26 years | 5 | 41.67 |
| | 26-35 years | 3 | 25.00 |
| Education level | Undergraduate | 4 | 33.33 |
| | Master student | 4 | 33.33 |
| | PhD student | 4 | 33.33 |

## Literature Review

**Distance Learning**

Online learning and e-learning are the primary forms and names of distance learning (Conrad, 2006). E-learning refers to learning that delivers information or knowledge to learners through an internet connection by a digital device such as a desktop, laptop or mobile device (Masrom et al., 2008). Online learning refers to technology for people to obtain knowledge or skills through internet accessibility for acknowledging learning materials and interacting with instructors, other learners and content (Ally, 2008). The online course is one of e-learning, which refers to the learning system with the help of electronic resources, such as computing devices and the internet, and carried outside the classroom (Aboagye et al., 2020). Maatuk et al. (2022) stated online course is a teaching system which employs various types of ICT (Information and Communication Technology) and electronic devices. Online learning is seen as a learning experience using technology and is distinguished from traditional teaching by its dependence on the technological medium and environment (Lowenthal et

al., 2009). Benson (2002) pointed out that online learning is an improved version of distance learning.

**Perceived Performance**

It offers students the opportunity to choose a comfortable learning environment without the constraints of the classroom (Turban et al., 2015; Tetteh, 2016). Asynchronous e-learning cancels the high dependence of traditional education on time, and students can obtain learning content at any point within a specified time interval. Synchronous e-learning realises the visualisation and real-time of traditional face-to-face courses (Clark & Mayer, 2011). Compared with the traditional face-to-face teaching mode, the relevant content of remote digital teaching is easy to store, and the screen recording software realises the transformation from real-time information to storable information (Bobley & Sebel, 2016). Some studies point to the excellent performance of digital technology compared to traditional education, e.g., educational cost (Isaac et al., 2019), educational performance (Allen & Seaman, 2014; Bell & Federman, 2013), time flexibility (Suzianti & Paramadini, 2021), location flexibility (Li et al., 2021), convenience (Isaac et al., 2019), dropout rates (Garrison, 2016), and educational opportunities (Bell & Federman, 2013), Educational Sustainability (Serhan, 2019).

**Existing Defects**

Areas with poor Internet-related infrastructure cannot achieve distance integral education coverage, and students not having receivers is another hindrance (Morgan, 2022). The prerequisites for distance learning are a good network setup and a computer or portable mobile device as a vehicle for receiving information and critical barriers for poor areas and households (Vogels et al., 2020). Distance education is boring and robs students of the social component of learning (Winthrop, 2020; Vielma & Brey, 2021). In distance education participation, students often play the role of listeners, focusing on videos and presentations (Winthrop, 2020). Qualitative research by Hebebci et al. (2020) found that asynchronous distance learning lacks a question-and-answer session, students' understanding of the teaching content is incomplete, and students show less concentration than traditional learning. Distance education requires educational institutions to provide a stable and resourceful learning management system (LMS) to ensure that students acquire knowledge and information equal to or better than face-to-face education (Ryan et al., 2012). Systems should conform to the principles of perceived usability and perceived ease of use to match student and teacher competencies and self-efficacy (Kundu, 2020).

Exam-taking and plagiarism-based cheating often occur in distance education due to insufficient remote supervision capabilities (Dendir & Maxwell, 2020; Balderas & Caballero-Hernández, 2020; Tiong & Lee, 2021). Another noteworthy phenomenon points to the study of Dendir and Maxwell (2020), where college students score significantly higher in online courses than in online proctoring. The study confirms that cheating occurs not only during exams but also during students studying in distance courses. Distance learning exacerbates the negative impact on student's mental health. Unger and Meiran (2020) stated that there is a big difference between online and face-to-face learning, and the sudden change in learning style has prompted students to have anxiety related to distance learning.

**Group Differences in Higher Education**

Student-centred teaching methods are ideal for postgraduate students with literature retrieval skills, who typically rely less on the classroom (Barraket, 2005; Watts, 2008). Online courses played an essential role in student-centred teaching methods, providing students with an effective way to obtain resources anytime and anywhere (Bailey & Lee, 2020). Differences in the learning performance of distance learning during COVID-19 for undergraduate, master's and doctoral

students in higher education have not been established. Saw et al. (2020) processed 4,603 undergraduate and graduate data in STEM fields in the United States and found that 7.6% of undergraduate students delayed their graduation. The delay ratios of graduate and doctoral students were as high as 18% and 35.5%. Thompson and McDowell (2019) showed that there was no significant difference in undergraduate education outcomes between traditional face-to-face teaching and distance education. However, some of the findings point to large grade fluctuations for a small number of undergraduate students, with fraud and laziness as plausible explanations for the growth and decline of unsupervised student grades, which are frequently seen in the deficits of distance education (Dendir & Maxwell, 2020; Balderas & Caballero-Hernández, 2020; Tiong & Lee, 2021). Teachers and students are willing to adopt distance learning as an alternative to face-to-face teaching, provided that distance learning does not significantly hinder knowledge transfer (Saeed Al-Maroof et al., 2020).

**Continuing Intention to Use Distance Learning**

Saeed Al-Maroof et al. (2020) identified several factors influencing distance learning in an empirical study of students' and teachers' continued use of distance learning, Technical Pedagogical Content Knowledge (TPACK), perceived ease of use (PEOU), perceived usefulness (PU), perceived technology self-efficacy (TSE), perceived organisational support (POS), Controlled Motivation (CTRLM). Perceived ease of use (PEOU), perceived usefulness (PU), perceived technology self-efficacy (TSE), perceived organisational support (POS) as a routine, high frequency in the interpretation of technology use and technology use intentions (Zhang et al., 2008; Alqurashi, 2016; Lazim et al., 2021). The perceived usefulness (PU) is related to the content of the Perceived performance chapter: educational cost (Isaac et al., 2019), educational performance (Allen & Seaman, 2014; Bell & Federman, 2013), time flexibility (Suzianti & Paramadini, 2021), location flexibility (Li et al., 2021), convenience (Isaac et al., 2019), dropout rates (Garrison, 2016), and educational opportunities (Bell & Federman, 2013), Technological content knowledge (TCK), pedagogical content knowledge (PCK), and technological pedagogical knowledge (TPK) are the three main components of TPACK, which point to the ability of teachers in distance learning (Schmidt et al., 2009). Doctoral students have less demand for distance courses. It may lead to a lower impact on teacher competency for distance learning for such students. CTRLM includes situational, contextual and global factors, usually describing internal (self-enhancement, obligation, avoidance of guilt) and external factors (avoidance of punishment, compliance with rules) that influence behavioural motivation (Ryan & Deci, 2000). In addition, UTAUT emphasises social influence and enabling conditions in its research on technology use behaviour and intentions (Gunasinghe et al., 2019; Abbad, 2021).

## Findings

**Themes of the Study**

The research results point to 7 main aspects, technology (earning management system (LMS) provided by schools, Internet facilities in the location of Chinese students, digital equipment support for Chinese students' families), competency (students' perception of teachers' abilities, students' perception of personal ability), economic (student job opportunities, student education cost, student disposable income), education (educational opportunity, learning performance, grades, language), social (family relationship, friends relationship, business-client relationship, colleague relationship, teacher-student relationship, classmate relationship), culture (culture shock, cultural attraction), personal (self-discipline, discipline, loneliness, interests, time management, project management). The themes information of findings is shown in Table 2.

Table 2
*Percentage Distribution*

| Factors | Sub-factors | Description | f |
|---|---|---|---|
| Technology | Earning management system (LMS) | Positive opinions | 10 |
| | Local internet facilities | Positive opinions | 12 |
| | Home digital equipment support | Positive opinions | 12 |
| Competency | Perception of teachers' abilities | Disagreement | - |
| (Technology use) | Perception of personal ability | Positive opinions | 10 |
| Economic | Student job opportunities | Disagreement | - |
| | Student education cost | Positive opinions | 12 |
| | Student disposable income | Disagreement | - |
| Education | Educational opportunity | Disagreement | - |
| | Learning performance | Positive opinions Disagreement | 11 |
| | Grades | Positive opinions | - |
| | Language | | 11 |
| Social | Family relationship | Disagreement | - |
| | Friends' relationship | Positive opinions | 9 |
| | Business client relationship | Disagreement | - |
| | Colleague relationship | Disagreement | - |
| | Teacher-student relationship | Disagreement | - |
| | Classmate relationship | Disagreement | - |
| Culture | Culture shock | Disagreement | - |
| | Cultural attraction | Disagreement | - |
| Personal | Self-discipline | Disagreement | - |
| | Discipline | Disagreement | - |
| | Loneliness | Disagreement | - |
| | Interests | Disagreement | - |
| | Time management | Disagreement | - |
| | Project management | Negative opinions | 11 |

*Disagreement means differences between undergraduate, graduate, and doctoral groups*

**Technology.** All respondents indicated having digital equipment and a good network setup as a recipient of remote courses. U2 and U4 were the few respondents who objected to LMS. Other respondents indicated that the LMS can meet distance learning needs and that no LMS-related learning disabilities exist. U2 and U4 share the same view; U2 believes:

*"I don't always have success accessing the distance learning website, especially during the critical course selection time."*

**Competency.** Students generally recognised their ability to use a computer or portable receiving device. In China, Generation Y and Generation Z have high digital literacy (Katz et al., 2021). P1 said:

*"I am a teacher in a Chinese university, and I use the digital teaching platform Chinese schools provide to handle student-related or job-related work almost daily."*

Regarding teacher ability perception, U1, U2, U3, U4, M1, M3, and P2 believed that teachers could skillfully use distance teaching equipment. M2, M4, P1, P3, and P4 believe teachers' mastery of digital devices is limited to video or voice functions. M3 mentioned.

*"In the initial use of distance learning, my teacher could not switch between voice and video. He complained that online classes were not as good as face-to-face teaching and often lost contact with us at some point in the course. This phenomenon gradually improved in the following months."*

In terms of perception of teachers' ability to use technology, undergraduate students have higher trust in teachers than other groups.

**Economic**. The study found that Chinese undergraduate and graduate students do not consider job opportunities. P1, P2, and P3 have teacher status in different educational institutions in China, and distance learning ensures continuous work opportunities. P3 indicated:

*"The cost of studying abroad is the loss of my current job, and distance learning has allowed me to retain my teaching position. In addition, Malaysia's ban on international students working will make me completely unemployed."*

All students recognised the excellent cost savings of distance education, including but not limited to housing, meals, shopping, socialising, and the more significant expense of airfare. Another significant difference is reflected in the changes in the disposable income of different students. The disposable income of M2, M4, P1, P2, P3, and P4 is related to job opportunities and is in a state of growth. The disposable income of U1, U2, U3, U4, M1, and M3 is related to the money from their parents; they get less money when staying home. U2 gave a specific explanation:

*"I don't know what job I can do to grow my wealth; my parents provide everything I need to live, except money. I hope to carry out face-to-face teaching, and going abroad will give me more reasons to obtain financial support."*

**Education**. Distance learning was widely cited as a significant factor in their choice to continue their studies by PhD and postgraduate students, most of whom enrolled for the first time in the wake of COVID-19. Currently, these respondents have not been to Malaysia. M2, M4, P1, P2, P3, and P4 expect distance learning to continue until they have completed their entire learning tasks. M4 means:

*"COVID-19 didn't bring me any bad results. Instead, I'm about to have a master's degree, which COVID-19 has bestowed upon me, and I'm very grateful for the opportunity to get an education. Of course, I beg for distance learning not to be interrupted until I have completed my studies."*

The students' unanimous point of view was that their performance in distance learning was ideal, and they repeatedly mentioned the lower English proficiency requirements of asynchronous learning. PhD students face almost the same troubles as undergraduates and care more about what they hear. In China, less than 1% (111) people are proficient in English. M2 describes:

*"For most of the time I was receiving synchronous distance learning, I couldn't understand what the teacher was talking about. I believe this performance will be worse in face-to-face classes. But the translation tool helped me find confidence in the learning materials provided by the teachers,*

*and distance learning allowed me more preparation in course comprehension."*

Significant cognitive disparities emerged between undergraduate and research in terms of educational outcomes. U1, U2, U3, and U4 perceive a significant performance improvement. This seems to corroborate the lower ability of distance learning to control student cheating (Dendir & Maxwell, 2020). U4 states:

*"In the past, my GPA was only 2.3 or lower. After distance learning started, my GPA stabilised above 3.0. In distance learning, teachers have given greater tolerance to grades. Also, with the start of distance learning courses, many closed tests became available, and we could translate content and choose from many forms of help."*

However, P2 and P4 felt that in distance learning, they contacted their tutors less frequently, and it often took longer to get a response, and the learning outcomes were not significant.

**Social**. One of the reasons the PhD group endorses distance learning is to have more time with family and colleagues. This statement confirms that PhD takes on more family and social responsibilities (Levecque et al., 2017). M2s, M4s and P4s, who work in various jobs, said they would not lose contact with business partners during distance learning. U1, U2, and U3 identified distance learning as one of the factors in the breakdown of their relationship with their families. U1 means:

*"I couldn't appreciate the joy of remote learning; my parents were always monitoring my behaviour, comparing me to other kids, expressing disgust with me. I have difficulty putting up with them, I desperately want to leave home, and I look forward to the early arrival of face-to-face classes."*

Compared with undergraduate students, graduate and PhD students expressed difficulty establishing a close relationship with teachers in distance courses. M1 mentions:

*"I am afraid to message my teacher too often for fear that he will be bored or disgusted by my actions. I haven't met my teacher, and we don't know each other. I look forward to developing a deep friendship with him that will allow me to stop worrying about things outside my studies as a stumbling block to my degree."*

A common difficulty encountered by undergraduate students (U1, U2, U3, U4) is a conflict with classmates. U2 means:

*"Different from Chinese education, the tasks assigned by teachers in Malaysia require the collaboration of multiple people. I don't know if this kind of collaboration makes sense in terms of facilitating learning. But I know that people from other countries don't like to cooperate with us, and the cooperation between Chinese students is not pleasant. People's different views on homework lead to frequent long-term or short-term quarrels."*

**Culture.** U1, U4, M1, M2, M3, M4, P1, P2, P3, and P4 explored the Malaysian culture and environment before becoming Malaysian students. Malaysia's food culture and tropical weather are the main factors for U1, U4, M2, P2, P3, and P4 recognition of distance education. As a U4 who has visited Malaysia said:

*"I like the enthusiasm of Malaysians very much, but I don't like Malaysia's heat and high-calorie food. I'm worried about going back there and getting fat or getting thinner, and getting thinner is because I reject most food categories; some foods are delicious, but not everyone is just concerned*

*with the texture of the food."*

U2, U3, M1, M3, and P1 are eager to visit Malaysia and get in touch with beautiful scenery, rich food, and festival culture. They can accept the disappearance of distance learning. U2 and U3 are looking forward to distance learning being replaced by face-to-face learning and looking forward to integrating into the Malaysian environment.

**Personal.** U1, U2, U3, U4, M1, M2, and M3 indicated that they adopted varying degrees of laziness during times when distance learning was not strictly regulated, such as doing other things in non-video synchronous learning. P1, P2, P3, and P4 have only a few courses and cherish the opportunity to communicate with teachers. U1, U2, U3, U4, M2, and M3 believe that distance learning is uninteresting. M2, M4, P1, P2, P3 and P4 pay attention to the advantages of asynchronous distance learning in time management, and various work, study and life will not cause time conflicts. All respondents faced more things outside of study during distance learning at home that hindered their acceptance of the learning experience.

## Discussion

This study confirms that the PhD group is more concerned about the multi-dimensional benefits of staying on their using distance learning, such as course quality, job opportunities, educational opportunities, family responsibilities, co-worker relationships, educational costs, language, culture shock, and time management. Doctoral groups often have clear learning goals, that is, to improve their academic qualifications and abilities to meet the needs of society. In a market environment with innovation as the core competitiveness, competencies appear more frequently in identifying organizational human resource advantages, exacerbating differences in the indispensability of different groups of people in organisations (Makhathini, 2016). Education, a reasonable means of narrowing the gap between the rich and the poor and improving social status, is more commonly rooted in different countries and regions than other forms of social behaviour (García & Weiss, 2017; Mirowsky & Ross, 2017). As Robertson (2015) interprets Amartya Sen's capability theory, what a person can accomplish and who he can become depends on what he is good at or has. Online classes have significantly reduced the cost of study for international students (SOHU.COM, 2021). Zheng et al. (2021) found that online courses did not reduce students' learning performance, and most achieved good course results. Work pressure, social pressure, occupational pressure, financial pressure, and family pressure are usually the troubles for doctoral students (Levecque et al., 2017). Xuan et al. (2019) affirmed that the teacher-student relationship is a valuable source for students to improve their performance.

XThe adverse effects of distance learning, such as loneliness, learning interest, and social needs, have been confirmed in past studies (Winthrop, 2020; Hebebci et al., 2020; Unger & Meiran, 2020). The qualitative research result of Vielma and Brey (2021) calls for more simultaneous instructional content to complement students' social needs. Close contact with peers tends to disappear in distance education, deepening students' sense of social isolation (Ali & Smith, 2015). Graduate students are the intermediate stage of undergraduate and doctoral students; There are some of the same deficiencies as undergraduates and similar learning goals and self-management skills as doctoral students. Self-discipline is a necessary skill for both undergraduates and some graduate students. Students who lack self-discipline and discipline are unlikely to benefit from distance learning, which is not an effective learning model for all students (Engelbrecht & Harding, 2005). Toch (2010) pointed out that young and immature students have a strong need for school, a place that restrains their behaviour rather than an opportunity to learn. Becoming a self-disciplined person is a prerequisite for success in distance learning (Burton & Goldsmith, 2002). Loneliness prevents

undergraduate students from using distance learning.

**Limitations**

The study did not address the relationship between the effectiveness of distance learning and discipline. For some art and engineering students, education occurs more in the teacher's assessment of the students' observed behaviour. Like traditional qualitative research, whether qualitative research can confirm or explain a social phenomenon needs to be supplemented by quantitative research. This study has not included the relationship between higher-end digital technology (e.g. virtual reality, augmented reality, metaverse) and distance learning.

**Recommendation**

As an alternative to quantitative research, hybrid research will be used next, examining the feasibility of distance education as an ongoing means of offering transnational courses to international students from a school perspective.

## Conclusion

Students worldwide have experienced similar distance learning experiences during these extraordinary times. Among different groups of international students continuing to pursue higher education, there are significant differences in people's perceptions of distance learning, so they have different degrees of desire for continued use of distance learning in the future. It is observed that distance students realize the dream of continuous learning for some Chinese people, freeing them from the conflict between work and study in terms of time and place. Data provided by the respondents showed that the vast majority of Chinese postgraduate students and Chinese doctoral students studying in Malaysia's public, private and national universities applied after the Malaysian distance learning program began. They are doing all their studies in China, not Malaysia. The resistance to studying abroad formed by family, economic, social, and work factors have weakened or even disappeared in distance learning. The creation of continuous distance-learning doctoral and postgraduate programs for the Chinese population is called for in this study. Of course, fewer factors affect undergraduate students under parental protection. Their perceptions of distance learning generally focus on issues related to learning and competence.

## References

Abbad, M. M. (2021). Using the UTAUT model to understand students' usage of e-learning systems in developing countries. *Education and Information Technologies*, 26(6), 7205-7224.

Aboagye, E., Yawson J. A., and Appiah, K. N. (2020). COVID-19 and E-learning: The Challenges od Students in Tertiary Institutions. *Social Education Research*, 2(1), 1-8.

Adarkwah, M. A. (2020). "I'm not against online teaching, but what about us?": ICT in Ghana post Covid-19. *Education and Information Technologies,* 1-21.

Al-Adwan, A. S., Al-Adwan, A. and Berger, H. (2017). Solving the mystery of mobile learning adoption in higher education.

Al-Arimi, A. M. A. K. (2014). Distance learning. *Procedia-Social and Behavioral Sciences*, 152, 82-88.

Ali, A. and Smith, D. (2015). Comparing social isolation effects on students' attrition in online versus face-toface courses in computer literacy. Issues in Informing Science and Information Technology, 12, 11-20.

Allen, I. E., and Seaman, J. (2014). Opening the Curriculum: Open Educational Resources in US Higher Education, 2014. *Babson Survey Research Group*.

Ally, M. (2008). The impact of technology on education. *Education for a Digital World*, 57.

Alqurashi, E. (2016). Self-efficacy in online learning environments: A literature review. *Contemporary Issues in Education Research (CIER)*, 9(1), 45-52.

Alraimi K.M., Zo H. and Ciganek A.P. (2015). Understanding the MOOCs Continuance: The Role of Openness and Reputation. *Computers & Education,*80, 28-38.

Ang, S. H. (2014). Research design for business & management. *Sage Publications*.

Babić, S., Sučić, S. K., and Sinković, G. (2020). Understanding the factors that influence secondary school teachers' intention to use e-learning technologies for Teaching After the COVID-19 Pandemic. *In 2020 43rd International Convention on Information, Communication and Electronic Technology (MIPRO)* . IEEE, 848-853.

Bailey, D. R., and Lee, A. R. (2020). Learning from experience in the midst of covid-19: Benefits, challenges, and strategies in online teaching. *Computer-Assisted Language Learning Electronic Journal, 21(2),* 178-198.

Baker-Eveleth, L. and Stone R.W. (2015). Usability, Expectation, Confirmation and Continuance Intention to Use Electronic Textbooks. *Behaviour & Information Technology*,34(10), 992-1004.

Balderas, A. and Caballero-Hernández, J. A. (2020, October). Analysis of learning records to detect student cheating on online exams: Case study during COVID-19 pandemic. In Eighth international conference on technological ecosystems for enhancing multiculturality (pp. 752-757).

Bandura, A. (1978). The self system in reciprocal determinism. *American psychologist*, *33*(4), 344.

Barraket, J. (2005). Teaching research method using a student-centred approach? Critical reflections on practice. Journal of University Teaching & Learning Practice, 2(2), 17-27.

Bell, B. S. and Federman, J. E. (2013). E-learning works-exactly how well depends on its unique features and barriers.

Benson, A. (2002). Using online learning to meet workforce demand: A case study of stakeholder influence. Quarterly Review of Distance Education, 3(4), 443−452.

Bhattacherjee A. (2001). Understanding Information Systems Continuance: An Expectation-confirmation Model. *MIS Quarterly*, 25(3), 351-370.

Bobley, L. and Sebel, A. (2016). Using Screen Recording Tools to Increase Instructor Presence in Online Courses.

Bourne, J., Harris, D. and Mayadas, F. (2005). Online engineering education: Learning anywhere, anytime. *Journal of Engineering Education*, *94*(1), 131-146.

Burton, L. J. and Goldsmith, D. (2002). Students' experiences in online courses: A study using asynchronous online focus groups. *Connecticut Distance Learning Consortium.*

Carminati, L. (2018) Generalizability in qualitative research: a tale of two traditions. *Qualitative Health Research* 28(13): 2094–2101.

Carr, P.B. (1999). The measurement of resourcefulness intentions in the adult autonomous learner. *Doctoral dissertation, The George Washington University. Dissertation Abstracts International*, 60 (11).

Catalano, A. (2013). Patterns of graduate students' information seeking behavior: a meta-synthesis of the literature. *Journal of documentation*.

Chandra, Y. (2020). Online education during COVID-19: perception of academic stress and emotional intelligence coping strategies among college students. *Asian education and development studies*.

Chen, Z., Cao, H., Deng, Y., Gao, X., Piao, J., Xu, F., .. and Li, Y. (2021). Learning from home: A mixed-methods analysis of live streaming based remote education experience in Chinese colleges during the COVID-19 pandemic. In *Proceedings of the 2021 CHI Conference on*

*human factors in computing systems* (pp. 1-16).
Christou, P., Farmaki, A. and Evangelou, G. (2018). Nurturing nostalgia? A response from rural tourism stakeholders. *Tourism Management*, 69, 42–51. https://doi.org/10.1016/j.tourman. 2018.05.010
Clark R.C. and Mayer R.E. (2011). E-Learning and The Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning(3rd ed). San Francisco, CA: Pfeiffer.
Conrad, D. (2006). E-Learning and social change: An apparent contradiction. *Perspectives on higher education in the digital age*, 21-33.
Dendir, S. and Maxwell, R. S. (2020). Cheating in online courses: Evidence from online proctoring. Computers in Human Behavior Reports, 2, 100033.
Derrick, M. G., Ponton, M., Rovai, F., Confessore, G. J., and Carr, P. (2005). An Examination of the relationship of specific demographic variables and learner autonomy. *19th International Self-Directed Learning Symposium*. Cocoa Beach, Florida.
Educationfair.nl. (2021). *Study abroad Market report on China*. Educationfair.nl. https://www.educationfair.nl/market-reports/asia/china/
Ehlers, V. J., Zuyderduin, A. and Oosthuizen, M. J. (2001). The well-being of gays, lesbians and bisexuals in Botswana. *Journal of Advanced Nursing*, *35*(6), 848-856.
El Refae, G. A., Kaba, A. and Eletter, S. (2021). Distance learning during COVID-19 pandemic: satisfaction, opportunities and challenges as perceived by faculty members and students. *Interactive Technology and Smart Education*.
Engelbrecht, J and Harding, A. (2005). Teaching Undergraduate Mathematics on the Internet. Part 2: Attributes and Possibilities. *Educational Studies in Mathematics*, (58)2, 253-276.
Feldman, A., Divoll, K. A. and Rogan-Klyve, A. (2013). Becoming researchers: The participation of undergraduate and graduate students in scientific research groups. *Science education*, *97*(2), 218-243.
Fidalgo, P., Thormann, J., Kulyk, O. and Lencastre, J. A. (2020). Students' perceptions on distance education: A multinational study. *International Journal of Educational Technology in Higher Education,* 17(1), 1-18.
Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, V., Eccles, M. P. and Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology and health*, *25*(10), 1229-1245.
García, E. and Weiss, E. (2017). Reducing and Averting Achievement Gaps: Key Findings from the Report'Education Inequalities at the School Starting Gate'and Comprehensive Strategies to Mitigate Early Skills Gaps. *Economic Policy Institute*.
Garrison, D. R. (2016). *E-learning in the 21st century: A community of inquiry framework for research and practice*. Routledge.
Greenfield, T. K., Midanik, L. T. and Rogers, J. D. (2000). Effects of telephone versus face-to-face interview modes on reports of alcohol consumption. *Addiction*, *95*(2), 277-284.
Guest, G., Bunce, A. and Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field methods*, *18*(1), 59-82.
Guilar, J. and Loring, A. (2008). Dialogue and community in online learning: Lessons from Royal Roads University. Journal of Distance Education, 22(3), 19−40.
Gunasinghe, A., Abd Hamid, J., Khatibi, A. and Azam, S. F. (2019). The adequacy of UTAUT-3 in interpreting academician's adoption to e-Learning in higher education environments. *Interactive Technology and Smart Education.*
Hagaman, A. K. and Wutich, A. (2017). How many interviews are enough to identify metathemes in multisited and cross-cultural research? Another perspective on Guest, Bunce, and Johnson's (2006) landmark study. *Field methods*, *29*(1), 23-41.
Hamdan, K. M., Al-Bashaireh, A. M., Zahran, Z., Al-Daghestani, A., Samira, A. H. and Shaheen, A. M. (2021). University students' interaction, Internet self-efficacy, self-regulation and

satisfaction with online education during pandemic crises of COVID-19 (SARS-CoV-2). *International Journal of Educational Management*.

Hebebci, M. T., Bertiz, Y. and Alan, S. (2020). Investigation of views of students and teachers on distance education practices during the Coronavirus (COVID-19) Pandemic. *International Journal of Technology in Education and Science, 4*(4), 267-282.

Isaac O., Aldholay A., Abdullah Z and Ramayah T. (2019). Online Learning Usage within Yemeni Higher Education: The Role of Compatibility and Task-technology Fit as Mediating Variables in the IS Success Model. computer & Educations,136, 113-129.

Jaggars, S. S. (2014). Choosing between online and face-to-face courses: Community college student voices. *American Journal of Distance Education, 28(1),* 27-38.

Joo S and Choi N. (2016). Understanding Users' Continuance Intention to Use Online Library Resources Based on an Extended Expectation-Confirmation Model. *Electronic Library*,34(4), 554-571.

Joo Y.J., Park S and Shin E.K. (2017). Students' Expectation, Satisfaction and Continuance Intention to Use Digital Textbooks. *Computers in Human Behavior*, 69, 83-90.

Kim, J. (2020). Learning and teaching online during Covid-19: Experiences of student teachers in an early childhood education practicum. *International Journal of Early Childhood, 52(2),* 145-158.

Kundu, A. (2020). Toward a framework for strengthening participants' self-efficacy in online education. *Asian Association of Open Universities Journal.*

Kundu, A., Bej, T. and Dey, K. N. (2020). An empirical study on the correlation between teacher efficacy and ICT infrastructure. *The International Journal of Information and Learning Technology.*

Kuo, Y. C., Walker, A. E., Schroder, K. E. and Belland, B. R. (2014). Interaction, Internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses. *The internet and higher education*, *20*, 35-50.

Lazim, C. S. L. M., Ismail, N. D. B. and Tazilah, M. D. A. K. (2021). Application of technology acceptance model (TAM) towards online learning during covid-19 pandemic: Accounting students perspective. *Int. J. Bus. Econ. Law,* 24(1), 13-20.

Lederman, L. (2022, April 19). *U.S. Extends Flexibility on Online Courses for Foreign Students | Inside Higher Ed*. Www.insidehighered.com. https://www.insidehighered.com/quicktakes/2022/04/19/us-extends-flexibility-online-courses-foreign-students

Levecque, K., Anseel, F., De Beuckelaer, A., Van der Heyden, J. and Gisle, L. (2017). Work organization and mental health problems in PhD students. *Research policy*, *46*(4), 868-879.

Li, Y., Nishimura, N., Yagami, H. and Park, H. S. (2021). An empirical study on online learners' continuance intentions in China. *Sustainability*, *13*(2), 889.

Lim, K., Kang, M. and Park, S. Y. (2016). Structural relationships of environments, individuals, and learning outcomes in Korean online university settings. *International Review of Research in Open and Distributed Learning*, *17*(4), 315-330.

Liu, Y. and Shirley, T. (2021). Without Crossing a Border: Exploring the Impact of Shifting Study Abroad Online on Students' Learning and Intercultural Competence Development during the COVID-19 Pandemic. *Online Learning*, *25*(1), 182-194.

Lowenthal, P. R., Wilson, B. and Parrish, P. (2009, October). Context matters: A description and typology of the online learning landscape. In *AECT International Convention, Louisville, KY*.

Maatuk, A. M., Elberkawi, E. K., Aljawarneh, S., Rashaideh, H. and Alharbi, H. (2022). The COVID-19 pandemic and E-learning: challenges and opportunities from the perspective of students and instructors. *Journal of Computing in Higher Education*, *34*(1), 21-38.

Makhathini, T. P. (2016). Work integrated learning competencies: Industrial supervisors' perspectives. *Perspectives in Education*, *34*(3), 56-71.

Manca, S. and Delfino, M. (2021). Adapting educational practices in emergency remote education: Continuity and change from a student perspective. *British Journal of Educational Technology*, *52*(4), 1394-1413.

Masrom, M., Zainon, O. and Rahiman, R. (2008). E-learning critical success factors: institutional and technological aspects. *e-Learning issues in Malaysian higher education,* 49-63.

McRoy, C., Patel, L., Gaddam, D. S., Rothenberg, S., Herring, A., Hamm, J., .. and Awan, O. (2020). Radiology education in the time of COVID-19: a novel distance learning workstation experience for residents. *Academic radiology*, *27*(10), 1467-1474.

Meyer, D.T. (2001). The measurement of intentional behavior as a prerequisite to autonomous learning. *Doctoral dissertation, The George Washington University. Dissertation Abstracts International*, 61(12).

Mirowsky, J. and Ross, C. E. (2017). *Education, social status, and health*. Routledge.

Mkwizu, K. H. and Ngaruko, D. D. (2020). Implied benefits of open and distance learning in Tanzania: A qualitative approach on its benefits in Tanzania. *BOOK REVIEW*, 81.

Morgan, H. (2022). Alleviating the challenges with remote learning during a pandemic. *Education Sciences*, 12(2), 109.

Mullen, C. A. (2021). Distance education as a space of possibility in pandemic-burdened societies. *Citizenship Teaching & Learning*, *16*(2), 229-239.

Musselwhite, K., Cuff, L., McGregor, L. and King, K. M. (2007). The telephone interview is an effective method of data collection in clinical nursing research: a discussion paper. *International journal of nursing studies*, *44*(6), 1064-1070.

Ng, S.F. and Confessore, G.J. (2011). Assessing the capacity for success in distance learning in Malaysia. *Procedia - Social and Behavioral Sciences*.15, 1742-1750. doi.org/10.1016/j.sbspro.2011.03.362

Nistor, N., Göğüş, A. and Lerche, T. (2013). Educational technology acceptance across national and professional cultures: a European study. *Educational Technology Research and Development*, *61*(4), 733-749.

PacMan100. (2018, August 21). *The Back Translation method: what is it and why use it?* PacTranz. https://www.pactranz.com/back-translation/

Parsons, A. F. (2020). Exploring Everyday Chemistry: The Effectiveness of an Organic Chemistry Massive Open Online Course as an Education and Outreach Tool. *Journal of chemical education, 97(5),* 1266-1271.

Paudel, P. (2020). Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. *International Journal on Studies in Education, 3(2),* 70-85.

Paudel, P. (2021). Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. *International Journal on Studies in Education*, *3*(2), 70-85.

Peters, M. and Romero, M. (2019). Lifelong learning ecologies in online higher education: Students' engagement in the continuum between formal and informal learning. *British Journal of Educational Technology*, *50*(4), 1729-1743.

Ploj Virtic, M., Dolenc, K. and Šorgo, A. (2021). Changes in Online Distance Learning Behaviour of University Students during the Coronavirus Disease 2019 Outbreak, and Development of the Model of Forced Distance Online Learning Preferences. *European Journal of Educational Research*, *10*(1), 393-411.

Qazi, A., Naseer, K., Qazi, J., AlSalman, H., Naseem, U., Yang, S., .. and Gumaei, A. (2020). Conventional to online education during COVID-19 pandemic: Do develop and underdeveloped nations cope alike. *Children and Youth Services Review*, *119*, 105582.

Rabaa'i A.A., AlMaati S.A and Zhu X. (2021). Students' Continuance Intention to Use Moodle: An Expectation-confirmation Model Approach. *Interdisciplinary Journal of Information, Knowledge & Management,* 16, 397-434.

Robertson, P. J. (2015). Towards a capability approach to careers: Applying Amartya Sen's thinking to career guidance and development. *International Journal for Educational and Vocational Guidance*, *15*(1), 75-88.

Ryan, T. G., Toye, M., Charron, K. and Park, G. (2012). Learning management system migration: An analysis of stakeholder perspectives. *The International Review of Research in Open and Distributed Learning, 13(1),* 220-237.

Saeed Al-Maroof, R., Alhumaid, K. and Salloum, S. (2020). The continuous intention to use e-learning, from two different perspectives. *Education Sciences, 11(1)*, 6.

Samardzic, K. (2019, March 21). *Doing a PhD while raising a family*. Imperial College London. https://www.imperial.ac.uk/earth-science/prosp-students/phd-opportunities/family/

Saw, G. K., Chang, C. N. and Lomelí, U. (2020). Fall enrollment and delayed graduation among stem students during the COVID-19 pandemic. *The Network for Research and Evaluation in Education (NREED) Data Brief*, (1).

Sawchuk, S. (2020, October 8). *As More Schools Resume In-Person Learning, Some Lessons From Districts That Did It First*. Education Week. https://www.edweek.org/leadership/as-more-schools-resume-in-person-learning-some-lessons-from-districts-that-did-it-first/2020/10

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J. and Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK) the development and validation of an assessment instrument for preservice teachers. *Journal of research on Technology in Education*, *42*(2), 123-149.

Serhan, D. (2019). Web-Based Homework Systems: Students' Perceptions of Course Interaction and Learning in Mathematics. *International Journal on Social and Education Sciences, 1(2),* 57-62.

Sohu.com. (2021, November 29). *Parents of international students find that online classes are even more cost-effective_Problem.* Www.sohu.com. https://www.sohu.com/a/448674467_372406

Staff, M. R. (2022, January 23). *McGill ready to resume in-person teaching*. McGill Reporter. https://reporter.mcgill.ca/mcgill-ready-to-resume-in-person-teaching/

Statista. (2018). *China: number of students that study abroad 2018 | Statista*. Statista; Statista. https://www.statista.com/statistics/227240/number-of-chinese-students-that-study-abroad/

Strauss, A. and Corbin, J. (1998). Basics of qualitative research: Procedures and techniques for developing grounded theory. *Sage*.

Streeton, R., Cooke, M. and Campbell, J. (2004). Researching the researchers: using a snowballing technique. *Nurse researcher*, *12*(1), 35-47.

Sturges, J. E. and Hanrahan, K. J. (2004). Comparing telephone and face-to-face qualitative interviewing: a research note. *Qualitative research*, *4*(1), 107-118.

Suzianti, A. and Paramadini S.A. (2021). Continuance Intention of E-learning: The Condition and Its Connecton with Open Innovation. *Journal of Open Innovation: Technology, Market & Complexity,* 1-14.

Teddlie, C. and Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Sage.

Tetteh, G.A. (2016). Effects of Business School Student's Study Time on the Learning Process. *Journal of International Education in Business,9*(2), 90-110.

The World Bank. (2022). *How countries are using edtech (including online learning, radio, television, texting) to support access to remote learning during the COVID-19 pandemic*. World Bank. https://www.worldbank.org/en/topic/edutech/brief/how-countries-are-using-edtech-to-support-remote-learning-during-the-covid-19-pandemic

Thompson, V. L and McDowell, Y. L. (2019). A case study comparing student experiences and success in an undergraduate course offered through online, blended, and face-to-face instruction. *International Journal of Education in Mathematics, Science and Technology*

*(IJEMST), 7*(2), 116-136.

Tiong, L. C. O. and Lee, H. J. (2021). E-cheating Prevention Measures: Detection of Cheating at Online Examinations Using Deep Learning Approach--A Case Study. *arXiv preprint arXiv:2101.09841*.

Toch, T. (2010). In an era of online learning, schools still matter. *Phi Delta Kappan, 91(7),* 72-73.

Turban E., King D., Lee J.K., Liang T.P and Turban D.C. (2015). Electronic Commerce: A Managerial & Social Networks Perspective. *Springer*.

Unger, S. and Meiran, W. R. (2020). Student attitudes towards online education during the COVID-19 viral outbreak of 2020: Distance learning in a time of social distance. *International Journal of Technology in Education and Science,* 4(4), 256-266.

Vielma, K. and Brey, E. M. (2021). Using evaluative data to assess virtual learning experiences for students during COVID-19. *Biomedical Engineering Education, 1*(1), 139-144.

Vogels, E., Perrin, A., Rainie, L. and Anderson, M. (2020). 53% of Americans Say the Internet Has Been Essential during the COVID-19 Outbreak: Americans with Lower Incomes Are Particularly Likely to Have Concerns Related to the Digital Divide and the Digital" Homework Gap". *Pew Research Center*.

Walls, A., Okumus, F., Wang, Y. and Kwun, D. J. W. (2011). Understanding the consumer experience: An exploratory study of luxury hotels. *Journal of Hospitality Marketing & Management*, *20*(2), 166-197.

Watts, J. H. (2008). Challenges of supervising part-time PhD students: Towards student-centred practice. *Teaching in Higher Education, 13*(3), 369-373.

Winthrop, R. (2020). *Top 10 risks and opportunities for education in the face of COVID-19*. Brookings. https://www.brookings.edu/blog/education-plus-development/2020/04/10/top-10-risks-and-opportunities-for-education-in-the-face-of-covid-19/

Wu, Y. C., Chen, C. S. and Chan, Y. J. (2020). The outbreak of COVID-19: An overview. *Journal of the Chinese medical association*, *83*(3), 217.

Yiu, W. (2022). A closer look at arrangements for Hong Kong schools to resume in-person classes. *South China Morning Post.* https://www.scmp.com/news/hong-kong/education/article/3173911/coronavirus-hong-kong-schools-will-resume-person-classes

Zhang, L., Tao, Y., Wang, J., Ong, J. J., Tang, W., Zou, M., .. and Fairley, C. K. (2020). Early characteristics of the COVID-19 outbreak predict the subsequent epidemic scope. *International Journal of Infectious Diseases*, *97*, 219-224.

Zhang, S., Zhao, J. and Tan, W. (2008). Extending TAM for online learning systems: An intrinsic motivation perspective. *Tsinghua science and technology, 13(3)*, 312-317.

Zheng, M., Bender, D. and Lyon, C. (2021). Online learning during COVID-19 produced equivalent or better student course performance as compared with pre-pandemic: empirical evidence from a school-wide comparative study. *BMC medical education, 21(1),* 1-11.

Zhou, J. (2017). Exploring the Factors Affecting Learners' Continuance Intention of MOOCs for Online Collaborative Learning: An Extended ECM Perspective. *Australasian Journal of Educational Technology,33(5),* 123-135.

# Applying Kolb's Learning Model to Enhance Accounting Students' Experience in Programming Subject: A Conceptual Framework

Mohd Hisham Bin Sharif*[a], Hasnah Binti Shaari[b], Zaimah Binti Abdullah[c]
[abc]Tunku Intan Safinaz School of Accountancy,
Universiti Utara Malaysia
*Corresponding Author: hisham79@uum.edu.my

## Abstract

This article proposed a conceptual framework to explore the application of Kolb's learning theory on service-learning activities of university students attending programming subject. The survey involved the participation of 28 accounting students from Universiti Utara Malaysia. The study aims to explore accounting students' early phase experience in applying service-learning activities in completing programming subject project requirements using Kolb's experiential learning model. Using the finding from the literature and the results from the questionnaire, all this vehiculated by the development of narratives that describe the progress of the projects. Qualitative methodological design will be applied to analyze the study. This study contributes on the alternative teaching method to accounting students undertaking programming subject and to a broader extend would help the instructor of other similar subjects to shift to an innovative teaching method.

*Keywords:* Service-learning, programming subjects, Kolb's experiential learning model

## Introduction

Programming is claimed as a complex subject, thus it is challenging to learn and master, even at the early stage of learning (Feldgen & Clúa, 2004; Cheah, 2020). Our experiences in teaching computer programming only in computer laboratories have shown that hands-on activities designed based on a prescriptive, step-by-step approach do not consistently achieve the expected learning outcomes. This approach is problematic because students could not relate class inputs to tackle real issues as they lack of problem-solving abilities (Aissa et al., 2020, Bosse & Gerosa, 2017; Cheah, 2020; Ismail et al., 2020). Problem solving and analytical skills have been identified as the critical ability needed by students to do programming (Linn & Clancy, 1992). Without this ability, the system developed by students often possesses poor practicality and does not have enough meaningful function that the end-user can utilize. However, Cheah (2020) claims that the problem lies not only within the students' level of efficacy but also involves other issues such as teaching and learning techniques. Thus, he insists that it is vital to consider both aspects to overcome the difficulties of learning programming.

## Research Objective

Much of the extant studies (for example; Bogdanchikov, Zhaparov, & Suliyev, 2013; Ismail et al., 2020) has focused on understanding the phases of programming subject itself and less on improving the programming skills. However, the problem remains unsolved. Therefore, this study proposes learning experiences involving hands-on experimentation for this subject, which was testified by Dunbar and Yadav (2022) as credible to increase student achievement. Asghar and Rowe (2017) claim that service learning can increase students' critical thinking and analytical skills, which are vital abilities that should be possesed by students doing programming subject (Linn & Clancy, 1992). In addition, we also utilize Kolb's Experiential Learning Cycle as a framework to design hands-on activities using the service-learning method. We argue that hands-on activities based on this

framework will enhance student learning outcomes as inputs from the industries can assist students in developing a more practical system that is better and closer to the full implementation. We believe that teaching using statistic materials such as printed textbook were ineffective for learning the dynamic nature of programming consistent with the claim by Bennedsen and Caspersen (2005). Thus, in order to find more effective teaching alternatives that can enhance the students' interest in programming, this study explores accounting information system students early phase experience in service-learning activities in implementing programming project requirements using Kolb's experiental learning model.

We believe this kind of study has the potential to explore the relationship between students' service-learning experience in programming subject. Dunbar and Yadav (2022) contend that service-learning has shown the assurance of students' better achievement, but unfortunately less implementation in the teaching and learning process. Thus, this study aims to examine how service learning experience can enhance accounting students' programming skills. This paper also focus on helping the students develop a better system with meaningful and practical functionalities by incorporating the inputs from service learning activities which is expected to improve students' learning experience.

**Kolb's Experiential Learning Model**

This study applies Kolb's experiential learning model (KELM). It is claimed by Healey and Jenkins (2000) that Kolb's theory is the best known educational theories in higher education. Turesky and Gallagher (2011) also agree that this theory provides a sound theoretical framework for leadership development skills. According to Kolb (1984), "Learning is a process, in which knowledge is created through the transformation of experience." Kolb's theory provides insights on learning by doing, work-based learning, and problem-based learning. The theory has a vast range of applications, including helping students realising themselves, helping teachers to become better teachers, identifying students' learning styles, and developing key teachers' skills. The essence of Kolb's model is the description of the learning process, which is pictured as a cycle made of four phases. In Kolb's model, it is shown how experience is transformed through reflection in ideas and concepts, which are used for active experimenting and new experiences. It consists of four phases: the Concrete Experience (CE) - doing, Reflective Observation (RO) - observing, Abstract Conceptualising (AC) – thinking, and Active Experimenting (AE) – planning.

Many studies have applied KELM to ascertain whether students could achieve the learning outcome through the process. For example, the empirical study by Rath and Rock (2021), found that students were able to use critical thinking to identify fallacies in their experiments of controversial products. In a different field, KELM was claimed to help professional coaches in the development of organizational leadership (Turesky and Gallagher, 2011). Also, in many subjects, this theory has proven to be beneficial in the learning process, such as geographic lessons in university (Healy & Jenkins, 2007). To the best of our knowledge, KELM have never been used in the context of exploring students' service learning experiences in programming subject.

## Proposed Conceptual Framework and Method

The Kolb's experiential learning model is applied in this proposed framework to examine the effectiveness of this learning theory in BKAS3143 (Programming for Accounting) class in first semester, 2021/2022 academic session and involved 28 students as the participants. This subject is one of the core subjects for Accounting Information System students where they need to develop a complete application to solve real and practical problems. For this subject, students were required to find an organization or institution, whether non-profit or business and find a solution for their daily issues or problems, particularly in managing information. Normally, a mobile application or web-

based system will be developed as part of the solution. This practice is considered as a service learning as the students improved their learning skills by dealing with real problems and at the same time contribute to the community (Resch & Schrittesser, 2021). The idea for this research is to involve experienced mentor intervention from the IT industry to give inputs to the students in the process of developing the application to serve the community. Reflections from students was taken using an online survey and interview after they have completed the requirement gathering process with community institution. An online survey is used to get the initial inputs from the students and further interviews is conducted to get a more detailed input from the student participants.

Thematic Analysis was used to examine the participants' inputs and reflections. Results would be presented in themes, as suggested by Braun and Clarke (2006). The first stage is to become familiar with the analysed data by reading making notes on probable themes for each reflection. The next step was to look for repeating themes, which was accomplished by making separate notes on potential themes. Then, for the report, examples were extracted and verbatim statements from participants, best illustrating the topics in relation to the research aims, were chosen (Braun & Clarke, 2006). From the most frequently repeated to the least frequently repeated, they were given in order. This study emphasised the use of direct quotes rather than indirect reports to allow each theme discussed in detail.

## Literature Review

Effective teaching and learning (T&L) in higher institutions require a blend of T&L approaches and techniques. The service-learning is among the pedagogical alternative that may enhance the student learning experience as well as provides opportunities to teachers or instructors to shift control of learning to students, which also benefited teachers in their professional growth. Service-learning is a teaching and learning approach that provide students with a platform to use their academic and civic knowledge and skills to address genuine community needs. Service learning is an educational strategy that emphasises learning in which the learner is in close contact with the topic under investigation, rather than simply observing, reading, hearing, or thinking about it (Kolb, 1984; Kohonen, 2001). This method allows students to interact with persons to whom it provides a needs- and context-adapted service outside of the classroom. It combines theoretical concepts with experiential learning, provides students with the opportunity for a heightened educational experience, and increases civic awareness across various community populations. In short, service-learning provides a community-based experience through which learning and critical reflection can take place.

Service-learning facilitates an exchange of ideas, learning, and hands-on experience to mutually benefit students and the community. Service opportunities enable students to acquire a sense of civic and social responsibility, learn about their community, apply classroom learning, expand their skills, and reflect on their experiences. In addition, courses at higher learning institutions incorporate service-learning activities, providing students with an opportunity to connect what they learn in the classroom with service in the community.

Prior studies provide much evidence on the different aspects of service learnings. For example, in terms of integrating service-learning in other academic disciplines, Salam et al. (2019) provide statistics on the integration of service-learning in various academic areas. Health service and nursing report the highest rate of 30%, followed by business and economics (17%), computer and information sciences (14%), sociology and criminal justice (10%) and other disciplines adopt less with the percentage below 10%. They report that most prior studies in these disciplines focus on implementing service learning in the community.

Past studies documented that community servicing helps students increase their civic awareness and responsibility to the public. McLeod (2013) have noted that service-learning supports students overall personality grooming, character building, growth and development. He claimed that

traditional classrooms do not provide real-life practical learning environments and only focus on the theory, thus ignoring the importance of practical skills in real life. When students face a real-life environment, such a situation may stimulate them to apply their theoretical knowledge and critically solve a problem. As such, service-learning experience encourages them to comprehend better the application and understanding of classroom learning (Figuccio, 2020).

Marshall et al. (2015) documented that service learning experience enabled students to develop an ability to practically transform their existing knowledge, improve the personal view of the practical world and challenge personal values. A recent study by Lin and Shek (2021) found that, during the COVID-19 pandemic, the undergraduate students who took service-learning subjects with and without face-to-face interaction showed similar positive changes in positive youth development competencies, service leadership qualities, and life satisfaction. In another study, Hart (2015) notes that service-learning offers an effective teaching and learning style, which extends the traditional classroom learning, to apply theoretical concepts in a real-world environment while helping community members work on a specific community problem. Halberstadt et al. (2019) developed a framework of key competencies for social entrepreneurship and insights on how service-learning impacts change in students' set of competences. Students' service-learning experiences appeared to meet most course-specific learning outcomes while also providing learning opportunities in unanticipated areas (Bettencourt, 2015).

Fair and Delaplane (2015) and Penick et al. (2014) claim that integrated service-learning programs develop a better and practical learning environment for students and community members, to understand the nexus between classroom learning theories and real-life problems. In other studies from Alexander et al. (2014), Meyer et al. (2016) and Weiler et al. (2013), they argue that service-learning pedagogy is a superior approach, as compared to any other traditional voluntarism approach because service-learning bridges the gap between academic institutes and communities to prepare students for the future workplace. It helps them to achieve social development objectives as well. In addition to this, service-learning also promotes critical thinking and analytical skills (Asghar and Rowe, 2017), as well as the ability to work in a collaborative environment (Toncar et al. 2006). In Spain, a survey was conducted on university's students who participated in community service learning. The results show that the students demonstated a positive perception of the impacts of their participation. Overall, the skills and competencies developed were primarily on collaboration, ethical commitment, adapting to new conditions, and problem-solving; and the service's utility was mostly in moral development and commitment (Folgueiras, 2020).

Astin et al. (2000) examined the effects of service-learning on undergraduates students and found the positive impact on academic performance (examination results, writing skills, critical thinking skills), values (commitment to activism and to promoting racial understanding). The study also documented that students demonstrate good leadership skills (leadership activities, self-rated leadership ability, interpersonal skills), and they also plan to engage in community service after college.

For physical education teacher education (PETE) students, Pérez-Ordás et al. (2021) found that service-learning has excellent potential as a resource for developing professional, personal, and social skills. Service-learning also promotes teaching by connecting future physical education professionals to the realities and challenges of a diverse and constantly evolving educational environment. This produces benefits for the community and connects education to the real world—similarly, Chiva-Bartoll et al. (2020) found that service-learning had a significant influence on subjective happiness as well as prosocial behaviour and professional learning.

However, the study by Muturi and Mwangi (2013) found that even though the students have participated in the service-learning project previously, it doesn't guarantee that it will influence their attitudes and expectation about the service-learning project in the future. The motivation to participate in service-learning is associated with higher expectations and positive attitude, including social and professional growth. To avoid any negative effects, students should receive information

and training regarding the organisations where they will perform their service (Largent, 2013; Wozencroft et al., 2015).

In Malaysia, various efforts have been taken to strengthen the quality of graduates. In 2006, the Ministry of Higher Education has designated seven soft skills that should be equipped to all graduates as documented in the Module for the Development of Soft Skills for Higher Learning Institution in Malaysia. These skills are critical thinking and problem-solving skills, communication skills, lifelong learning and information literacy, team-working skills, professional ethics and morality, entrepreneurship skills, and leadership skills. 10 years later, in 2015, the education ministry had issued The Education Blueprint 2015-2025 which highlighted the use of experiential and service-learning in higher education. To assist the implementation of experiential learning, the ministry also had introduced Service Learning Malaysia-University for Society (SULAM), an initiative that refers to teaching and learning methods that combine course learning outcomes with community service that involves students interacting with the community to solve local problems (Yusof et al., 2020).

Consistent with prior studies in service learning, studies in Malaysia show that this learning pedagogy improves students' academic performance, civic involvement and personal development (Ibrahim, Hassan & Anak bayang, 2020; Mari et al., 2018), positively influences academic learning and skills development (Salam, Awang Iskandar & Abang Ibrahim, 2017) and develops the students soft skills for their future career (Md Salleh and Mokhtar, 2017). Similarly, Cheuk et al. (2020) reported that students that involved in the preparation of tax assessment to clients discovered that the service learning help them to improve communication skill, knowledge management and time management skills. The activity also contribute to better understanding of course content, increased confidence level and enhance sense of responsibility. In a collaborative study between Malaysia and Indonesia, Hashim and Bakar (2018) reported that the service learning activities conducted in the study were deemed to be successful in establishing new cross-cultural experiences and enhancing students' community engagement skills. Despite the benefits gained by the students, Yusof et al. (2020) reported among challenges when participating in service learning is the gap between theory and practice and also the cognitive autonomy.

## Conclusion

This paper discussed on the proposed research framework on the application of Kolb's experiential learning model in programming subject for accounting students. In the subject's requirement, the service learning element is incorporated in the design of the syllabus. With the exposure to the real world, the students need to find a solution for their daily issues or problems, particularly in managing information. To achieve the above objective, the paper provided an extensive review of literature concerning the service learnings and its effect on students performance. The paper also provided an explanation of the Kolb's experiential learning model as the underlying theory of the study. This study contributes to the body of knowledge by being the first study to examine the effectiveness of service learning in improving the performance of programming students.

## References

Aissa, M., Al-Kalbani, M., Al-Hatali, S., & BinTouq, A. (2020). Novice learning programming languages in omani higher education institution (Nizwa University) issues, challenges and solutions. In *Sustainable Development and Social Responsibility—Volume 2* (pp. 143-148). Springer, Cham. https://doi.org/10.1007/978-3-030-32902-0_18

Alexander, G. K., Canclini, S. B., & Krauser, D. L. (2014). Academic-Practice Collaboration in Nursing Education: Service-learning for injury prevention. *Nurse Educator, 39*(4), 175–178. doi:10.1097/NNE.00000 00000 00004 4.

Asghar, M., & Rowe, N. (2017). Reciprocity and critical reflection as the key to social justice in service learning: A case study. *Innovations in Education and Teaching International, 54*(2), 117–125. doi:10.1080/14703 297.2016.12737 88.

Astin, A. W., Vogelgesang, L. J., Ikeda, E. K., & Yee, J. A. (2000). How service learning affects students. *Higher Education*, 144.

Bennedsen, J., & Caspersen, M. E. (2005). Revealing the programming process. Paper presented at the ACM SIGCSE Bulletin. https://doi.org/10.1145/1047344.1047413

Bettencourt, M. (2015). Supporting student learning outcomes through service learning. *Foreign Language Annals*, *48*(3), 473-490. doi:10.1111/flan.12147.

Bogdanchikov, A., Zhaparov, M., & Suliyev, R. (2013). Python to learn programming. In *Journal of Physics: Conference Series* (Vol. 423, No. 1, p. 012027). IOP Publishing.

Bosse, Y., & Gerosa, M. A. (2017). Why is programming so difficult to learn? Patterns of Difficulties Related to Programming Learning Mid-Stage. *ACM SIGSOFT Software Engineering Notes*, *41*(6), 1-6. doi:10.1145/3011286.3011301.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Cheuk, S., Nichol, E., Marsidi, A., Ali, S. S. S., Sahari, S., Jakpar, S., Tinggi, M., Yusof, S. M., Mohamed, A. S., Lee, D., and Janang, J. (2020). Service learning in a Malaysian undergraduate tax class. *International Journal of Academic Research in Progressive Education & Development. 9*(2), 661-673. doi:10.6007/IJARPED/v9-i2/7963

Chiva-Bartoll, O., Ruiz-Montero, P. J., Capella-Peris, C., & Salvador-García, C. (2020). Effects of service-learning on physical education teacher education students' subjective happiness, prosocial behaviour and professional learning. *Frontiers in psychology*, *11*, 331. doi:10.3389/fpsyg.2020.00331.

Cheah, C. S. (2020). Factors contributing to the difficulties in teaching and learning of computer programming: A literature review. *Contemporary Educational Technology*, *12*(2), ep272. doi:10.30935/cedtech/8247.

Dunbar, K., & Yadav, A. (2022). Shifting to student-centered learning: Influences of teaching a summer service learning program. *Teaching and Teacher Education*, *110*, 103578. https://doi.org/10.1016/j.tate.2021.103578

Fair, C. D., & Delaplane, E. (2015). "It is good to spend time with older adults. You can teach them, they can teach you": Second grade students reflect on intergenerational service learning. *Early Childhood Education Journal, 43*(1), 19–26. https ://doi.org/10.1007/s1064 3-014-0634-9. doi:10.1007/s10643-014-0634-9.

Feldgen, M., & Clúa, O. (2004). Games as a motivation for freshman students learn programming. In *34th Annual Frontiers in Education, 2004. FIE 2004.* (pp. S1H-11). IEEE.

Figuccio, M. J. (2020). Examining the Efficacy of E-Service-Learning. *Frontiers in Education, 5*. doi: 10.3389/feduc.2020.606451.

Folgueiras, P., Aramburuzabala, P., Opazo, H., Mugarra, A., & Ruiz, A. (2020). Service-learning: A survey of experiences in Spain. *Education, Citizenship and Social Justice*, *15*(2), 162-180. doi:10.1177/1746197918803857

Halberstadt, J., Timm, J. M., Kraus, S., & Gundolf, K. (2019). Skills and knowledge management in higher education: how service learning can contribute to social entrepreneurial competence development. *Journal of Knowledge Management*. *23*(10), 1925-1948. doi:10.1108/JKM-12-2018-0744.

Hart, S. (2015). Engaging the learner: The ABC's of service–learning. *Teaching and Learning in Nursing, 10*(2), 76–79. doi:10.1016/j.teln.2015.01.001.

Hashim, S., & Bakar, Z. A. (2018). International service learning initiatives: a case study on strategic collaboration between university and community in Malaysia and Indonesia. *Advanced Science Letters*, *24*(1), 190-192. doi:10.1166/asl.2018.11955

Healey, M., & Jenkins, A. (2000). Kolb's experiential learning theory and its application in geography in higher education. *Journal of geography*, *99*(5), 185-195.

Ibrahim, S. M., Hassan, Z., & Anak bayang, R. (2020). Benefits of Service Learning for Undergraduate Students of Education, Universiti Teknologi Malaysia. *Jurnal Kemanusiaan*, *18*(2). Retrieved from https://jurnalkemanusiaan.utm.my/index.php/kemanusiaan/article/view/389

Ismail, M. N., Ngah, N. A., & Umar, I. N. (2010). Instructional strategy in the teaching of computer programming: A need assessment analyses. *TOJET*, 9(2), 125-131. Retrieved from http://tojet.net/articles/v9i2/9214.pdf

Kolb, D. (1984). Experiential learning: Experience as the source of learning and development, New Jersey: Prentice-Hall.

Kohonen, V. 2001. Towards experiential foreign language education. In Kohonen, V., R. Jaatinen, P. Kaikkonen and J. Lehtovaara, Experiential learning in foreign language education. London: Pearson Education, 8-60.

Largent, L. (2013). Service-learning among nontraditional age community college students. *Community College Journal of Research and Practice 37*(4): 296–312. doi:10.1080/10668920903527100.

Linn M. C. & Clancy M. J. (1992). The case for case studies of programming problems. *Communications of the ACM*, 35(3), 121-132.

Lin, L., & Shek, D. T. (2021). Serving Children and Adolescents in Need during the COVID-19 Pandemic: Evaluation of Service-Learning Subjects with and without Face-to-Face Interaction. *International Journal of Environmental Research and Public Health*, *18*(4), 2114. doi:10.3390/ijerph18042114.

Mari, M. T., Kuppusamy, S., Sriangam, S., Karuppannan, G., & Sheng, L. X. (2018). Investigating Civic Responsibilities among Architecture Undergraduates using Service-Learning in Malaysia. *Pam International Architectural Education Conference*. Kuala Lumpur.

Marshall, J. H., Lawrence, E. C., Williams, J. L., & Peugh, J. (2015). Mentoring as service-learning: The relationship between perceived peer support and outcomes for college women mentors. *Studies in Educational Evaluation*, *47*, 38-46. doi:10.1016/j.stueduc.2015.07.001.

McLeod, P. L. (2013). Experiential learning in an undergraduate course in group communication and decision making. *Small Group Research*, 44(4), 360–380. https://doi.org/10.1177/1046496413 488217.

Md Salleh, M. S., & Mokhtar, M. (2017). Service Learning: Experiences and Perceptions Towards Students in UTM, Malaysia. *Sains Humanika*, *9*(1-3). https://doi.org/10.11113/sh.v9n1-3.1138

Meyer, C. L., Harned, M., Schaad, A., Sunder, K., Palmer, J., & Tinch,C. (2016). Inmate education as a service learning opportunity for students: Preparation, benefits, and lessons Learned. *Teaching of Psychology, 43*(2), 120–125. https ://doi.org/10.1177/0098628316 63627 8.

Ministry of Education Malaysia. (2015). Malaysia Education Blueprint 2015–2025 (Higher Education). *Ministry of Education Malaysia*.

Ministry of Higher Education Malaysia. (2006). Development of soft skills for Institutions of Higher Learning. Universiti Putra Malaysia

Murray, M., Ross, A., Blaney, N., & Adamson, L. (2015). Mentoring undergraduate civil engineering students. *Proceedings of the Institution of Civil Engineers-Management, Procurement and Law*, *168*(4), 189-198.

Muturi, N., An, S., & Mwangi, S. (2013). Students' Expectations and Motivation for Service-Learning in Public Relations. *Journalism & Mass Communication Educator*, *68*(4), 387–408. https://doi.org/10.1177/1077695813506992

O'Connell, C., McCauley, J., & Herbert, L. (2021). Improvisation-Based Workshop to Build Empathy in Mentor-Mentee Relationships and Support Academic Equity. *Journal of Student Affairs Research and Practice*, 1-14. doi:10.1080/19496591.2020.1842747.

Penick, J. M., Fallshore, M., & Spencer, A. M. (2014). Using intergenerational service learning to promote positive perceptions about older adults and community service in college students. *Journal of Intergenerational Relationships, 12*(1), 25–39. doi:10.1080/15350770.2014.870456.

Pérez-Ordás, R., Nuviala, A., Grao-Cruces, A., & Fernández-Martínez, A. (2021). Implementing service-learning programs in physical education; teacher education as teaching and learning models for all the agents involved: A systematic review. *International Journal of Environmental Research and Public Health*, *18*(2), 669. doi: 10.3390/ijerph18020669.

Rath, D. R., & Rock, C. R. (2021). Applying Kolb's experiential learning framework to investigate the safety of energy drinks in a critical thinking general education course. *Journal of Food Science Education*, *20*(4), 228-237.

Resch, K., & Schrittesser, I. (2021). Using the Service-Learning approach to bridge the gap between theory and practice in teacher education. *International Journal of Inclusive Education*, 1-15.

Salam, M., Awang Iskandar, D. N., & Abang Ibrahim, D. H. (2017). Service Learning Support for Academic Learning and Skills Development. *Journal of Telecommunication, Electronic and Computer Engineering (JTEC)*, *9*(2-10), 111–117. Retrieved from https://jtec.utem.edu.my/jtec/article/view/2713

Salam, M., Awang Iskandar, D. N., Abang Ibrahim, D. H., & Farooq, M. S. (2019). Service learning in higher education: A systematic literature review. *Asia Pacific Education Review*, *20*(4), 573-593. doi:10.1007/s12564-019-09580-6.

Scerri, M., Presbury, R., & Goh, E. (2020). An application of the mentoring framework to investigate the effectiveness of mentoring programs between industry mentors and student mentees in hospitality. *Journal of Hospitality and Tourism Management*, *45*, 143-151. doi:10.1016/j.jhtm.2020.08.010.

Schlee, R. P. (2000). Mentoring and the professional development of business students. *Journal of Management Education, 24*(3), 322–337. doi:10.1177/105256290002400304.

Serrat, O. (2017). Coaching and mentoring. In *Knowledge Solutions* (pp. 897-902). Springer, Singapore.

Tinoco-Giraldo, H., Torrecilla Sánchez, E. M., & García-Peñalvo, F. J. (2020). E-mentoring in higher education: a structured literature review and implications for future research. *Sustainability*, *12*(11), 4344. doi:10.1177/105256290002400304.

Toncar, M., Reid, J., Burns, D., Anderson, C., & Nguyen, H. (2006). Uniform assessment of the benefits of service learning: The development, evaluation, and implementation of the seleb scale. *The Journal of Marketing Theory and Practice, 14*(3), 223–238. https ://doi.org/10.2753/MTP10 69-66791 40304 .

Turesky, E. F., & Gallagher, D. (2011). Know thyself: Coaching for leadership using Kolb's experiential learning theory. *The Coaching Psychologist*, *7*(1), 5-14.

Weiler, L., Haddock, S., Zimmerman, T. S., Krafchick, J., Henry, K., & Rudisill, S. (2013). Benefits derived by college students from mentoring at-risk youth in a service-learning course. *American Journal of Community Psychology, 52*(3–4), 236–248. https ://doi.org/10.1007/s1046 4-013-9589-z.

Wozencroft AJ, Pate JR and Griffiths HK (2015). Experiential learning and its impact on students' attitudes toward youth with disabilities. *Journal of Experiential Education 38*(2): 129–143. doi:10.1177/1053825914524363.

Yusof, N., Awang Hashim, R., Tengku Ariffin, T. F., & Nordin, H. (2020). Conceptualizing and developing effective practices of service learning in UUM. *Unpublished Research Report*. University Utara Malaysia.

Yusof, N., Tengku Ariffin, T. F., Awang Hashim, R., Nordin, H., & Kaur, A. (2020). Challenges of service learning practices: student and faculty perspectives from Malaysia. *Malaysian Journal of Learning and Instruction*, *17*(2), 279-309. doi:10.32890/mjli2020.17.2.10

# Service Learning Philosophies, Implementation and Impacts on Legal Education: A Systematic Review

'Ain Husna Mohd Arshad*[a], Ani Munirah Mohamad[b], Nor Azlina Mohd Noor[c]
[abc]School of Law, College of Law, Government and International Studies, Universiti Utara Malaysia, Sintok, Kedah
*Corresponding Author: ainhusna@uum.edu.my

## Abstract

Service learning, or community-based learning, is a form of experiential learning where the process of learning is conducted through meaningful services to the community. In the area of legal education, service learning has been conducted in many ways. The aim of this paper is to study the philosophies of service learning, to examine how it is implemented in law classroom and to analyse the impacts of service learning on legal education. Systematic literature review (SLR) has been chosen as the method of study. This involves the process of selecting literatures according to the specified search procedure. Subsequently, descriptive and thematic analysis are made to the contents of selected literatures. Based on the review conducted, the philosophical foundation of service learning is centred upon service to the community and it is structured as part of curriculum contents. Service learning can be implemented through direct services to the community, or indirectly, or through advocacy or research-based project. Service learning increases students understanding of a subject, develops soft skills necessary for law students, promotes community engagement and enhances capacity building in the legal education institution.

*Keywords:* service learning, legal education, high impact learning, collaborative learning

## Introduction

The purpose of legal education is to prepare students to enter into legal professions. Students who graduated with law degree are equipped with knowledge that will qualify them to become lawyers, court officers, law enforcement officers, policy maker, legal researchers, legal educators etc. These professions do not only require competency in understanding legal knowledge but also applied skills and human skills. Therefore, in legal education, students are expected to learn theories and subsequently make connection between theory and application to be applied in their future profession so that they can provide services to the community or clients which is up to the level expected from law graduates. Therefore, service learning is regarded as one of the best methods of teaching and learning law courses as it has been characterized as a pedagogy that bridges academic content with lived reality (Butin, 2005). However, due to much emphasis and focus given to the substance of curriculum contents, there were very few discussions on the method of learning, such as service learning, amongst educators who are not specialized in the field of education. It is hope that this paper can answer some basic questions on service learning such as what is service learning, how it is conducted and whether it gives any different impacts on the students.

## Objectives

The purpose of this paper is to analyse past literatures on service learning involving law students through a systematic review. The objectives are, firstly, to understand the philosophical ideas behind service learning. This in turn will help the educators as well as students who are engaged in service learning understand why they do what they do. Secondly, to identify various forms of service learning that have been implemented by law schools. This can help instructors to diversify service learning activities in the future. Thirdly, to analyse the impacts of service learning

on legal education in general and for law students in particular. By acknowledging the impacts, further efforts can be made to strengthen or improve the practice of service learning in the future.

## Methodology

A systematic literature review (SLR) was conducted to achieve the three objectives of study stated above. It is mentioned by Urinboyev, Wickenberg, and Leo (2016) that SLR significantly differs from traditional narrative reviews because it can be replicated by other researchers, and it is based on a more transparent selection and rigorous data collection process. According to Mohamed Shaffril (2021), any SLR must be guided by at least review protocol, or publication standard, or reporting standard, or established guidelines, or past published SLR articles. For the purpose of this paper, search procedures have been created to structure systematic literature reviews based on guidelines from past published SLR articles, specifically Bekaert et. al. (2021); Urinboyev, Wickenberg, and Leo (2016); and Pedaste et.al. (2015). The following sections explain the inclusion and exclusion criteria of literatures, followed by description of search procedure and data analysis process.

### Inclusion and exclusion criteria

The review covers scholarly articles from journals and proceedings. No publication dates were applied as we want to find the most relevant literatures across time. Similarly, no specific regions were excluded as long as the contents are relevant to service learning and legal education. However, there are relevant literatures which were excluded due to inaccessibility. The literatures must cover service learning related to the area of legal education or involving law students. However, there are literatures on legal education which do not directly discuss service learning but still included. This is when we found that the literatures have characterized important features of legal education or called for transform in legal education and subsequent full-text reading indicates that this article could support the objectives of this paper.

### Search procedure

A literature search was conducted using the Scopus, ScienceDirect, Taylor and Francis Online, CLJ Law and Lexis Advance Malaysia. All these databases were accessed through UUM's library eResources portal. While the first three databases are the leading databases, the last two databases are flagship publications in the legal field. Search terms used with the Scopus, ScienceDirect, Taylor and Francis Online were "service learning" AND "legal education". However, when the same search terms were used in CLJ Law and Lexis Advance Malaysia, the result was nil. Therefore, keyword "legal education" was used instead of "service learning" AND "legal education". These terms were searched from the title and abstract used in the articles. If the articles passed title review and abstract review process, they will be selected for full-text review. Articles that passed full-text review were included for appraisal. This systematic search procedure together with the number of records found is illustrated in the flowchart in Figure 1 below.

### Data analysis

Following the search procedure, there is a total of 17 literatures that met the inclusion criteria for this systematic literature review. This is followed with data analysis involving descriptive and thematic analysis made to the contents of the 17 literatures. Descriptive analysis provides an overview of the characteristics of the studies in the literatures, which comprises of these criteria: name of the author/s, the year of publication, the law school or participants involved in the study, the purpose of study, the methods adopted, findings, and limitations and/or strengths. To enable the authors as well as readers to overview the context and findings of each literature, a summary of descriptive analysis has been prepared in Figure 2 below.

Thematic analysis was conducted according to three broad themes, which subsequently divided into sub-themes. The first theme is the philosophies of service learning, which is further divided into sub-themes: community-centred, academic learning, practical or hands-on, outcome-based and sustainability. The second theme is the implementation of service learning, which is further divided into sub-themes: direct, indirect, advocacy and research-based. The third theme is the impacts of service learning, which is further divided into sub-themes: knowledge, soft skills, enhanced engagement, capacity building and values. These themes and sub-themes are illustrated in Figure 3 below.

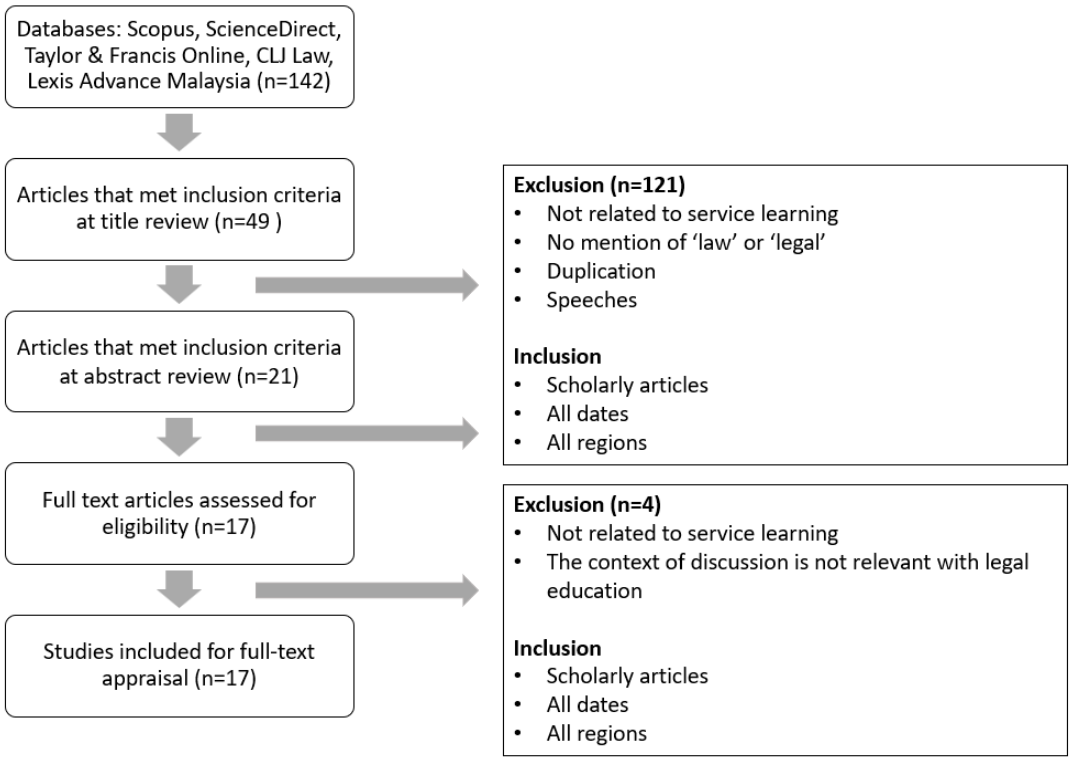


*Figure 1*. Flowchart of the literature search procedure.

## Findings

### Study characteristics

Based on descriptive analysis conducted on 17 studies included in this paper which were published within the span of 16 years, 2006 until 2022, it is found that service learning is not a new method of learning in law schools. It has been adopted in many ways by many law schools across the globe including in Ireland (Bracken, 2022); Malaysia (Ashgar Ali, 2021); Australia (Babacan and Babacan, 2017; Israel et.al., 2010; Blissende, 2006); United States (Gillis and Tushaus, 2017; Babacan and Babacan, 2017; Boys et.al, 2015; Rougeau, 2009); India (Tushaus et.al, 2015) and other law schools in South Asia (Gurpur and Routdesai, 2014). Most of the studies adopted qualitative method of research by collecting data rigorously through literatures, interviews with participants, distribution of questionnaires, observations and focus group study.

Those studies have been conducted with various purposes, among others, to call for transform in legal education to be in harmonious with contemporary needs in legal profession (Ashgar Ali, 2021; Puteri Sofia, 2020; Gurpur and Rautdesai, 2014); to analyse high impact educational practices such as capstone project (Bracken, 2022); to study pro bono legal services for the community conducted by students, which is also known as clinical legal education (Fryar, 2019; Gillis and

Tushaus, 2017; Babacan and Babacan, 2017; Tushaus et.al., 2015; Duncan, 2010, Blissenden, 2006); to discuss interdisciplinary service learning (Hallenberg and Haddow, 2016) and other types of learning activities that involve collaborative work between students or students with other professionals (Allen et.al., 2012; Duncan, 2010); Rougeau, 2009).
Based on the review made to the above papers, the following findings are identified and arranged according to the objectives of this paper.

**Philosophical aspect of service learning**

Service learning is rooted on the element of service to a community. This is the first and foremost ingredient of service learning. The element of service to the community is found in all literatures that have been included in this study, be it a small or larger community, local or international community (Bracken, 2022; Gillis and Tushaus, 2017), though in some literatures it is termed as experiential learning (Ashgar Ali, 2021; Babacan and Babacan, 2017; Nasab and Meghdadi, 2012; Blissenden, 2006), while another authors called it as 'signature pedagogy' because it is a method of instruction that orient students to the norms and values of an attached profession (Knee and Means, 2018). Depending on learning outcomes and objectives of a service learning project, the community varies. It could be secondary school students (Bracken, 2022), earthquake survivors and victims of domestic violence (Gillis and Tushaus, 2017).

The implementation of service learning project is tied to the contents of law curriculum, which means it is a part of courses taught by lecturers (Boys et. al., 2015) and it is credit bearing (Knee and Means, 2018). It must be structured and organized because it is part of educational programme which is based on the contents of law courses (Gillis and Tushaus, 2017; Tushaus et. al, 2015). This will differentiate between service learning and other volunteer activities. Based on the study conducted by Gurpur and Rautdesai (2014), attempts have been made by law schools in South Asian regions to embrace world class parameters in legal education including to be more learner centric method. Legal education in Malaysia requires fulfilment to the programme standards specified by the Malaysian Qualification Agency (MQA) and the Legal Profession Qualifying Board (LPQB) to ensure the standard of academic achievement for law graduates. However, in terms of teaching and learning methods, the educators

| No | Author | Year | Law school/ participants | Purpose of study | Methodology/ Methods | Findings | Limitations/ Strengths |
|---|---|---|---|---|---|---|---|
| 1 | Bracken | 2022 | University of Limerick School of Law, Ireland | To study the utility of a small-scale Street Law project as a capstone service-learning course in the University of Limerick | Qualitative – questionnaires and interviews | Impacts of the project on law students, including feeling more confidence, practical, interactive and deeper learning | Findings exclusive to one law faculty in one university only.<br><br>Study includes opinion of law students involved. |
| 2 | Ashgar Ali | 2021 | Not mentioned | Transforming legal education teaching and learning by considering remote communication technology in the real practice. | Not mentioned | Experiential learning is one the innovative methods of teaching and learning in legal education. This include community services and collaborative projects. | The study is not specific for service learning, but it explains the need for innovations in the delivery of legal education. |
| 3 | Puteri Sofia, et.al. | 2020 | Not mentioned | Transformation of legal education to be in line with IR4.0 while maintaining the quality of legal education | Not mentioned | There is a need to transform legal education to equip students with necessary skills in line with IR4.0, including independent learning skills, research skills, problem solving skills, teamwork skills, creativity skills and other methods of learning that promote collaborative learning etc. | The study is not specific for service learning, but it highlight certain features that contemporary legal education must have |
| 4 | Fryar Am | 2019 | Not mentioned | Benefits of pro bono legal services | Not mentioned | One of the ways to promote pro bono is to participate in the provision of free community legal education on issues affecting low income or disadvantaged members of the community | The study is not directly related to service learning, but it is about free legal services to the community. |

| No | Author | Year | Law school/ participants | Purpose of study | Methodology/ Methods | Findings | Limitations/ Strengths |
|---|---|---|---|---|---|---|---|
| | | | | | | or on issues of public interest. | |
| 5 | Knee and Means | 2018 | Not mentioned | Analysis of active learning or 'signature pedagogy' | Qualitative – content analysis using systematic literature review | Signature pedagogies, where discipline-specific methods of instruction that characterized the nature of professionalism in the related field is embedded in teaching and learning process. This can be achieved by 4 modes: (a) community collaboration, (b) professional engagement, (c) learning situated in real-world experiences, and (d) service learning. | Analysis is limited based on articles published in specific publication. No actual or field work analysis involved. |
| 6 | Gillis and Tushaus | 2017 | Volunteer law students in the US and Nepal, together with other volunteers | To discuss how mobile clinics can be used to provide legal aid on various issues including domestic violence to survivors of natural disasters with specific reference to the earthquake that devastated Nepal in 2015. | Qualitative – survey, fieldwork | The concept of service learning can be adopted in mobile legal aid for earthquake survivors, domestic violence survivors to help the community with legal issues that arise as an aftermath of the natural disasters. | Study involves collaborative service learning among professionals, volunteers law students, law professors, lawyers and other students. |
| 7 | Babacan and Babacan | 2017 | Australia and United States | To study student pro bono services in legal education | Qualitative – contents review | The importance of reflective practice in experiential learning, including service | Findings is based on the context of Australia and United States |

| No | Author | Year | Law school/ participants | Purpose of study | Methodology/ Methods | Findings | Limitations/ Strengths |
|---|---|---|---|---|---|---|---|
| | | | | | | learning. Transformative pedagogies can encourage critical consciousness and social transformation necessary for active involvement in volunteer lawyering after graduation. | |
| 8 | Hallenberg and Haddow | 2016 | Not mentioned | Interdisciplinary approach, service learning and other value-driven approach in criminology | Qualitative – focus group discussion, observation | Service learning and volunteering elements are forms of Education for Sustainable Development (ESD). They are very relevant to sustain criminal justice education. | Service learning in the context of criminology and sustainable development agenda |
| 9 | Tushaus, et.al. | 2015 | Undergraduate law school students across India | The importance of legal aid clinics to provide better legal education and access to justice in the community | Quantitative and qualitative – survey and questionnaires | Legal aid clinics can be used as a tool of service learning as it is more effective in teaching analytical skills, critical thinking skills and practical skills | The research design and the results were explained in detail. The survey questions were attached. |
| 10 | Boys et. al. | 2015 | Midwestern university Law school | The impact of interdisciplinary service learning | Descriptive study, quasi-experimental | There is an intersection between legal practice and social work. Practical experience gives significant improvement in interpersonal skills of the law students involved in interdisciplinary service learning | Small sample size. |
| 11 | Gurpur and | 2014 | Various law | To review the best | Qualitative - | One of the characteristics of | The context of discussion |

| No | Author | Year | Law school/ participants | Purpose of study | Methodology/ Methods | Findings | Limitations/ Strengths |
|---|---|---|---|---|---|---|---|
| | Rautdesai | | schools across South Asia | practices in legal education across South Asian region | doctrinal, observation, survey | best practice legal education is the element of community engagement and addressing the legal needs of the community | on engagement with community is much more broader, not limited to service learning |
| 12 | Nasab & Meghdadi | 2012 | Not mentioned | Effective methods of human right education | Not mentioned | Experiential learning is a form of learning which is very effective to shape students leadership skills and increase students' ability to think critically and solve problems | Study conducted based on review of literatures only. The context of discussion on engagement with community is much more broader, not limited to service learning |
| 13 | Allen, et.al. | 2012 | Undergraduate students at the Community Legal Information Center (CLIC), California State University, Chico. | Study on how CLIC successfully provides undergraduate students with the opportunity to serve the legal needs of their community while also applying what they have learned through traditional classroom learning | Questionnaires | CLIC internships benefit participating students by providing hands-on legal training and active learning experiences. It gives benefits to the Northern California community by addressing the legal needs of low-income and indigent clients through civic engagement. | Limited to CLIC of State California University. |
| 14 | Israel, et.al | 2010 | Australia | To evaluate graduate learning outcomes against bachelor of law academic standard | Qualitative | There were six threshold learning outcomes (TLOs) for the Bachelor of Laws. These are: knowledge; ethics and professional responsibility; thinking skills; research skills; communication and | The study is not specific for service learning, but it highlight academic standards of Bachelor of law programmes. |

| No | Author | Year | Law school/ participants | Purpose of study | Methodology/ Methods | Findings | Limitations/ Strengths |
|---|---|---|---|---|---|---|---|
| | | | | | | collaboration; and self-management | |
| 15 | Duncan | 2010 | Not mentioned | Review of community engagement in contemporary legal education, which includes pro bono, clinical legal education and service learning | Book review | Overview of opinions for and arguments against experiential learning pedagogies. | Surface contents as the nature is to give an overview. |
| 16 | Rougeau | 2009 | Law schools in the United States | The importance of faith-based service learning in legal education | Not mentioned | Service learning offers students an opportunity to develop skills and values that make clear the integral role that lawyers must play in assuring access to justice for all members of society | Limited to the context of American legal education |
| 17 | Blissenden | 2006 | Law schools in Australia | Analysis of clinical legal programme for Revenue Law students | Not mentioned | Service learning may become a mechanism for students to help low-income earners in the community and apply their academic knowledge and reflect on the experience. Reflection is the key to assess student learning. | The context of discussion is more specific to the area of revenue law |

*Figure 2* Descriptive analysis of included literatures

are free and encouraged to be innovative and to adopt high impact educational practices in the classroom (Ashgar Ali, 2021; Israel et.al., 2010).

Service learning requires active participation from students through hands-on activities. This is also an important aspect of transformation in legal education because experiential learning can connect knowledge with real legal issues in the community (Ashgar Ali, 2021; Puteri Sofia, 2020). The focus shifted from teacher's teaching to students' learning (Gurpur and Rautdesai, 2014). Allowing students to play an active role in understanding the communities through community needs assessments is an important part of the process (Gillis and Tushaus, 2017). It also provides law students with practical experience with clients and subsequently they can master the practical skills needed for their future profession, and becomes a culturally competent counsels (Hallenberg and Haddow, 2016; Boys et.al, 2015).

In relation to the above, programme standards for law degree require several learning outcomes to be achieved. This is also known as outcome-based learning. Whether this is a law degree offered in Malaysia or overseas, the learning outcomes cover knowledge and understanding as well as other soft skills components such as communication skills, problem-solving skills, cognitive skills (Ashgar Ali, 2021) ethics and professionalism, research skills, collaboration and self management skills (Israel et.al, 2010). Service learning projects are considered as outcome-based learning, as the activities and assessment must be aligned with the course learning objectives (Tushaus et. al, 2015).

Service learning can be conducted through projects that involves legal assistance and community legal education for low income or disadvantaged members of the community, or charitable organisations. Through these services many legal disputes can be addressed as early as possible thus reducing the number of cases that go to the court (Fyar Am, 2019). This can promote sustainability in the process of conflict resolution as a whole.

**Implementation of service learning**

Based on the review, the implementation of service learning can be categorized into four groups: direct, indirect, advocacy and research-based projects. An example of direct service learning project can be seen in the final year Street Law students at the University of Limerick who delivered Street Law lessons to secondary school students in their locality, whereby, the law students were required to individually prepare and deliver two 40-minute classes to the secondary school students and subsequently work together as a group to prepare the secondary school students to undertake the roles of lawyers, judges, jury and witnesses as part of the mock trial (Bracken, 2022). In Symbiosis Law School in India, the law students are engaged in public service through internship with human rights NGOs specifically those providing legal services to people, and also work with community-based organization (Gurpur and Rautdesai, 2014). In Nepal, international clinical service learning was conducted by way of mobile clinics to serve distressed population, who were the survivors of earthquake and natural disasters that devastated Nepal. It involved international collaboration between members from non-governmental organizations (NGOs), US and Nepalese professors, legal professionals and volunteer law students in the United States and Nepal (Gillis and Tushaus, 2017). In Midwestern University, an interdisciplinary service learning was conducted by way of pairing law students with social works students to handle cases. Law students assessed legal needs of the clients while social works students conducted holistic

needs assessment. This in turn, provide a more comprehensive solutions that address clients' needs (Boys et. al., 2015). In a Community Legal Aid Clinic in California, there were between 100 to 125 undergraduate students served the clinic each semester. They play the role as staffs and carry out programs such as Environmental Advocates, Family Law Projects, Housing Law Program, Workers' Rights Program etc. for the community (Allen et.al., 2012). Meanwhile, faith-based service learning had been conducted by law students of Notre Dame (Rougeau, 2009).

For indirect service learning project, there are several articles that do not specifically use the term 'service learning', but the nature of projects that they carried out involved community engagement and academic assessment. Thus, we categorized it as indirect service learning. Apparently, service learning can be carried out in many ways, as it falls under the broad method of 'learning by doing' or 'experiential learning' (Ashgar Ali, 2021; Gurpur and Rautdesai, 2014). Several literatures discussed clinical legal education or legal aid clinics that benefits the community by giving legal services to disadvantaged or low-income group of the community (Bracken, 2022; Ashgar Ali, 2021; Puteri Sofia, 2020; Babacan and Babacan, 2017). According to Bracken (2022), clinical legal education is that which focuses on the development of the skills required for legal practice. It is also known as legal clinics; it is where students take responsibility to do law-related work for a client under supervision of academic staff. The aim is to learn from reflective experiential learning and to shape public-minded future legal professionals (Gurpur and Rautdesai, 2014).

There were service learning projects which involve advocacy. For example, faculty members and students serving in law school based legal aid clinics had worked out to create awareness on the rights to get justice, call for a more flexible access to justice, provide client counselling, jail visitation, file public interest litigation, engage in legislative advocacy or collaborate with NGOs (Tushaus et. al, 2015).

There were also service learning activities which were based on research, or combined with research. For example, Tushaus et.al, (2015) reported that a research was conducted to study the effectiveness of community service provided by legal clinics. Another example is the project which was implemented in Nepal which was preceded by a research on community needs assessment to assess the knowledge of community on the legal protections available for victims of domestic violence (Gillis and Tushaus, 2017).

**Impacts of service learning on law students and legal education**

The impacts of service learning on law students are numerous. For the purpose of this paper, we have divided the impacts into five categories, these are, knowledge and understanding, soft skills, enhanced engagement, capacity building and values. In terms of knowledge and understanding, service learning improves the quality of learning and knowledge (Allen et.al, 2012). It gives an opportunity for students to apply their theoretical knowledge into the real situations. Knowledge of substantive law and procedural law enhance as student teach others about specific legal topics (Bracken, 2022; Ashgar Ali, 2021; Puteri Sofia, 2020). It is an opportunity for students to serve a community while learning legal knowledge and polishing their practical skills (Gillis and Tushaus, 2017; Tushaus et.al, 2015;). By combining traditional academic teaching with community service, the universities can provide undergraduate civic consciousness and civic engagement opportunity for students (Babacan and Babacan, 2017; Allen, et.al., 2012). This allows the students to internalize theoretical knowledge that they have learned.

The next impact is on soft skills. Service learning has the potential to improve law students' soft skills including legal skills, client interviewing skills (Allen et.al, 2012), communication skills and advocacy skills through presentation and interaction in a different environment (Bracken, 2022), enhance research and writing skills, build listening and argumentative skills, develop critical thinking skills to discern underlying ideological assumptions, suggest reforms and respect diversity (Gurpur and Rautdesai, 2014). This is also described as analytical skills (Tushaus, et.al., 2015). In a research-based service learning, students can develop their research skill as they design the research questions, research objectives and determine the best method to achieve the objectives (Gillis and Tushaus, 2017). Lawyers must understand the underlying goals and emotions of their clients which are normally not mentioned. Service learning provides opportunities for students to develop the skills needed to access such feelings and information, particularly interpersonal communication skills (Boys et.al., 2015) which subsequently can enhance confidence level (Bracken, 2022). Not less important is that, learning methods which is conducted online will increase students ICT skills (Ashgar Ali, 2021; Puteri Sofia, 2020, Gurpur and Rautdesai, 2014). With the digital advancement today, there is no doubt that service learning could be conducted online through digital space, either wholly or hybrid service learning.

Next, service learning promotes enhanced engagement with the community of various background (Knee and Means, 2018). This reminds law students to explain the law in a plain language to the non-legal audience which in turn will increase legal literacy of the public (Bracken, 2022). There are always opportunities for legal professionals to contribute to the well-being of the community, either through pro bono legal assistance or community legal education where publics can get free information on law (Fryar Am, 2019). This pro bono spirit does not develop overnight. Legal education providers have a role to play in nurturing the spirit through connection with the community. By establishing a community connection, the students develop a genuine understanding of the needs of that community (Nasab and Meghdadi, 2012). For example, the mobile clinics following earthquake in Nepal were able to offer legal consultations and help with referral services with local government agencies (Gillis and Tushaus, 2017).

For capacity building, service learning can transform students into diverse, worldly civic-minded individuals who will have a broader understanding of different cultures and ideas (Gillis and Tushaus, 2017). Law students who were trained to serve clients can become a means of social change, because they have involved in various activities and actively participating in community outreach programmes, such as legal literacy camps, to create awareness on their rights and obligations (Tushaus et. al, 2015). Law students are expected to obtain a high academic achievement standard defined as a set of learning outcomes and to graduate with good honours or CGPA degree. The content of the law program generally is decided by both the professional body and the universities, while the admission to the program is based on a merit system. Therefore law faculties and legal educators must be ready to embrace new digital advancement and innovations in teaching and learning legal education (Ashgar Ali, 2021; Puteri Sofia, 2020) including the implementation of high impact practices in education because this will increase the quality of legal education at the institutional level and unleash the potential of students.

The value of being able to contribute or help make things better for people will give satisfaction beyond monetary value (Fryar Am, 2019; Nasab and Meghdadi, 2012). Service learning is about the installation of professional values and public

responsibility in the students (Gillis and Tushaus, 2017). The role of legal education is to produce lawyers who are advocates of justice, experts of law and are samaritans of public good (Gurpur and Rautdesai, 2014). Another aspect which is also an added value to service learning is that, it normally ends with the process of critical reflection (Knee and Means, 2018; Babacan and Babacan, 2017; Hallenberg and Haddow, 2016). Reflection closes the learning cycle and allows the students to gain meaning over their own process of learning. This instils values in the students that they will hold throughout their journey as legal professionals as they become reflective practitioners (Blissenden, 2006). Bracken (2022) reveal that there were students who distaste active learning. Regardless of this, they still admit that service learning had led to deeper learning and more understanding of the subject which eventually nurture positive values in the students.

| **Themes:** | | **Philosophy** | | | | | **Implementation** | | | | **Impacts** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sub-themes: | Community-centered | Academic learning | Practical@ hands-on | Outcome-based | Sustainability | Direct | Indirect | Advocacy | Research based | Knowledge | Softskills | Enhanced engagement | Capacity building | Values |
| 1 | Bracken, 2022 | / | / | / | | / | / | | | | / | / | / | / | / |
| 2 | Ashgar Ali, 2021 | / | / | / | / | | | / | | | / | / | / | / | |
| 3 | Puteri Sofia, et.al., 2020 | / | | / | | | | / | | | / | / | | / | |
| 4 | Fryar Am, 2019 | / | | | | | | / | | | | | / | / | / |
| 5 | Knee and Means, 2018 | / | / | / | | | / | | | | / | / | / | | |
| 6 | Gillis and Tushaus, 2017 | / | / | / | | | / | | | / | / | / | / | / | / |
| 7 | Babacan and Babacan, 2017 | / | / | / | / | / | | / | | | / | / | / | | |
| 8 | Hallenberg and Haddow, 2016 | / | / | / | / | / | / | | | | / | / | / | | / |
| 9 | Tushaus, et.al., 2015 | / | / | / | / | | / | | / | / | / | / | / | / | |
| 10 | Boys et.al, 2015 | / | / | / | / | | / | | | | / | / | / | | |
| 11 | Gurpur and Rautdesai, 2014 | / | / | / | / | | / | | | | | / | | / | |
| 12 | Nasab & | / | / | / | | | | / | | | | / | / | | |

| | Themes: | Philosophy | | | | Implementation | | | | | Impacts | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sub-themes: | Community-centered | Academic learning | Practical@ hands-on | Outcome-based | Sustainability | Direct | Indirect | Advocacy | Research based | Knowledge | Softskills | Enhanced engagement | Capacity building | Values |
| | Meghdadi, 2012 | | | | | | | | | | | | | | |
| 13 | Allen, et.al., 2012 | / | / | / | | | / | | | | / | / | / | | |
| 14 | Israel, et.al., 2010 | / | / | / | / | | | / | | | | / | | | |
| 15 | Duncan, 2010 | / | / | / | | | / | | | | / | / | / | | |
| 16 | Rougeau, 2009 | / | / | / | | / | / | | | | / | / | / | | |
| 17 | Blissenden, 2006 | / | / | / | / | | | | | | / | / | / | | / |

*Figure 3* Summary of thematic analysis

## Discussion

This paper provides a systematic literature review of service learning, its philosophies, implementations and impacts on legal education. While we can find many literatures that discuss on service learning, the literatures that specifically focus on learning as implemented in law schools or involving law students, especially in Malaysian context, is still limited. This has enabled the authors, and perhaps others that involve in legal education, to propose and develop more research on service learning or other forms of experiential learning in legal education. We found scarcity of literatures on methods of delivery, or teaching and learning law in flagship legal publications, i.e, CLJ Law and Lexis Advance Malaysia. However, it is understandable that this is due to the nature of the publications that focused on the substantive and procedural aspects of law. Nevertheless, publications on legal education in general is abundant.

Service learning has been accepted and adopted as a tool of learning, or pedagogy, in law school across many countries in Asia, Europe and Western. It is learnt that there are many ways on how service learning can be implemented, for example, through collaboration with NGOs, legal aid clinics, industries and professionals. These can be taken into consideration for future implementation of service learning for law students in Malaysian universities. Service learning is not limited to be participated by law students only, but can be extended to other organs inside or outside the universities. However, we acknowledge that the question whether law schools or legal educators are prepared to adopt and expand this particular high impact educational practice is a question that must be addressed at the institutional level.

Based on the review, the impacts of service learning are strikingly evident in developing soft skills of students and engagement with communities for the purpose of applying legal knowledge to the real situation. These soft skills range from listening skills, communication skills, critical thinking skills and presentation skills to

technical skills such as designing research projects. These are very important skills for law graduates, as the underlying purpose of legal education is to produce graduates who are not only knowledgeable, but able to apply the knowledge and play an effective role to solve problems or minimize conflicts in the community.

It is also learnt that service learning requires dedication and thorough preparation on the part of supervisors or instructors. Students must be given clear direction on the objectives, phases and expected outcomes of service learning. A study specifically mentioned that a training session was provided for Street Law students before they conduct their service learning project for secondary school students (Bracken, 2022). Some basic understanding and skills are needed on the part of the instructors, such as to align between course learning outcomes with service learning activities and the assessment. Students must be made clear of the aspects that will be assessed throughout the project. In relation to this as well, we need to consider whether the benefits to students proportionate with the workload on the part of supervisors; and whether students learning time (SLT) is proportionate with the projects and marks given. Without proper clarification of this, there could be a perception that service learning entailing more works compared to conventional teaching and learning.

The assessment for service learning project is a kind of authentic assessment because students need to apply their theoretical knowledge to a unique real case scenario, instead of regurgitate what has been taught during lectures. The criteria of assessment is specified in a rubric. A study conducted by Williamson (2017) had discussed the adoption of Singapore Declaration on Global Standards and Outcomes of a Legal Education 2013, whereby, in this study, an analysis has been made on how the values in this Declaration can be met by the use of rubrics. It was found that rubric has several advantages, among others, it allows students to understand what is expected of them before they attempt a task; it encourages fairness and promote a culture of trust between student and teacher; and it allows the teacher to engage in post-task meaningful discussions with students. In addition to field work assessment, students can be assessed through reflection, where students write their own self-evaluation on learning experience. Reflection can be done in many ways such as journaling, reporting, presentation, online or in person.

Last but not least, in line with rapid advancement of technology and digital learning, especially post Covid-19 pandemic, law schools or course instructors should consider the suitability of adopting electronic service learning or hybrid service learning. There are literatures that shows e-service learning can leave positive impacts on students of higher learning institution (Schmidt, 2021; Shek et.al., 2022). For this purpose, there is a need to effectively integrate Information and Communication Technology into online platform to develop both the activities and assessment (Dapena et.al., 2022).

## Limitation

This writing is made based on a review of 17 literatures from 5 databases only, i.e., Scopus, ScienceDirect, Taylor and Francis Online, CLJ Law and Lexis Advance Malaysia. The literatures were selected based on the criteria that has been outlined earlier. It is undeniable that there could be other relevant literatures in other databases, but they could not be covered in this paper due to technical limits. Therefore, the

findings and discussions are specific for the context of this paper only and does not intent as a generalisation for other context of study.

## Conclusion

Through a systematic literature review method (SLR), this paper has presented the rationale behind the implementation of service learning, how it is structured into law classroom and its impacts on legal education. 'Community-centred' is a strong philosophical element underlying service learning. There are other elements that make up service learning, i.e., academic learning, practical or hands-on experience, outcome-based learning and sustainability. However, if the last four elements are available but the first and foremost element of community service is not there, then it is not a service learning. Serving the community is the heart and soul of service learning. The implementation of service learning should not be static, it can be diversified according to the intended learning outcomes. Other aspects such as accessibility to community, availability of facilities and other scenarios, such as disease outbreak, must also be taken into consideration in the implementation strategies. The literatures shows that service learning is an impactful learning activity. It is one of the high impact educational practices that should be considered by educator in higher learning institutions. It promotes independent and active learning, as well as increase rate of retention and engagement because students are learning by doing. It leaves added value to the students as they acquire numerous soft skills that are crucial for legal profession. This in turn, will ensure capacity building for law schools as a professional academic institution.

## References

Allen, M. D., Parker, S. A., & DeLorenzo, T. C. (2012). Civic Engagement in the Community: Undergraduate Clinical Legal Education. *Journal of Political Science Education*, *8*(1), 35-49.

Ashgar Ali, A.M. (2021). Transforming Legal Education Teaching and Learning: The Remote Communication Technology. Malayan Law Journal 2, cxxxvii

Babacan, A., & Babacan, H. (2017). Enhancing civic consciousness through student pro bono in legal education. *Teaching in Higher Education*, *22*(6), 672-689.

Bekaert, S., Paavilainen, E., Schecke, H., Baldacchino, A., Jouet, E., Zabłocka–Żytka, L., Bachi, B., Bartoli, F., Carra, G., Cioni, R.M., Crocamo, C. & Appleton, J. V. (2021). Family members' perspectives of child protection services, a metasynthesis of the literature. *Children and youth services review*, *128*, 106094.

Blissenden, M. (2006). Assessment and reflection in the service learning arena: An application to the area of revenue law. *The Law Teacher*, *40*(2), 173-194.

Boys, S. K., Quiring, S. Q., Harris, E., & Hagan, C. A. (2015). Social work and law interdisciplinary service learning: Increasing future lawyers' interpersonal skills. *Journal of Teaching in Social Work*, *35*(4), 410-424.

Butin, D.W. Service-learning as post-modern pedagogy. In Butin, D.W. (Ed.), Teaching social foundations of education: Contexts, theories, and issues, Erlbaum, Mahwah, NJ (2005), pp. 109-126.

Dapena, A., Castro, P. M., & Ares-Pernas, A. (2022). Moving to e-Service Learning in Higher Education. *Applied Sciences*, *12*(11), 5462.

Duncan, N. (2010). Patrick Keyzer, Amy Kenworth and Gail Wilson (eds), Community Engagement in Contemporary Legal Education: Pro Bono, Clinical Legal Education and Service Learning, *The Law Teacher*, *44*(1), 99-102.

Fryar, K. (2019). Pro Bono: for whose benefit? *Ethos: Official Publication of the Law Society of the Australian Capital Territory*, (252), 22-29.

Gillis, C., & Tushaus, D. (2018). Value of Service Learning Through Global Collaborations. *Asian Journal of Legal Education*, *5*(1), 1-20.

Gurpur, S., & Rautdesai, R. (2014). Revisiting legal education for human development: Best practices in South Asia. *Procedia-Social and Behavioral Sciences*, *157*, 254-265.

Hallenberg, K. M., & Haddow, C. (2016). Beyond criminal justice: connecting justice and sustainability. *The Law Teacher*, *50*(3), 352-370.

Knee, E., & Thomas Means, W. (2018). Out of the stands and onto the court: A signature pedagogy for the recreation field. *Schole: A Journal of Leisure Studies and Recreation Education*, *33*(2), 70-86.

Mohamad, A.M., Mohd Arshad, A.H., and Mohd Noor, N.A. (2021). *Service Learning Implications for Legal Studies: Students' Reflections*. Proceeding 5th Inspirational Scholar Symposium (ISS) 2020, Organized by University Teaching and Learning Centre (UTLC), University Utara Malaysia, 10-11 November 2020.

Mohamed Shaffril, H. A., Samsuddin, S. F., & Abu Samah, A. (2021). The ABC of systematic literature review: The basic methodological guidance for beginners. *Quality & Quantity*, *55*(4), 1319-1346.

Pedaste, M., Mäeots, M., Siiman, L. A., De Jong, T., Van Riesen, S. A., Kamp, E. T., Manoli, C.C., Zacharia, Z.C. & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational research review*, *14*, 47-61.

Rougeau, V. D. (2009) Reforming the Legal Profession Through Faith-Based Service Learning for Law Students: Notre Dame's "Just Communities" Project, Journal of College and Character, 10:7, , DOI: 10.2202/1940-1639.1439

Rusu, A. S., Bencic, A., & Hodor, T. I. (2014). Service-Learning programs for Romanian students–an analysis of the international programs and ideas of implementation. *Procedia-Social and Behavioral Sciences, 142*, 154-161.

Schmidt, M. E. (2021). Embracing e-service learning in the age of COVID and beyond. *Scholarship of Teaching and Learning in Psychology*.

Shek, D. T., Li, X., Yu, L., Lin, L., & Chen, Y. (2022). Evaluation of Electronic Service-Learning (e-Service-Learning) Projects in Mainland China under COVID-19. *Applied Research in Quality of Life*, 1-24.

Tushaus, D. W., Gupta, S. K., & Kapoor, S. (2015). India legal aid clinics: creating service learning research projects to study social Justice. *Asian Journal of Legal Education*, *2*(2), 100-118.

Urinboyev, R., Wickenberg, P., & Leo, U. (2016). Child rights, classroom and school management: A systematic literature review. *The International Journal of Children's Rights*, *24*(3), 522-547.

Williamson, M. E. (2017). Global standards and outcomes of a legal education: how rubrics can help to deliver objectivity, transparency, verifiability and consistency. *The Law Teacher*, *51*(3), 287-311.

## Contact Information

Secretariat
Inspirational Scholar Symposium 2022
University Teaching and Learning Centre (UTLC)
Universiti Utara Malaysia, 06010 Sintok, Kedah
Kedah Darul Aman.

Tel: 04-9284707/4698
Faks: 04-9284701

Email: fadhlina@uum.edu.my
raihanah@uum.edu.my
nurassila@uum.edu.my