

2022 ASEAN QUALITY ASSURANCE CONFERENCE

EMERGING FROM CRISIS:

REFINING QUALITY ASSURANCE TOWARD STABILITY IN HIGHER EDUCATION

PROCEEDINGS OF THE ASEAN QUALITY ASSURANCE CONFERENCE 2022

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EMERGING FROM CRISIS: REFINING QUALITY ASSURANCE TOWARDS STABILITY IN HIGHER EDUCATION

Proceedings of ASEAN Quality Assurance Conference (AQAC) 2022

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PREFACE

The path, of course, is not always smooth, and may at times this year have felt quite bumpy, but small steps can make a world of difference.

Queen Elizabeth II of the United Kingdom

In 2021, Sunway University and the Malaysian Higher Education Institutions Quality Assurance Network (MyQAN), supported by the Malaysian Qualifications Agency (MQA), co-organised the Seminar on Internal-External Quality Assurance (SieQA) 2021 which was attended by 400 participants. The ASEAN Quality Assurance Conference (AQAC) 2022, a sequel to the SieQA 2021, is focused on the initiatives to maintain the culture of quality and to create a more focused goal based on the current environment, post-COVID-19. The Conference's objectives were to recognise and share progress in the development of quality assurance benchmarks as institutions experience the impact of COVID-19, to explore the importance of a pervasive quality assurance (QA) culture within academic institutions, and to discuss strategies for transition from emergency remote teaching and learning to a holistic hybrid educational experience.

As postulated by YBhg Professor Dato' Dr Mohammad Shatar Sabran (Chief Executive Officer, Malaysian Qualifications Agency), Higher Education Institutions (HEIs) are urged to incorporate Education for Sustainable Development as well as Planetary Health into HEIs' Quality Assurance framework. Malaysia's education system must equip students with the knowledge and mindfulness of these challenges, and HEIs are tasked to produce students who are conscientious of the planet, nature, and environment. The HEIs should aim to produce graduates who can work anywhere in ASEAN, with their qualifications recognised in all ASEAN nations.

In the Honourable Datuk Seri Dr Noraini Ahmad's (Minister of Higher Education Malaysia) address to learners, learners are reminded of the need for continuous improvement as the priority of QA at the HEI level, especially during the period of transitioning and adjusting to the new normal. Learners are also urged to continue to reflect and refine education and quality assurance practices in new forms of

learning, teaching, assessing, and monitoring which require innovative thinking and adjustment to a future-forward mindset, while developing and strengthening the culture of quality in HEIs should be continued.

Post-COVID-19 pandemic, HEIs have worked hard to ensure that students can receive quality education adequately. Institutions reviewed and restructured their teaching and learning approaches, and lecturers went the extra mile to enhance students' learning experience. During AQAC 2022, various areas of best practices were showcased and discussed on how best HEIs could support the students, while maintaining and delivering the standards of the programmes' learning outcomes. Now that we are in the endemic phase, it is also important for us to look for new and innovative ways to ensure quality assurance in a post-COVID-19 world, and even beyond that.

Our gratitude to the keynote speakers—Professor Melinda Dela Peña Bandalaria Chancellor (University of the Philippines Open University) and Professor Dr Angela Yung Chi Hou—Professor and Associate Dean, College of Education (National Chengchi University, Taiwan)—for addressing the learners on open, flexible, and distance learning, and the importance of ensuring the quality assurance during and post-COVID-19.

We were also honoured to have Assoc Prof Dr Fariza Khalid (Deputy Director, Center of Education Extension of Universiti Kebangsaan Malaysia), Ms Caroline Yap Yu Li (Principal Teaching Fellow, Department of Accounting, Sunway University Business School, Sunway University) and Dr Alexius Chia (Associate Dean, Practicum & Partnerships, Office of Teacher Education, National Institute of Education, Singapore) who shared their views and directions of future QA in learning and teaching practices during the forum.

To our 2nd forum speakers—Prof Dr Hjh Hanim Salleh (Deputy President, MyQAN), Assoc Prof Dr Gerardo L Largoza (Executive Director, De La Salle University Strategic Management & Quality Assurance Office; and Member, ASEAN University Quality Assurance Council), and Prof Ir Dr Khairul Salleh bin Mohamed Sahari (Deputy Chief Executive Officer, Malaysian Qualifications Agency (MQA)—thank you for shedding light on quality assurance and best practices in ASEAN.

The seminar and proceedings would not have been possible without the leadership of the advisors of AQAC 2022—Professor Dr Elizabeth Lee (CEO, Sunway Education Group; Sunway Education Group Chair, AQAC2022), Professor

Graeme Wilkinson (Tan Sri Jeffrey Cheah Distinguished Professor and Advisor to the President), Ms Ng Beng Lean (Group Registrar, Sunway Education Group), Professor Matthew Sansom (Chairperson, AQAC 2022), and Associate Professor Dr Sim Tze Ying (Organizing Chairperson, AQAC 2022), as well as the committed organising committees from various business units of Sunway Education Group.

This proceedings volume is the formal record of AQAC 2022, and it is hoped that this report will not only provide readers with up-to-date information about quality assurance processes in higher education institutions but also ideas, experiences, and best practices from quality assurance professionals across Southeast Asia.

ACKNOWLEDGEMENTS

This proceedings volume would not have been possible without the leadership and partnership of various parties. We thank the individuals below for their contributions in reviewing the submissions and final papers included in this report.

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CRACKING THE CODE: AN INNOVATIVE WAY OF EMBEDDING FORMATIVE ASSESSMENTS IN THE NUMBER-BASED WEB ATTENDANCE SYSTEM

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ABSTRACT

Efficient documentation of students' attendance reports is imperative in monitoring students' progress and providing supporting evidence for audit purposes. Since 2017, Sunway University has adopted the iCheckIn web attendance system, which requires learners to key in a unique 5-digit numeric code generated by instructors. Leveraging on the numerical nature of the iCheckIn codes, the otherwise mundane attendance-taking routine could be made more rewarding and engaging by creatively embedding formative assessments in the process. This work proposes an innovative way of embedding formative assessments in the existing number-based web attendance system. The study also presents and analyses the feedback collected from learners. We first presented the principles in designing mathematical questions such that their solutions match the generated 5-digit iCheckIn codes. We then administered a questionnaire to collect feedback from learners. Both descriptive and inferential analysis were employed in analysing the data collected. A total of 152 respondents participated in the survey. The mean score of the six items in the questionnaire ranged from 3.78 to 4.07. No significant difference between population means was observed across respondents from different demographic groups. Learners found the proposed mechanism interesting and stimulating. In addition to fostering teaching creativity, the innovative practice of embedding formative assessments in the number-based web attendance system greatly benefits both instructors and learners, by providing insightful feedback to instructors in

assessing students' understanding on the topics taught in previous lessons. From learners' point of view, these interactive activities increase their engagement during lessons and promote peer discussions.

Keywords Formative assessments; web attendance system; educational innovation

INTRODUCTION

Formative assessment is an integral part of the teaching and learning process. It gathers information about learners' comprehension level and provides insights to instructors in adjusting their instructional strategies so as to meet learners' needs (Black & William, 2009). Though the benefits of formative assessments are well documented, their effective implementation have been hindered due to personal and contextual factors, which include instructors' incompetence of assessment principles, complexity of the classroom ecosystem, and regulatory policies (Yan et al., 2021). A conducive learning environment and good support measures are instrumental in promoting the successful implementation of formative assessments.

Automated attendance systems serve the primary purposes of recording learners' participation in classes and providing supporting evidence for audit and programme-monitoring purposes (MQA, 2014). The attendance systems also provide great opportunities for instructors to creatively embed formative assessments in the otherwise mundane attendance-taking routine. A multitude of automated web-based attendance systems have been proposed and implemented in various higher education providers worldwide. These include barcode-based (Elaskari et al., 2021), biometric-based (Raj & Basu, 2021), facial recognition-based (Sunaryono et al., 2021), QR code-based (Liew & Tan, 2021), and radio-frequency identification (RFID)-based systems (Wakchoure et al., 2022). These works reported in the literature have largely focused on the development of efficient attendance systems that aim to reduce the administrative burden of instructors. The previous research works, however, have not considered the incorporation of formative assessments in the various web attendance systems.

Since 2017, Sunway University has adopted a number-based web attendance system, termed the iCheckIn system, where learners are required to key in a 5-digit code generated by instructors during classes. To the authors' best knowledge, this is the first study that reports how assessments can be creatively and seamlessly embedded into the existing web attendance system. The objectives of this paper are two-fold:

1. To devise a novel attendance-taking mechanism by embedding formative assessments in the process
2. To evaluate the effectiveness of the proposed mechanism based on the feedback collected from learners

The rest of this paper is organised as follows. Section 2 first provides an overview of the implementation of the proposed mechanism, illustrated using a mathematical problem as an accompanying example. Section 2 then describes the methodology adopted to collect data from learners. Section 3 presents the results of the survey, whereas Section 4's discussion illustrates the study's main findings. Lastly, Section 5 concludes the paper, identifies limitations of the study, and provides some suggestions for future research.

MATERIALS AND METHODS

Principles and Guidelines in Designing Questions for the iCheckIn System

The iCheckIn web attendance system, adopted by Sunway University since 2017, requires instructors to sign in to the iCheckIn system to generate a 5-digit iCheckIn code, which will be shared with learners during the classes. The learners will then key in the given code using their mobile devices to complete the attendance-taking process.

Figure 1 depicts a screen capture of the iCheckIn's system, where the top page displays the 5-digit iCheckIn code. The names of all learners initially appear on the right column of the page (indicated as '**Not Checked In!**'). Learners who have entered the correct iCheckIn code will appear on the left column of the page (indicated as '**Checked In!**').

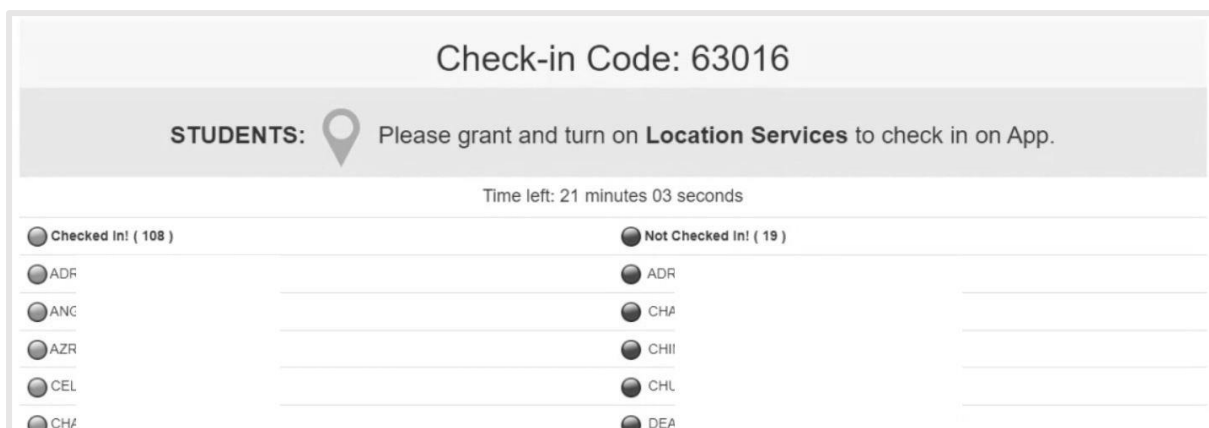


Figure 1 A screen capture of the iCheckIn web-attendance system

We illustrate how the questions can be designed and embedded into the iCheckIn system using the following mathematical question as an accompanying example to guide our discussion.

Question: Let $A = \begin{pmatrix} 1 & 1 & 1 \\ x & 2 & 1 \\ x^3 & 8 & 1 \end{pmatrix}$ be a square matrix of size 3. The three solutions

of the equation $\det(A) = 0$ are given by x_1 , x_2 , and x_3 , where $x_1 < x_2 < x_3$. The iCheckIn code is given by $c = 3x_1 + 2x_2 + x_3 + d$.

1. Formulating the question - We prepare the question to be embedded in the iCheckIn system prior to the lesson. We take note of the incomplete question that contains the missing value d , which needs to be computed based on the 5-digit code, c , generated during the lesson.
2. Generating the iCheckIn code - While generating the iCheckIn code during lesson, we should ensure that the code is only made available to us, without revealing the code to learners.
3. Re-formulating the question - Based on the mathematical question, we re-formulate the mathematical question such that the final answer matches the 5-digit iCheckIn code, namely 63016. The values of x_1 , x_2 , and x_3 are -3, 1, and 2, respectively.

$$c = 3x_1 + 2x_2 + x_3 + d = 3(-3) + 2(1) + 2 + d = -5 + d = 63016 \Rightarrow d = 63021$$

Solving for d , we obtain $d = 63021$. We then pose the following question to learners:

Question: Let $A = \begin{pmatrix} 1 & 1 & 1 \\ x & 2 & 1 \\ x^3 & 8 & 1 \end{pmatrix}$ be a square matrix of size 3. The three solutions of the equation $\det(A) = 0$ are given by x_1, x_2 , and x_3 , where $x_1 < x_2 < x_3$. The iCheckIn code is given by $c = 3x_1 + 2x_2 + x_3 + 63021$.

4. Motivating and rewarding learners - We then allow learners some time to work on the mathematical problem. We may provide additional hints to learners to promote discussion among peers and to motivate them in attempting the problem. We take note of learners who have solved the question as their names will appear on the left column of the iCheckIn page, marked by green dots.
5. Discussing the solution - We guide learners in the subsequent discussion on how to solve the question posed, before revealing the actual i-CheckIn code. We upload the question posted to learning management system after the lesson to allow learners to access the instructional materials.

Study Design

This study involved both quantitative and qualitative investigations of learners' perceptions with regard to the incorporation of formative assessments in the web-attendance system. The target population was 220 students who were taking either Linear Algebra and Applications (a Year One mathematics subject) or Simulation and Credibility Theory (a Year Three actuarial mathematics subject) during the semester commencing April 2022. We implemented the proposed mechanism in the classes of these two subjects throughout the semester. Towards the end of the semester in June 2022, we distributed a self-administered online questionnaire to these students.

The questionnaire contained three main sections. The first section consisted of three demographic questions, collecting the respondents' information such as gender, subject taken, and programme. The second section consisted of six 5-point Likert scale questions (responses included strongly disagree, disagree, neutral, agree, and strongly agree) aimed at characterising the respondents'

feedback on the proposed mechanism. The third section contained an open-ended question, which allowed the respondents to provide narrative responses regarding the implementation of the mechanism.

Data Analysis

We reported the respondents' demographic information in terms of frequency and percentage. In addition, we computed the values of descriptive statistics, namely mean and standard deviation, for the responses collected from the six 5-point Likert scale questions. We performed Student's *t*-tests and one-way ANOVA tests to determine if there are any significant difference in the population means across different groups of respondents. We employed a significance level of $\alpha = 0.05$ in this study. Based on the additional open-ended feedback provided by the respondents, we created a word-cloud image that highlighted the most prominent key words.

RESULTS

Respondents' Profile

A total of 152 students completed the questionnaire. This figure represented 69.1% of the target population. Table 1 summarises the distribution of the respondents' characteristics. The respondents were almost equally divided between the two genders. Approximately 61% of the respondents took the subject Linear Algebra and Applications, whereas the remaining 39% took the subject Simulation and Credibility Theory. At almost 80%, the majority of the respondents studied the Actuarial Studies programme. The remaining 20% were made up of students enrolling in the Industrial Statistics and Information Systems Data Analytics programmes, with approximately 10% each.

Table 1 *Respondents' characteristics*

Characteristic	Responses	Frequency	Percentage
		<i>n</i>	%
Gender	Male (M)	75	49.3
	Female (F)	77	50.7
Subject Taken	Linear Algebra and Applications (LAA)	93	61.2
	Simulation and Credibility Theory (SCT)	59	38.8
Programme	BSc (Hons) in Actuarial Studies (BAS)	121	79.6
	BSc (Hons) in Industrial Statistics (BINDS)	15	9.9
	Bachelor of Information Systems (Hons) Data Analytics (BSDA)	16	10.5

Learners' Perception of the Proposed Mechanism

Table 2 reports the values of mean and standard deviation (SD) for each of the six 5-point Likert scale questions (1 – strongly disagree; 2 – disagree; 3 – neutral; 4 – agree; 5 – strongly agree). Item 3, asking respondents if the mechanism “enables [them] to assess [their] understanding on the topics taught previously”, yielded the highest mean value at 4.07, whereas item 6, asking respondents if the mechanism “creates healthy competition among peers”, gave the lowest mean value at 3.78.

Table 2 *Learners' responses on the incorporation of formative assessments in the web attendance system*

No.	Item – The integration of formative assessments in the i-CheckIn web attendance system	Mean	SD
1	Is a more interesting way to record the attendance compared to the ‘standard’ attendance taking process.	4.06	1.16
2	Provides additional resources and questions, in addition to lecture examples and tutorial questions.	4.00	1.12
3	Enables me to assess my understanding on the topics taught previously.	4.07	1.13
4	Motivates me in my learning process.	3.93	1.16
5	Promotes discussion among peers.	3.95	1.19
6	Creates healthy competition among peers.	3.78	1.23

Table 3 Hypothesis testing using Student's *t*-tests and ANOVA tests

Student's <i>t</i>-tests				
Item	Mean (SD)		<i>p</i>-value	
	Male ($n_M = 75$)	Female ($n_F = 77$)		
1. Interesting approach	4.19 (1.11)	3.97 (1.20)	0.26	
2. Providing additional resource	4.11 (1.01)	3.90 (1.21)	0.25	
3. Assessing understanding	4.20 (1.05)	3.95 (1.20)	0.17	
4. Providing motivation	4.07 (1.04)	3.79 (1.26)	0.15	
5. Promoting peer discussion	4.08 (1.15)	3.82 (1.22)	0.18	
6. Creating healthy competition	3.97 (1.15)	3.60 (1.29)	0.06	
Item	Mean (SD)		<i>p</i>-value	
	LAA ($n_L = 93$)	SCT ($n_S = 59$)		
1. Interesting approach	3.94 (1.24)	4.31 (0.99)	0.06	
2. Providing additional resource	3.91 (1.18)	4.14 (1.01)	0.23	
3. Assessing understanding	3.96 (1.22)	4.25 (0.98)	0.12	
4. Providing motivation	3.82 (1.22)	4.10 (1.06)	0.14	
5. Promoting peer discussion	3.91 (1.28)	4.00 (1.03)	0.66	
6. Creating healthy competition	3.76 (1.28)	3.81 (1.17)	0.81	
One-way ANOVA tests				
Item	Mean (SD)			<i>p</i>-value
	BAS ($n_1 = 121$)	BINDS ($n_2 = 15$)	BSDA ($n_3 = 16$)	
1. Interesting approach	4.12 (1.14)	3.93 (1.39)	3.88 (1.09)	0.64
2. Providing additional resource	4.02 (1.09)	3.80 (1.37)	4.00 (1.10)	0.77
3. Assessing understanding	4.08 (1.10)	3.93 (1.49)	4.13 (1.09)	0.88
4. Providing motivation	3.96 (1.16)	3.87 (1.36)	3.75 (1.06)	0.78

5. Promoting peer discussion	3.97 (1.21)	4.00 (1.00)	3.75 (1.24)	0.78
6. Creating healthy competition	3.79 (1.21)	3.67 (1.50)	3.81 (1.22)	0.93

Table 3 presents the p -values of all the hypothesis tests. We performed Student’s t -tests to determine if there are any significance difference between the population means of the responses received across various groups (male versus female, and students taking the two courses). We also performed one-way ANOVA tests to investigate if there are any significant difference between the values of the responses, across three groups of students who enrolled in different academic programmes. Using a significance level of $\alpha = 0.05$, we reported that there was no significant difference observed for all cases considered.

Figure 2 depicts the word cloud generated based on the feedback collected for the open-ended question that asks respondents the following question: “How would you describe your experience of the incorporation of formative assessment in the i-CheckIn web attendance system?” The word cloud highlights several prominent key words which include “interesting”, “good”, “great”, “fun”, “unique”, “exciting”, “creative”, and “interactive”.

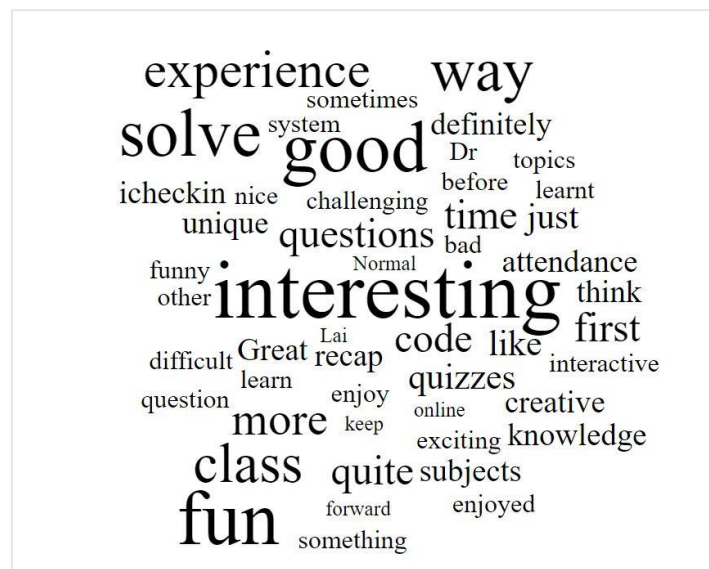


Figure 2 *Word cloud summarising respondents’ feedback on the proposed mechanism*

DISCUSSION

Learners' Perception of the Proposed Mechanism

Item 3 of the questionnaire, which asked learners whether the proposed mechanism “enables [them] to assess [their] understanding on the topics taught previously, reported the highest mean value at 4.07. This suggested that learners viewed the proposed mechanism as a viable platform to self-assess their comprehension of the concepts covered in previous topics. This shows that formative assessments drive the motivation for learners to engage in self-regulated learning, which provides useful feedback to learners regarding their level of understanding. This finding corroborated a work reported previously, where formative assessments, when implemented successfully, will enhance learners’ self-regulated learning (Granberg et al., 2021).

The item that yielded the second highest mean score, at 4.06, was item 2, which asked respondents whether the proposed mechanism “is a more interesting way to record the attendance compared to the ‘standard’ attendance taking process”. It is noteworthy to highlight that most learners found the traditional attendance-taking approach to be a mundane and time-consuming routine, not to mention the potential flaw in the existing system, which learners might abuse to update attendance on behalf of their peers (Arif et al., 2018). While our work does not address this potential flaw, it definitely injected an exciting element and twist in the procedural attendance-taking routine. Employing a variety of formative assessments is of great importance in generating significant learning and enhancing learners’ attainment of learning outcomes (Cifrian et al., 2020).

Item 6, which asked respondents whether the mechanism “creates healthy competition among peers”, received the lowest mean score at 3.78. Interestingly, this item also reported the highest standard deviation at 1.23. The relatively low mean score, coupled with a comparatively high value obtained for the measure of dispersion, indicated a mixed response among learners. This finding was further supported by the feedback collected from the open-ended question, where a respondent wrote, “[I] wish to be the first one to check in.” Another respondent wrote, “I still wait for the code most of the time.”

Hypothesis Testings on Learners' Feedback across Different Groups

Based on the Student *t*-tests and one-way ANOVA tests conducted, we observed no significant difference in the population means of the responses collected for each of the six 5-point Likert scale questions across the three demographic characteristics (i.e., the two genders, the two subjects, and the three programmes).

Nonetheless, it is noteworthy to highlight that two cases where the obtained *p*-values were 0.06 approximated the significance level $\alpha = 0.05$ employed in this study. The first case reported that there was no significant difference between male and female respondents, and that the mechanism “creates a healthy competition among peers”. In contrast, a previous work has concluded that there was a significant difference in how students from different genders responded to various assessment tools (Hendricks et al., 2016).

The second case considered whether the mechanism “is a more interesting way to record the attendance compared to the ‘standard’ attendance taking process”, by comparing responses from students taking the two subjects. Though students taking the Year Three subject Simulation and Credibility Theory reported a greater sample mean compared to those taking the Year One subject Linear Algebra and Applications, further statistical analysis revealed no significant difference in students' views. This finding contradicted the results reported previously, where students from different phases of study were found to provide significantly different quantitative feedback based on their assessment experience (Adam et al., 2021). However, a fair comparison could not be performed as the target population for this study was students taking mathematics-related courses, whereas the target population for Adam et al.'s (2021) study was medical students.

Learners' Narrative Feedback

We highlighted some noteworthy feedback collected from the open-ended question in the questionnaire. The following comments are consistent with what was reported by Carrillo et al. (2019), where the incorporation of gamification in classes has proven to increase learners' motivation. A respondent described the mechanism as “a welcoming change to the original check-in system”. Another respondent noted “it was engaging and creative. [I]

appreciate the effort to keep us engaged and focused during the class.” Another similar comment included “this is something new, I am glad to see minigames like this incorporated into university sessions”.

Most learners also remarked how the formative assessments have provided a mechanism to self-assess their understanding, which is consistent with findings reported by Rahayu and Purnawarman (2019), where innovative self-assessment methods were crucial in providing feedback to learners. The relevant comments collected include “It definitely tested my knowledge on the materials taught”, “[it] also helps to reinforce my knowledge on the course”, “it was a good way to motivate me to refresh my knowledge on the lessons taught previously”, and “it is a quick indication on whether I have understood the contents of the week”.

CONCLUSION

This study presented a novel method of embedding formative assessments in the number-based web attendance system. Based on learners’ feedback, we showed that they favoured and welcomed the proposed mechanism. This good practice benefits instructors in terms of obtaining useful insights into learners’ progress. Moreover, learners also found the interactive activities to be engaging and motivating. In addition to fostering teaching creativity, the findings of this work also provide ideas to improve current assessment practice which, in turn, provide meaningful experience to learners.

This work has mainly focused on obtaining feedback from learners, and it would be interesting to collect feedback from instructors who have adopted this mechanism. Though such a method of recording attendance using the number-based attendance system is more relevant for mathematics and accounting modules, the idea can be creatively extended to other modules and other web-based attendance systems. Furthermore, designing a more comprehensive questionnaire that encompasses various domains and more items would be a good future research direction.

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The authors declare no conflicts of interest.

REFERENCES

- Adam, S. K., Mazlan, N. A., Selvakumar, S., Teh, X. H., & Idris, F. (2021). Undergraduate students' perception on assessment experience in a Malaysian medical school: Comparison among gender, ethnicity and phase of study. *IIUM Medical Journal Malaysia*, 20(3), 61–69.
- Arif, Z. H., Ali, N. S., Zakaria, N. A., & Al-Mhiqani, M. N. (2018). Attendance management system for educational sector: Critical review. *International Journal of Computer Science and Mobile Computing*, 7(8), 60–66.
- Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment. *Educational Assessment, Evaluation and Accountability*, 21(1), 5–31.
- Carrillo, L. D., García, C. A., Laguna, R. T., Magán, R. G., & Moreno, J. A. (2019). Using gamification in a teaching innovation project at the University of Alcalá: A new approach to experimental science practices. *Electronic Journal of E-learning*, 17(2), 93–106.
- Cifrian, E., Andrés, A., Galán, B., & Viguri, J. R. (2020). Integration of different assessment approaches: Application to a project-based learning engineering course. *Education for Chemical Engineers*, 31, 62–75.
- Elaskari, S., Imran, M., Elaskri, A., & Almasoudi, A. (2021). Using barcode to track student attendance and assets in higher education institutions. *Procedia Computer Science*, 184, 226–233.
- Granberg, C., Palm, T., & Palmberg, B. (2021). A case study of a formative assessment practice and the effects on students' self-regulated learning. *Studies in Educational Evaluation*, 68. <https://doi.org/10.1016/j.stueduc.2020.100955>
- Hendricks, K. S., Smith, T. D., & Legutki, A. R. (2016). Competitive comparison in music: Influences upon self-efficacy beliefs by gender. *Gender and Education*, 28(7), 918–934.
- Liew, K. J., & Tan, T. H. (2021). QR code-based student attendance system. 2021 2nd Asia Conference on Computers and Communications (ACCC), 10–14. DOI: 10.1109/ACCC54619.2021.00009

- Lok, B., McNaught, C., & Young, K. (2016). Criterion-referenced and norm-referenced assessments: Compatibility and complementarity. *Assessment & Evaluation in Higher Education*, 41(3), 450–465.
- Malaysian Qualifications Agency. (2022). Guidelines to good practices: Monitoring, reviewing and continually improving institutional quality (GGP: MR-CIIQ). <https://www2.mqa.gov.my/qad/garispanduan/MR%20CIIQ%20BI.pdf>
- Rahayu, I. S. D., & Purnawarman, P. (2019). The use of Quizizz in improving students' grammar understanding through self-assessment. *Proceedings of the Eleventh Conference on Applied Linguistics (CONAPLIN 2018), Indonesia*, 102–106. <https://doi.org/10.2991/conaplin-18.2019.235>
- Raj, S., & Basu, S. (2021). Attendance automation using computer vision and biometrics-based authentication—A review. *Computer Networks and Inventive Communication Technologies*, 757–767. https://doi.org/10.1007/978-981-15-9647-6_58
- Sunaryono, D., Siswanto, J., & Anggoro, R. (2021). An android based course attendance system using face recognition. *Journal of King Saud University-Computer and Information Sciences*, 33(3), 304–312.
- Wakchoure, S. S., Shewale, P. S., Rajput, J. G., Gaupal, S. A., Thakre, M. P., & Rade, M. R. (2022). Multiple approach of RFID-based attendance system using IoT. In Ranganathan, G., Fernando, X., Shi, F., & El Alloui, Y. (Eds.), *Soft Computing for Security Applications: Proceedings of ICSCS 2021* (pp. 487–499). Springer.
- Yan, Z., Li, Z., Panadero, E., Yang, M., Yang, L., & Lao, H. (2021). A systematic review on factors influencing teachers' intentions and implementations regarding formative assessment. *Assessment in Education: Principles, Policy & Practice*, 28(3), 228–260.

RESPONSIVE BLENDED LEARNING: A WAY FORWARD?

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ABSTRACT

Background Responsive Blended Learning was introduced in Heriot-Watt University Malaysia in response to the disruption to learning and teaching due to the COVID-19 pandemic. Besides responding to the pandemic lockdown, it also enables future learning and teaching activities in the digital era. It is designed as a response to any extraordinary situation, including the COVID-19 pandemic. However, with the transition to the endemic phase since 1 May 2022, many learning and teaching activities are returning to pre-pandemic modes.

Aim This study is intended to explore the perceived experience of the lecturers in adopting Responsive Blended Learning for future learning and teaching activities.

Methods Semi-structured interviews were conducted to gather the rich experiences of the lecturers. Data were analysed using thematic coding via Nvivo as a tool.

Findings Five themes emerged from the data which are increased flexibility, perceived student's engagement, advanced learning experience, and comprehensive assessments.

Conclusion Responsive Blended Learning is perceived as a useful tool for future learning and teaching. However, it was not always perceived as positive approach due to the increased workloads. It is suggested that future research can explore the views of students as the end users to ensure a broader understanding of Responsive Blended Learning.

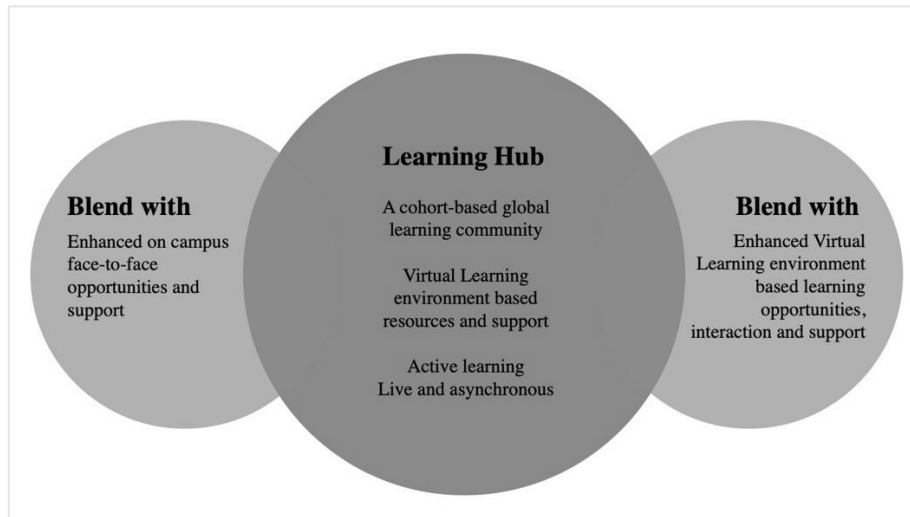
Keywords Responsive blended learning; university; learning and teaching

INTRODUCTION

Though many universities have been promoting the use of blended learning, the academicians in universities are still apprehensive about its effectiveness (Ma'arop & Embi, 2016). Academicians have no choice but to adopt blended learning as the outbreak of the COVID-19 has disrupted the learning and teaching environment in all parts of the world, including Malaysia (Shahzad, Hassan, Aremu, Hussain, & Lodhi, 2021; Sundarassen et al., 2020). In response to the pandemic, the management of Heriot-Watt University (HWU) has introduced Responsive Blended Learning (RBL) to all its campuses including the Malaysian campus (Heriot-Watt University, 2020). This RBL approach is designed specifically to enable the university to meet the needs of students and staff operating as one global university (Heriot-Watt University, 2020). Besides that, it also aims to respond to the dynamic changes in the external environment. There are three key areas that the university aims to respond to, which are (1) responsiveness to learning environment; (2) responsiveness to student learning context; and (3) responsiveness to the wellbeing needs of the global learning community.

To ensure an effective implementation of RBL, a delivery framework and recommended structure for RBL, with attention to the balance of synchronous contact and asynchronous learning resources, are needed to support students (Heriot-Watt University, n.d.). The framework ensures students are given the opportunity to engage face-to-face and online with course lecturers/tutors and each other on a weekly basis, but a significant proportion of their learning effort will be guided via the e-learning portal and comprise core content available asynchronously (Heriot-Watt University, n.d.). This requires the academics to restructure the teaching materials, adapt methods of delivery and introduce more guided learning activities to compensate for reduced class contact time. While blended learning is a familiar term in describing the learning and teaching approach of blending face-to-face with online activities, RBL is a new approach and yet to be explored. In the recent study by Megahed and Ghoneim (2022), a conceptual matrix on blended learning was proposed to fit into learning in post-pandemic. In addition, as the government has announced the transition to the endemic

phase which started on 1 May 2022, many learning and teaching activities are returning to pre-pandemic modes. Hence, this study intends to explore the perceived experience of the lecturers in adopting RBL for future learning and teaching activities.



Source: Learning and Teaching Academy, 2020

Figure 1 RBL framework

RESEARCH METHODS

This study adopts qualitative research that emphasises the individuals' "lived experience" as well as fundamentally discovers the meanings of events, processes, and structures of their lives by further connecting these meanings to the social world around them (Creswell & Creswell, 2018). According to Al-Huneidi and Schreurs (2011), the constructivism theory explains that the role of lecturers is essential and important in the learning process, where they understand how students interpret knowledge and respond to students to improve learning. Hence, the experiences of the participants in this study were

identified through semi-structured face-to-face interviews. Purposive sampling was adopted in selecting participants in order to achieve in-depth understanding (Patton, 2002) on RBL. A total of 10 Heriot-Watt University Malaysia's lecturers were interviewed (refer to Table 1). The interviews were recorded, transcribed, and analysed using thematic coding via Nvivo as a tool.

Table 1 *List of participants interviewed*

Participants	Position	Level Taught
P1	Assistant Professor	Foundation
P2	Assistant Professor	Foundation
P3	Assistant Professor	Undergraduate
P4	Assistant Professor	Undergraduate
P5	Assistant Professor	Undergraduate
P6	Assistant Professor	Postgraduate
P7	Assistant Professor	Undergraduate
P8	Assistant Professor	Undergraduate
P9	Associate Professor	Postgraduate
P10	Associate Professor	Undergraduate

Table 2 *Key interview questions for participants*

No	Interview Questions
1	Can you share your views about how RBL contributes towards future learning and teaching?
2	What recommendation can be implemented to cope effectively for future learning and teaching?

FINDINGS

The findings from the semi-structured interview revealed five (5) themes on RBL which are (1) perceived student's engagement; (2) increased workloads; (3) advanced learning experience; (4) increased flexibility; and (5) comprehensive assessments. The findings are discussed in the following subsection.

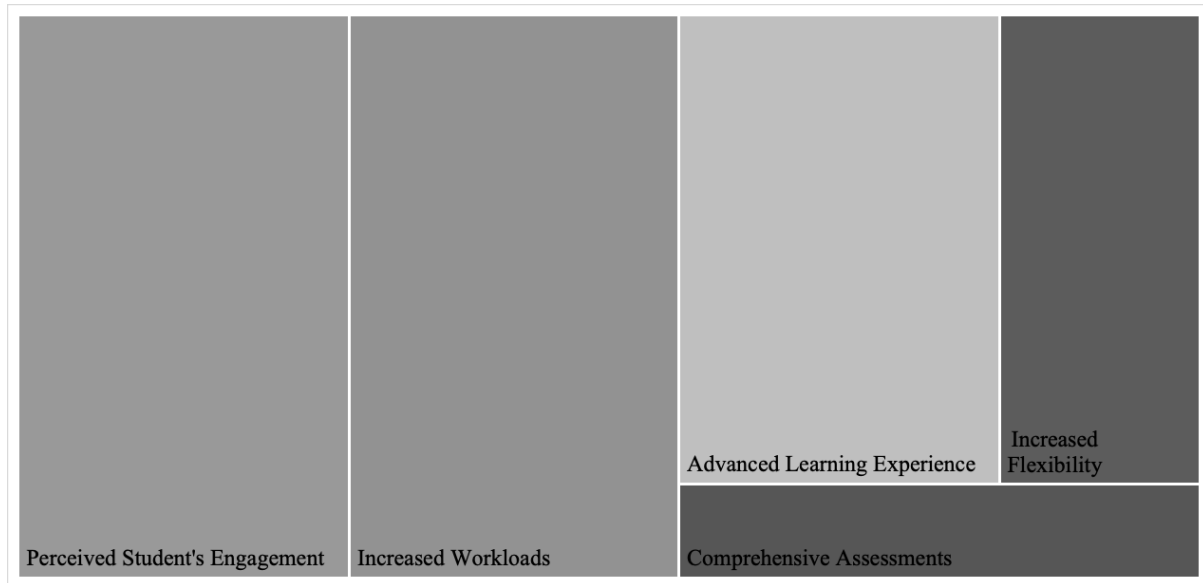


Figure 2 *Tree-map nodes of participants*

Perceived Student's Engagement

First, the participants revealed that the RBL platform has encouraged more student's engagement. For example, P3 commented that, "... students are more engaged compared to traditional classes." P1 commented that, "... the students are required to go through the materials first unlike traditional classes where the students come to class and then they expect us to go through with them the notes first." As a result, the participants (P1–P10) realised that the students are more open to discussions through RBL platforms. This is because the students are expected to look at the asynchronous materials in their own time prior to attending a class and, during a class, the academics will then use the time to discuss or debate on issues and cases. Thus, students' discussion is not confined to what is taught in the class only but a more practical side of the topic. Furthermore, students could engage with students from different campuses through RBL. P9 commented that "... it has been a much better approach so that we have more productive time with our students to actually work with them in terms of understanding the application of theories."

Increased Workloads

The second most revealed theme by the participants is the increased workload. As the RBL platforms are new to the participants (P1–P10), all participants found that it was very challenging to adapt to the platform. For instance, learning the technologies involved in delivering RBL to the students. P7 commented that, “... it's rather new to me, where I will need to learn how to really enable the students to get what I am teaching, compared to our traditional classes.” Furthermore, P5 commented that there is a lack of consistency of the practices in the RBL platforms. This caused the academics to fail in adapting and preparing the teaching and learning materials for the RBL platform quickly. The academics hope to have a clear guideline to facilitate the steep learning curves. In addition, the support for the academics was not enough for their learning curves. Though training was provided to them, most of the time, they needed to rely on their peers or external sources when preparing the materials for the RBL platforms (P1–P10). This has resulted increased workload for the preparation for each class.

Advanced Learning Experiences

The third most revealed theme by the participants is the advanced learning experience. It has given the opportunity to the academics to reflect on the learning and teaching experience for the students (P1–P10). As mentioned by P9, “... we have to design the learning experience that blends both technology and face-to-face right.” RBL has enabled the lecturers to successfully flip the classroom as compared to traditional classrooms. The academics would prepare a pre-recording of the class which students need to study before the class, and have a discussion during the actual class whether online or face-to-face (P1–P10). P9 asserted that, “I can actually spend those two hours now going through in depth the application of the theories, in the context of cases, problems, scenarios and all that.” The academics are required to prepare asynchronous and synchronous materials for the students. As a result of these materials, the learning model has become more comprehensive for the students. In addition, P3 asserted that, “... the learning becomes comprehensive, and it covers more areas in the course under RBL.” P8 added that RBL requires academics to incorporate various methods and materials to supplement the course. Furthermore, RBL also stimulates student’s learning where self-learning has become more appealing in their course of study. In

addition, P2 commented that, “I will say this RBL makes me a more creative person.” RBL has given opportunities for the academics to explore various pedagogy and methods to enhance the teaching and learning model.

Increased Flexibility

Fourth, the increased flexibility through RBL. Through RBL, students can conduct their learning at their own pace (P1). P7 commented that, “... it has become more convenient and flexible for the students.” This is because the academics need to prepare pre-recordings and are required to record their lectures and tutorials. Student were able to view the recordings at their own convenience. Also, with the asynchronous learning materials, students can prepare for their classes better and discuss topics in detail during the classes. With RBL, students have the flexibility to explore more on the current issues relating to the topic with the given materials and tools (P1). Thus, the academics have more flexibility in delivering their lectures to facilitate more discussions from the students. Furthermore, the academics have flexibility to assess the students through RBL. As a result, the academics may be able to monitor the students’ performance timelier (P1 & P2).

Comprehensive Assessments

Last but not least is the comprehensive assessment in the RBL platform. The platform has enabled the lecturers to provide more comprehensive assessments throughout the semester. As a result, P10 commented that RBL has given the opportunity to rethink the assessment questions. P1 asserted that, “... our questions have become more rigorous ... it provides the challenge to the students because the questions are no longer so direct.” In addition, the evaluation of the assessments has become more rigorous as they are now distributed randomly to all academics within all the campuses. P6 added that, “... provides us opportunity to mark students from all different campuses.” Hence, it provides fair and equal evaluations for all students.

DISCUSSION

The interviews with the participants of this study revealed that it is good to move RBL forward for future teaching and learning. All participants responded that student engagement is improved with the use of RBL platform. This is consistent with the research of Mohd Zaidil, Azizi and Fadzilah (2002), whereby the authors commented that collaborative learning and online discussion would increase the preparedness and attention of students in learning. In addition, RBL advances learning experiences of students, as students can go through asynchronous materials prepared by the academics. This preparation enables a more in-depth discussion and application during the class, as what is claimed by Muñoz Rodríguez and Rojo (2020).

The participants of this study appreciated the flexibility offered in RBL. This is consistent with the claim of Azizan (2010). For instance, they can make the learning materials and resources easily available and accessible for students. This is particularly good for students as they can conduct their learning at their own convenience as well as their own pace. Also, learning and teaching sessions can be conducted in both online and offline mode, where students can attend classes conveniently. In other words, RBL opens the doors to increasing contents of learning and improving learning and teaching experience of both academicians and students at minimum costs. In addition, the participants of the study reviewed the assessment of their course when the RBL platform was introduced. The assessment is now more rigorous and fairer to students with the use of richer assessment methods. According to Bowyer (2017), students can acquire knowledge at home and consolidate the knowledge in class via RBL platforms, and this makes student assessment continuous, enabling them to measure their achievements and face any test or exam with greater confidence.

However, the findings of the study showed that the introduction of RBL comes with increased workload. Participants of the study viewed the preparation of the teaching and learning materials as taking too much time, and this is similar to the findings of Picciano and Dziuban (2007) and Benson, Anderson and Ooms (2011), that the development of online-based activities is perceived by academics as time-consuming. One of the reasons of such perception could be due to lack of support during the preparation stage.

According to Tshabalala, Ndeya-Ndereya and van der Merwe (2014), inadequate training for staff is perceived as a constraint in the implementation of blended learning. As a result, academic staff may have lacked confidence in incorporating blended learning due to a lack of adequate knowledge (Tshabalala et al., 2014).

CONCLUSION

RBL was introduced in response to the COVID-19 pandemic. The interview findings revealed that RBL is beneficial as the way forward for future learning and teaching. The foremost advantage of RBL is the engagement between students and lecturers. RBL also encourages advanced learning experiences and comprehensive assessments for students. However, the participants also claimed that RBL is not without its drawbacks due to the increased workload. Hence, university support is vital for future preparation. For future recommendations, it is suggested that the future research can explore the views of students as the end users to gain a broader understanding of RBL.

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The authors declare no conflicts of interest.

REFERENCES

- Al-Huneidi, A., & Schreurs, J. (2011). Constructivism based blended learning in higher education. In M. D. Lytras, D. Ruan, R. D. Tennyson, P. Ordonez De Pablos, F. J. García Peñalvo, & L. Rusu (Eds.), *Communications in Computer and Information Science: Vol. 248. Information Systems, E-learning, and Knowledge Management Research* (pp. 581–591), World Summit on Knowledge Society. Springer, Berlin, Heidelberg.
- Azizan, F. Z. (2010). Blended learning in higher education institution in Malaysia. *Proceedings of Regional Conference on Knowledge Integration in ICT, 10*, 454–466.

- Benson, V., Anderson, D., & Ooms, A. (2011). Educators' perceptions, attitudes and practices: Blended learning in business and management education. *Research in Learning Technology*, 19(2), 143–154. <https://doi.org/10.1080/21567069.2011.586676>
- Bowyer, J. (2017). Evaluating blended learning: Bringing the elements together. *Research Matters: A Cambridge Assessment*, 23, 17–26.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Heriot-Watt University. (2020, July 22). Deputy Principal (Learning and Teaching) Weekly Update - Responsive Blended Learning. <https://www.hw.ac.uk/news/articles/2020/DPLT-RBL.htm>
- Heriot-Watt University. (n.d.) *Archived resource: Responsive blended learning*. Learning & Teaching Academy. <https://lta.hw.ac.uk/responsive-blended-learning/>
- 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. <http://dx.doi.org/10.5539/ies.v9n3p41>
- Megahed, N., & Ghoneim, E. (2022). Blended learning: The new normal for post-Covid-19 pedagogy. *International Journal of Mobile and Blended Learning*, 14(1), 1–15. <https://doi.org/10.4018/IJMBL.291980>
- Mohd Zaidil, A., Azizi, Z., & Fadzilah, S. (2002). Agen pedagogi sebagai tutor: Pemantapan pemahaman pelajar di dalam e-pembelajaran. [Pedagogical agent as a tutor: Strengthening learners' understanding in e-learning.]. *Proceedings of the 2002 ICT Seminar*, Universiti Utara Malaysia, Sintok, 218–224.
- Muñoz Rodríguez, J. M., & Rojo, A. S. (2020). On blended learning flexibility: An educational approach. *Blended Learning: Convergence between Technology and Pedagogy*, 126, 21–44. https://doi.org/10.1007/978-3-030-45781-5_2
- Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). SAGE Publications.
- Picciano, A. G., & Dziuban, C. (Eds.). (2007). *Blended learning: Research perspectives* (Vol. 2). The Sloan Consortium.
- Shahzad, A., Hassan, R., Aremu, E. Y., Hussain, A., & Lodhi, R. N. (2021). Effects of COVID-19 in e-learning on higher education institution students: The group comparison between male and female. *Quality & Quantity*, 55, 805–826. <https://doi.org/10.1007/s11135-020-01028-z>

Sundarasan, S., Chinna, K., Kamaludin, K., Nurunnabi, M., Baloch, G. M., Khoshaim, H. B., Hossain, S. F. A., & Sukayt, A. (2020). Psychological impact of COVID-19 and lockdown among university students in Malaysia: Implications and policy recommendations. *International Journal of Environmental Research and Public Health*, *17*(17), 6206. <https://doi.org/10.3390/ijerph17176206>

Tshabalala, M., Ndeya-Ndereya, C., & van der Merwe, T. (2014). Implementing blended learning at a developing university: Obstacles in the way. *Electronic Journal of e-Learning*, *12*(1), 101–110. <https://eric.ed.gov/?id=EJ1020735>

EFFECT OF BEHAVIOURAL ENGAGEMENT ON THE PERFORMANCE OF ACTUARIAL SCIENCE UNDERGRADUATES IN A HIGHER EDUCATION INSTITUTION

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ABSTRACT

The rise of learning analytics enables instructors to collect, analyse, and report data to understand students' learning experience within the course. Since student engagement, specifically behavioural engagement, is deemed to be important, learning analytics can be applied to assess behavioural engagement to improve students' learning experience. This study aims to identify behavioural engagement elements which have impact on students' performance of an actuarial science undergraduate course. This study applied learning analytics which consist of Blackboard data as well as attendance and academic results, where the analysis was conducted through principal component analysis using RStudio. Three principal components will be considered as they explain around 85% of the variance in the data. We found that students who have better attendance, spend more time on videos, have more Blackboard clicks and have higher videos views, obtain better grades. Besides, students with low homework completion rates tend to have poorer grades. Lastly, no concrete observation can be made for video completion. This study has identified five behavioural engagement elements that instructors can consider to understand students' academic progression through learning analytics, allowing an early intervention to improve students' learning. Learning analytics is the way forward and is recommended. Limitations of the study have been outlined, and some recommendations have been given for future studies.

Keywords Learning analytics; behavioural engagement; principal component analysis

INTRODUCTION

Student engagement is an important factor to keep students connected through the interaction with the content, their peers, and the instructor of the course. Behavioural engagement, a type of student engagement, is a significant factor which can be used to predict dropout rates and academic achievements (Hospel, Galand, & Janosz, 2016). It can be defined as the time and effort of students interacting with others within their community through educational activities such as attending classes, participation in class, time on tasks, effort, concentration, and active attempts (Hospel et al., 2016) to optimise their experience and, hence, improve learning outcomes and the development of students (Czerkawski & Lyman, 2016). Studies have been conducted to study the relationship between certain behavioural engagement elements and academic performance. Research conducted by Stewart, Stott, & Nuttall (2011), Shah and Barkas (2018), and Nepal and Rogerson (2020) have shown that attendance has a positive impact on student performance in Geography, Civil Engineering and Economics courses respectively. On the other hand, Shah and Barkas (2018) concluded that “Blackboard clicks” have a positive significant impact on students’ performance in a Civil Engineering course. Another study concluded that the higher completion rate of homework, the better students’ academic performance (Keane & Heinz, 2019). However, in the study of Wilkinson, McNamara, Wilson, and Riggs (2019), no correlation was found between students’ performance and “number of page views” and “time spent on learning management system” by students, which explained that most engaged students are not top students, and they spend more time in studying to improve their academic performance. The ability to measure and understand behavioural engagement effectively is important for the better learning experience of students, based on the past research.

Learning analytics is the collection, analysis, and reporting of data about learners’ behaviour within educational communities (Zhong, 2017). The field of learning analytics has arisen with the rich and fine-grained data available in learning management system (Rienties, Nguyen, Holmes, & Reedy, 2017). Traditional evaluation, such as self-reporting instruments, may not be accurate

due to response bias (Fincham et al., 2019). Given the limitation of self-reported evaluation, learning analytics have provided a possible way to measure student engagement using trace data generated by students in the learning management system (Fincham et al., 2019). Through learning analytics, instructors can monitor students' learning behaviour, understand the online learning experience for each individual student in real-time, and allow the adaptation of suitable teaching practices at an earlier stage, subsequently improving retention rates (Wilkinson et al., 2019).

Considering the importance of student engagement, particularly behavioural engagement, the purpose of this study is to identify the important behavioural engagement elements which will impact students' academic performance through learning analytics. In this study, we will focus on the time and effort that students put into their learning to measure behavioural engagement, and compare it against their academic performance using principal component analysis.

MATERIALS AND METHODS

Blackboard and Data Collection

An actuarial science undergraduate course of a private university was designed in a learning management system, i.e. Blackboard. Blackboard is one of the teaching and learning tools which has been widely used in that private university, and students are required to use Blackboard from their first year of studies. Blackboard is one of the leading commercial learning management software packages and is a world-class software application for educational institutions for teaching and learning due to its powerful and easy-to-use capabilities on instruction, communication, and assessment (Beatty & Ulasewicz, 2006).

This study applied learning analytics consisting of Blackboard data, attendance, and academic results to assess the effect of behavioural engagement of students on their academic performance. Five types of Blackboard data were collected in this study: Blackboard clicks, videos views, total minutes spent in videos, video completion and homework completion. On the other hand, attendance was collected through the university attendance

system where students will check in their attendance at the end of every class. Lastly, students' grades were based on their test marks obtained in the subject. The data analysis will be conducted using principal component analysis through RStudio version 2022.07.0 (<https://www.rstudio.com/products/rstudio/download/>).

Participants

The target participants of this study were full-time students from a private university in Malaysia. With more than 400 students in the actuarial science undergraduate programme, a convenience sampling approach was used, yielding 62 Year 2 students for our study. Among the 62 students, 57.4% are male students and the remaining 42.6% are female students.

Principal Component Analysis

Principal component analysis (PCA) is an unsupervised learning approach that uses the dependencies between variables to produce a low-dimensional representation of a dataset and uncover hidden trends and patterns, at the same time retaining as much information as possible (Jolliffe & Cadima, 2016). The objective of principal component analysis is to reduce the dimensionality of a data set in which there are a large number of interrelated variables, while maintaining the variation present in the data set. This reduction is done by transforming the data into a new set of variables, which are the principal components. The principal components are ordered so that the first few components have most of the variation present in all of the original variables. The principal components may then be used as predictor or criterion variables in subsequent analyses.

Before performing principal component analysis, we will check the existence of the correlation between variables, and Bartlett's Test for Sphericity will be performed. The null hypothesis for this test is that there is no correlation between the variables, where principal component analysis would not be appropriate to be carried out as it relies on the construction of a linear combination of the variables (Bartlett, 1937). A significance level of 0.05 will be used. We will also check whether the sample size is sufficient. Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy will be conducted.

It measures the strength of relationship among variables based on correlations and partial correlations, where values of 0.5 and above indicate that the sample size is sufficient (Kaiser & Rice, 1974).

RESULTS AND DISCUSSION

Based on the result presented in Table 1, the Bartlett’s Test of Sphericity was significant where the p -value is less than 0.05. Therefore, we rejected the null hypothesis and concluded that there is an existence of correlation between variables. Besides, the Kaiser-Meyer-Olkin measure of sampling adequacy is 0.69, which is above the recommended value of 0.5, indicating that the sample size is sufficient.

Table 1 *Kaiser-Meyer-Olkin (KMO) and Bartlett’s Test of Sphericity*

KMO Measure of Sampling Adequacy		0.69
Bartlett’s Test of Sphericity	χ^2	154.9801
	df	15
	Significant	0.000

Principal component analysis was performed on the data using ‘prcomp’ command in RStudio, where each variable is standardised to have a mean of zero and standard deviation of one. Based on the Scree plot presented in Figure 1 and proportion of variance in Table 2, three principal components can be potentially considered as they explain around 85% of the variance in the data. Subsequently from Table 3, two highly weighted variables under PC1, PC2, and PC3 will be considered.

Based on Table 3, PC1, that is “total minutes spent on videos” and “attendance”, explains about 52% of variation in the data. PC2 explains about 20% of variation in the data and consists of “Blackboard clicks” and “videos views”. Lastly, PC3 refers to “homework completion”, which contributes about 13% of variation in the data. Only one element will be considered in PC3 as “Blackboard clicks” has been included in PC2.

Table 2 *Proportion of variance and cumulative proportion explained from principal component analysis*

	PC1	PC2	PC3	PC4	PC5	PC6
Proportion of variance	0.5195	0.2022	0.1274	0.0721	0.0416	0.0372
Cumulative proportion	0.5195	0.7217	0.8491	0.9212	0.9628	1.0000

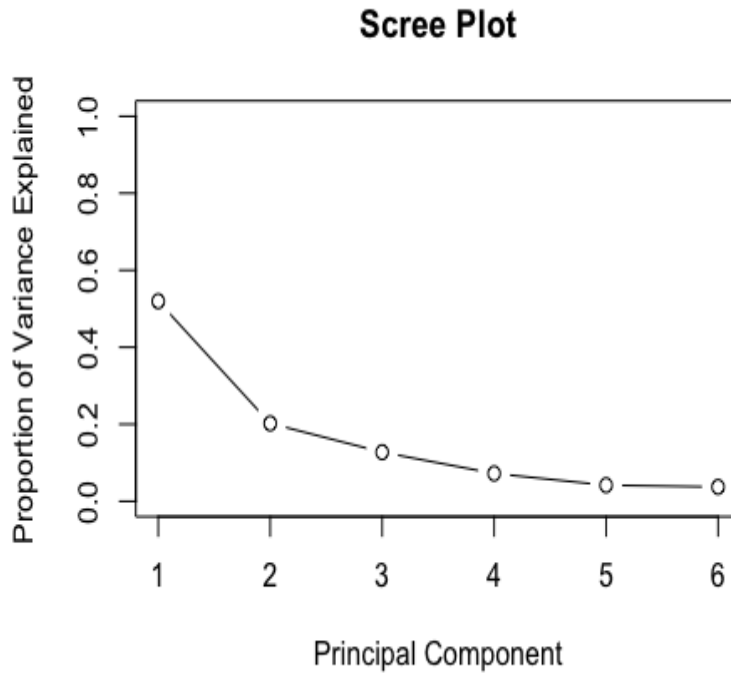


Figure 1 *Scree plot of principal component*

Table 3 *Loadings of each principal component from principal component analysis*

	PC1	PC2	PC3	PC4	PC5	PC6
Attendance	0.4423	-0.4405	0.0786	-0.0622	0.7348	-0.2455
Blackboard clicks	0.3044	0.6130	0.4245	0.4320	0.0406	-0.4038
Videos views	0.4066	0.5153	-0.1519	-0.3184	0.2587	0.6146
Total minutes spent on videos	0.4510	0.0715	-0.5381	-0.3299	-0.3684	-0.5072
Video completion	0.4383	-0.2854	-0.2620	0.6967	-0.2331	0.3437
Homework completion	0.3884	-0.2793	0.6575	-0.3375	-0.4487	0.1538

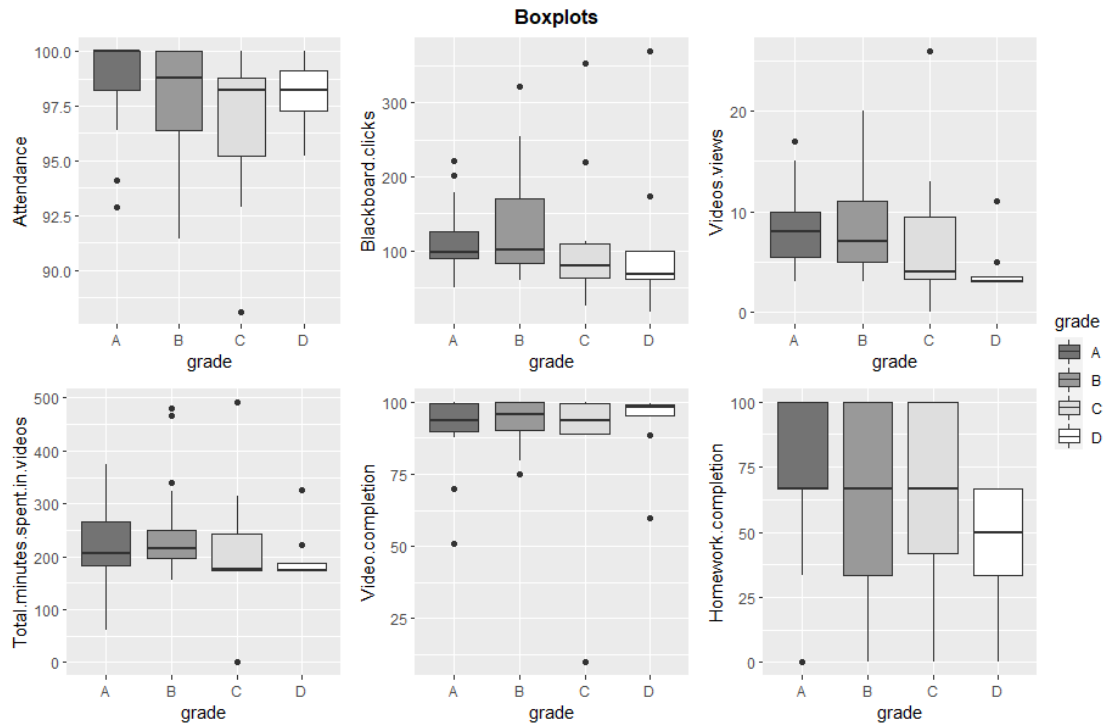


Figure 2 *Boxplots of six behavioural engagement elements against grades*

Based on the boxplots provided in Figure 2, students who scored grades A or B have better attendance, spent more time on videos, more Blackboard clicks and higher videos views, as compared to students who scored grades C or D. Under homework completion, it is obvious that students who scored grade D have lower homework completion rates as compared to the others. Lastly, no obvious observation can be found under video completion, where all grades have students achieving 100% video completion. This result explains that video completion is not able to inform the progress of students as they may just play the video without watching it, hence completing the video without understanding the content of it.

At the end of this study, we discovered that five behavioural engagement elements, which are “total minutes spent on videos”, “attendance”, “Blackboard clicks”, “videos views”, and “homework completion”, have an impact on students’ performance of an actuarial science undergraduate course through principal component analysis. Students who make an effort in attending classes and spend more time watching videos perform better in their studies. Besides, students who have a higher frequency in viewing learning materials also perform better in their studies. Finally, students who do not complete their homework perform poorer in their studies.

CONCLUSION

This study has identified five behavioural engagement elements that instructors can consider to understand students' academic progression through learning analytics. This enables an early intervention of instructors, possibly identifying students at risk and subsequently suggesting ways to improve their learning and performance. Learning analytics is the way forward and is recommended due to its convenience in collecting data and ability to inform about students' academic progression quickly. However, some limitations are found in this study. Firstly, we only focused on learning activities that occurred within the learning management system. Secondly, the results may differ if students from different programmes are participating in the study. Thirdly, we did not exclude outliers in our principal component analysis. The main reason is due to our small size of participants. By excluding the outliers, we may have insufficient sample size to perform the principal component analysis. Lastly, we only considered six behavioural engagement elements in our study. New insights can be obtained if more behavioural engagement elements are included in future studies, such as the frequency of asking questions and visiting discussion post. In this regard, it is also recommended to include demographic data in future analyses.

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REFERENCES

- Bartlett, M. S. (1937). Properties of sufficiency and statistical tests. *Proceedings of the Royal Society of London, Series A, Mathematical, Physical and Engineering Sciences*, 160(901), 268–282.
- Beatty, B., & Ulasewicz, C. (2006). Faculty perspectives on moving from blackboard to the Moodle learning management system. *TechTrends*, 50(4), 36–45.

- Czerkawski, B. C., & Lyman, E. W., III (2016). An instructional design framework for fostering student engagement in online learning environments. *TechTrends*, 60(6), 532–539.
- Fincham, E., Whitelock-Wainwright, A., Kovanović, V., Joksimović, S., van Staalduinen, J.-P., & Gašević, D. (2019). Counting clicks is not enough: Validating a theorized model of engagement in learning analytics. *Proceedings of the 9th International Conference on Learning Analytics & Knowledge, USA*, 501–510.
- Hospel, V., Galand, B., & Janosz, M. (2016). Multidimensionality of behavioural engagement: Empirical support and implications. *International Journal of Educational Research*, 77(1), 37–49.
- Jolliffe, I. T., & Cadima, J. (2016). Principal component analysis: A review and recent developments. *Philosophical Transactions of the Royal Society A, Mathematical, Physical and Engineering Sciences*, 374(2065).
- Kaiser, H. F., & Rice, J. (1974). Little Jiffy, Mark IV. *Educational and Psychological Measurement*, 34(1), 111–117.
- Keane, G., & Heinz, M. (2019). Differentiated homework: Impact on student engagement. *Journal of Practitioner Research*, 4(2).
- Nepal, R., & Rogerson, A. M. (2020). From theory to practice of promoting student engagement in business and law-related disciplines: The case of undergraduate economics education. *Education Sciences*, 10(8), 205.
- Rienties, B., Nguyen, Q., Holmes, W., & Reedy, K. (2017). A review of ten years of implementation and research in aligning learning design with learning analytics at the Open University UK. *Interaction Design and Architecture(s)*, 33, 134–154.
- Shah, R. K., & Barkas, L. A. (2018). Analysing the impact of e-learning technology on students' engagement, attendance and performance. *Research in Learning Technology*, 26.
- Stewart, M., Stott, T., & Nuttall, A.-M. (2011). Student engagement patterns over the duration of level 1 and level 3 geography modules: Influences on student attendance, performance and use of online resources. *Journal of Geography in Higher Education*, 35(1), 47–65.
- Wilkinson, K., McNamara, I., Wilson, D., & Riggs, K. (2019). Using learning analytics to evaluate course design and student behavior in an online wine business course. *International Journal of Innovation in Science and Mathematics Education*, 27(4), 97–108.

Zhong, L. (2017). Using learning analytics to improve instructional support design for online learning. *Journal of Educational Technology Development and Exchange*, 10(2), 25–36.

EASING THE BURDEN OF QUALITY ASSURANCE IN HIGHER EDUCATION WITH DATA ANALYTICS AND MACHINE LEARNING: PROSPECTS AND RESEARCH NEEDS

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ABSTRACT

While most professionals in higher education strive to deliver high quality education and enjoy doing so, the processes connected with “assuring” the quality are less welcome. Quality assurance in higher education throughout the world is a largely bureaucratic process aimed at ensuring a good student experience and fit-for-purpose education, often considered to be the production of streams of graduates that meet industrial needs. Quality assurance processes involve much administrative work, which is the bane of academics the world over as well as for quality assurance agencies. The question arises as to whether this administrative burden may be lightened by the use of approaches such as data analytics (DA) and machine learning (ML). This paper considers the prospects for DA/ML in quality assurance in higher education and the research issues that arise from this.

Keywords Quality assurance; higher education; big data; data analytics; machine learning; research needs

INTRODUCTION: THE CONTEXT AND BURDEN OF QUALITY ASSURANCE

Quality assurance in higher education has evolved as a major activity in an industry that has been rapidly growing worldwide. Tertiary education participation rates have steadily increased and reached the majority of the population in some highly developed countries. There is now great diversity in terms of types of institutions: some large, some small; some public, some private; some new, some long-established; some specialised and some comprehensive. The quality of the education provided by such institutions varies enormously, and ensuring high quality is a challenge both for the institutions themselves as well as for the governments that wish to regulate them. Students themselves, as well as their parents and future employers, want institutions to provide high quality education that is relevant to the future needs of society and that will guarantee lifelong employment as well as national, social, and economic success. Institutions therefore seek to be well managed in order to deliver high quality and, this requires academic leaders to become effective as managers with a focus on key stakeholder interests (Wilkinson, 2021).

But the essence of quality “assurance” has emerged primarily as checks on curricula, resources, and student satisfaction, as has been well documented in reviews such as Ryan (2015). Both internally within institutions, and externally at the level of government quality assurance agencies, the emphasis has been on verifying that a curriculum is what is expected in terms of breadth and up-to-date content; that students enjoy their learning experience; and that a deep and comprehensive set of learning resources have been put in place such as facilities, equipment, library resources both physical and digital, and staff with appropriate qualifications, expertise, and experience. All of these checks and evaluations have become bureaucratic and led to many concerns about their impact on the education that they are supposed to protect.

But even though we might recognise the essential features of quality assurance in higher education, the purpose and even the true meaning of it is still subject to interpretation and some authors consider the hermeneutics of higher education quality assurance, for example Vettori (2018) who articulates the meaning in terms of “structural interpretive patterns” such as a consumer protection pattern, an entrepreneurial pattern, a managerial pattern, and a quality engineering pattern.

WHY THE QUALITY ASSURANCE BURDEN NEEDS TO BE LIGHTENED

Seyfried and Reith (2019) have comprehensively documented the “sins” that accompany quality management in higher education, including the “gluttony” of excessive bureaucratisation, the “wrath” which accompanies standardisation that can stifle creativity and innovation, the “envy” of benchmarking which can lead to unwelcome competition and internal conflict, and the “greed” of quality managers looking after their own self-interests and expanding their scope of activities, amongst other so-called sins. Frequently, quality management in higher education is viewed as interventionist or interfering and denying of academic freedom. Academics find themselves being expected to conform to norms and benchmarks. Quality assessment, as often practised, involves checking for compliance rather than encouraging new thinking, defining new subjects, or creating new educational objectives to match rapid changes in society. For example, employability is seen as a vital outcome of any higher education programme, and employability skills are almost universally expected to be included in course frameworks. But traditional modes of employment are disappearing in favour of portfolio careers and gig working. Ultimately work may take place in a range of virtual worlds, or “metaverses” as one famous global company labels them, with the worker taking different roles in each one. Employability-focused education will need to adapt to such evolutions in what it means to be a human at work.

Quality assurance is also often seen as “threatening” in higher education, involving the imposition of business, industry or advertising cultures (Taousanidis and Antoniadou, 2010). Moreover, while quality assurance has moved from a notion of control towards the idea of continual improvement and enhancement (Williams, 2016), critics say that even the notion of “continual improvement” implies the higher education product never reaches a state of perfection. Bringing all these things together (i.e., bureaucratisation, enforced competition, implicit standardisation and regression to potentially out-of-date models, and a lack of adaptation to a rapidly changing world) and, considering the excessive interventionist administrative processes at institutional and governmental level, it becomes clearer that quality assurance in higher education needs a revolution. Moreover, as in many other industries, disruptive revolution could in principle be driven potentially by the latest developments in advanced information technologies.

Higher education quality assurance, in essence, is ripe for technological disruption. In the rest of this paper, we shall examine what that could mean in practice.

POTENTIAL UTILISATION OF NEW TECHNOLOGIES FOR QUALITY ASSURANCE

The use of advanced information technologies in quality control is well known in industries outside of higher education (see for example Gorchet (2020)). In these other contexts, the key to developing more effective and more efficient quality control is the better use of data. This means both gathering more data and using more effective means of analysing it, which can include deep learning. Higher education is of course an industry which captures and stores a lot of data. Such data can include student and parental demographics, student performance, student retention and drop-out rates, and student destinations post-graduation. Institutions will also have digital information about their physical resources, their library collections, their taught curricula, and their staff such as teaching loads, annual performance appraisals, and so forth. In addition, there is much external data available about staff achievements in terms of their publication track records (from sources such as Google Scholar and the Web of Science) and about their external engagements in professional networks and so forth from web reports posted by professional bodies. External data about employment trends and trends in industrial salaries are available. In addition, social media are full of sentiments and expressions of satisfaction (or dissatisfaction) with experiences in many settings including in education. All of this means that, in theory, it is possible to assimilate and analyse large datasets about what a particular higher education institution provides for its students, what society and employers need from its graduates, and what students feel about their experience. There is, in essence, a plethora of information that can be mined to determine whether an institution, and even a particular course within that institution, is giving good value to its students and to society. The quality of the educational delivery can be both inferred from this information and even predicted in the case of new institutions and new courses. Thus, digital datasets could become the key to streamlining quality assurance in higher education and making it as efficient and minimally intrusive in the educational process as possible.

So-called “big data” analytics is becoming a standard approach in commerce, especially in marketing, but there are many other potential applications, including those in highly specialist fields such as medical diagnostics. Interestingly, although many universities teach data science courses, few as yet use sophisticated data science approaches in evaluating and assessing their own performance and quality, but this is precisely what we are arguing for in this paper.

DATA ANALYTICS AND MACHINE LEARNING AS KEY ENABLING TECHNOLOGIES

The potential of data analytics in higher education has already been recognised (Ekowo and Palmer, 2016), and various experiments have demonstrated the potential to predict student learning outcomes based on data concerning learning behaviour, especially in the online learning context (Luo et al., 2022) where such data are more readily available for analysis. Furthermore, the potential of data analytics for quality assurance in higher education has also been recognised (Mishra, 2019), though this usage of analytics is still in its infancy. Likewise, artificial intelligence (AI) which can involve predictions based on machine learning has been recognised as a useful technology in higher education (Mishra, 2019; Zeide, 2019) with potential application, for example, in constructing personalised learning paths (Somasundaram et al., 2020).

The main use of data analytics and machine learning (hereafter DA and ML) is to understand patterns in complex data and to make predictions from new data based on what has been learned so far from prior data. The concept of “prediction” in this context can also mean “recognition”. So, for example, ML systems can be trained with thousands of photographs of human faces and then recognise people when presented with new photos of individuals it has already “seen”, and such systems can now easily outperform humans in such a task. In principle, therefore, with the right data, such systems could be trained to undertake quality assurance, looking for patterns in data that are indicative of the quality of higher education provision and advising the relevant stakeholders of its determinations.

However, in order to achieve this, there is a need to bring some formality to the quality assurance “problem”, to assimilate the required datasets, and to frame the predictive questions in the right way for an AI system to be able to yield useful results. This gives rise to a set of research needs which have yet to be addressed.

FORMALISING QUALITY ASSURANCE AS AN AI PROBLEM

In attempting to build efficient automated quality assurance, we have to define the different functions of quality assurance in higher education and understand how data can be assimilated for use in machine learning algorithms and AI predictive systems. Different stakeholders (i.e., students, parents, employers, professional bodies, governments) may view quality assurance differently and, therefore, the definition of what we mean or what we want from a quality assurance system has to be the first step. It is not just a matter of what we “mean” but also of the “purpose” or expected outcome. Outcomes can be judged at different levels and in different ways. For example, an outcome may be to determine whether or not a proposed new course will create employable graduates, with the purpose of that ultimately being to improve industry and the national economy. Other typical outcomes might be to determine whether the student experience at an institution is adequate, or whether the education offered at the level of an institution, faculty, department, course or even at the level of an individual student is value for money, with the ultimate purpose being to ensure that graduates have successful careers without being burdened by unnecessary debt. Other outcomes might be to detect weaknesses and to recommend corrective actions. But in order to automate the process, the outcomes have to be defined in a way that they can be output from a system in a formalised way with labels such as “satisfactory”, “unsatisfactory”, or that the quality assurance body has “confidence”, “partial confidence” or “no confidence” in the educational provision achieving the desired outcomes with potential lists of remedial actions that can be determined automatically.

Once the desired outcomes and formalised labels have been specified by the stakeholders of the quality assurance process, it becomes necessary to define the information and data needs and sources to arrive at them. This may be difficult to define, given that potentially huge quantities of data are available,

but much is unstructured, and many data items may not be adequate or structured in a way that can be used for automatic processing. There may be a need to seek new forms of data.

The domains of quality assurance in higher education and potential information requirements are illustrated in Table 1 below.

Table 1 *Domains of quality assurance and types of information needed*

Quality domains	Types of information needed in quality assurance	Examples of relevant information/data availability
Institutional overall effectiveness	Campus physical environment, campus intellectual environment, engagement with the “student voice”, student support systems, overall graduate attributes, overall staff quality, staff onboarding and development, support for innovation and IP exploitation, research quality	International rankings, International student barometer survey, overall drop-out rates, institutional h-index, staff qualifications data, patents granted, spin-out companies formed, research grant income, staff retention rates, proportion of graduates joining high value industrial companies, trends in all of the above
New academic programme approval	Comprehensiveness of curriculum, suitability for meeting industrial needs and national priorities, adequacy of resources for programme delivery, appropriateness of assessment strategies, graduate employability	External curriculum benchmarks; professional body guidelines; employment market and salary data; comparable curricula nationally and worldwide; physical delivery locations: rooms, labs, studios, etc.; library resources; online pedagogic resources; staff CVs
Ongoing assurance of achievement of academic outcomes	Student experience, student knowledge acquisition and retention, graduate employment	Pass/fail rates, graduate employment rates, graduate starting salaries, types and quality of employers joined by graduates, student course satisfaction rates, student retention rates

Once the desired outcomes and types of data have been defined, in order for an AI system to undertake a quality assurance process, there is the need to collect relevant data that ML can work with. Assembling and working with large datasets is now the focus of data science, which is receiving much attention in academia and industry both from a theoretical perspective and in practical application.

RESEARCH NEEDS

We can therefore conceive of an automated quality assurance system potentially in terms of a deep-learning network or multi-layer connectionist network that can diagnose or predict quality outcomes from relevant assimilated data sets, as shown in Figure 1.

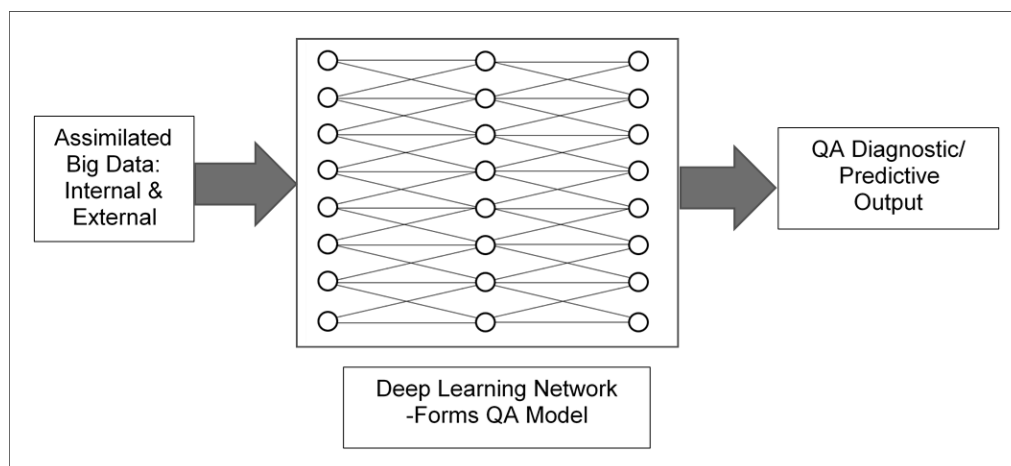


Figure 1 *Potential quality assurance connectionist network*

But in conceiving such a system, a number of critical research and development issues arise, which are generic to data analytics applications and not exclusive to this case. These include technical issues such as:

1. How to select relevant data, both public and private, and where do they come from?
2. How to integrate data of different types, both structured and unstructured?
3. How to format data for machine learning?
4. How much information or data are needed in order to make a quality assessment?

5. How to deal with missing or incomplete data?
6. How to define what the output should be?
7. What is the right system architecture to use for quality assurance in higher education?
8. What, if any, is the role of human analysts in the process?

In addition, there are, however, human issues such as whether or not those evaluating an institution or course are willing to relinquish control of the task to an AI system. Also, there is the question as to whether those who are being evaluated would accept the results. This could include academics as well as institutional administrators.

The lack of transparency and the so-called “black box” nature of some AI predictive systems also remains a challenge in usability and acceptability, as does the potential for bias in such systems (Nowotny, 2021). Moreover, if an automated system were to deliver a negative verdict on the quality of an institution or course, there could be significant impacts on the institution’s ability to attract students, and there could be implied criticism of the staff. In such scenarios, issues such as who takes responsibility for the machine’s decision, how to get a verdict re-examined, or how to obtain redress for any loss or damage caused start to arise (Gardner, 2022), and this becomes especially complicated with the lack of transparency of an automated system.

DISCUSSION AND CONCLUSIONS

There is little doubt that quality assurance in academia is something that needs to be streamlined and made as efficient as possible in order to save institutional and government resources and the valuable time of academic staff. Potentially, the wide range of data available about institutions, their staff, their students, and specific courses, as well as data from the external world about industry needs, and so forth, can all be brought into play in attempting to automate quality assurance with big data analytics and artificial intelligence approaches. So far this has not been done, but we have argued that the potential is there. There are many issues to solve, akin to other areas of application of big data and AI. But it can be argued that it is worth attempting to do it, and to develop a strategy in a small and clearly definable context such as the internal validation

of a new undergraduate degree programme, bringing together a robust collection of internal and external public datasets. Fundamentally, the scale of the global higher education industry indicates that this should happen.

REFERENCES

- Abualrub, I., Karseth, B., & Stensaker, B. (2013). The various understandings of learning environment in higher education and its quality implications. *Quality in Higher Education*, 19(1), 90–110. <https://doi.org/10.1080/13538322.2013.772464>
- Ekowo, M., & Palmer, I. (2016). The promise and peril of predictive analytics in higher education. New America Foundation. https://na-production.s3.amazonaws.com/documents/Promise-and-Peril_4.pdf
- Gardner, A. (2022, June 13). Responsibility, recourse, and redress: A focus on the three R's of AI ethics. *IEEE Technology and Society Magazine*, 41(2), 84–89.
- Gorchet, A. (2020, November 20). Deep learning has reinvented quality control in manufacturing—but it hasn't gone far enough. *IEEE Spectrum*. <https://spectrum.ieee.org/deep-learning-has-reinvented-quality-control-in-manufacturingbut-it-hasnt-gone-far-enough>
- Horn, M. B., & Dunagan, A. (2018). Innovation and quality assurance in higher education. Christensen Institute. <https://files.eric.ed.gov/fulltext/ED586374.pdf>
- Luo, Y., Han, X., & Zhang, C. (2022). Prediction of learning outcomes with a machine learning algorithm based on online learning behavior data in blended courses. *Asia Pacific Education Review*. <https://doi.org/10.1007/s12564-022-09749-6>
- Mishra, R. (2019). Use of data analytics and artificial intelligence in ensuring quality assurance at higher education institutions. *Proceedings of the 2019 Amity International Conference on Artificial Intelligence*, 1022–1025. DOI: 10.1109/AICAI.2019.8701392
- Nowotny, H. (2021). In AI we trust: Power, illusion and control of predictive algorithms. Polity Press.
- Ryan, P. (2015). Quality assurance in higher education: A review of literature. *Higher Learning Research Communications*, 5(4). DOI: 10.18870/hlrc.v5i4.257

- Seyfried, M., & Reith, F. (2019). The seven deadly sins of quality management: Trade-offs and implications for further research. *Quality in Higher Education*, 25(3), 289–303, DOI: 10.1080/13538322.2019.1683943
- Somasundaram, M., Junaid, K. A. M., & Mangadu, S. (2020). Artificial Intelligence (AI) Enabled Intelligent Quality Management System (IQMS) For Personalized Learning Path. *Procedia Computer Science*, 172, 438–442.
- Taousanidis, N. I., & Antoniadou, M. A. (2010). Quality assurance: Enhancing or threatening higher education? *Industry and Higher Education*, 24(2), 87–93.
- Vettori, O. (2018). Shared misunderstandings? Competing and conflicting meaning structures in quality assurance. *Quality in Higher Education*, 24(2), 85–101.
- Wilkinson, G. G. (2021). *Managing effectively in academia*. Sunway University Press.
- Yussupova, N., Kovacs, G., Boyko, M., & Bogdanova, D. (2016). Models and methods for quality management based on artificial intelligence applications. *Acta Polytechnica Hungarica*, 13(3), 45–60.
- Zeide, E. (2019, August 26). Artificial intelligence in higher education: Applications, promise and perils, and ethical questions. *EDUCAUSE Review*.
<https://er.educause.edu/articles/2019/8/artificial-intelligence-in-higher-education-applications-promise-and-perils-and-ethical-questions>

SUSTAINING QUALITY OF HIGHER EDUCATION STUDENT EXPERIENCE IN A CHANGING HIGHER EDUCATION LANDSCAPE

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ABSTRACT

The COVID-19 crisis has brought about another disruptive change to the higher education landscape. Higher education institutions which had not been responding well to the fourth industry revolution (IR 4.0) struggled to adapt to the abrupt changing needs of students and the industry. They strived to sustain the quality of education and student experience during the pandemic. On the other hand, institutions which had responded well to the digital transformation of IR 4.0 have been adapting well to the changing landscape, as they have weaved in the adoption of technology advancements in their service delivery to offer flexible and responsive education to students. In the endemic phase of the crisis, it is observed that certain expectations of students in the quality of education and services they experience have changed. Constant transformation of a higher education institution to respond to the changing needs of students and the industry is vital to ensure its relevancy and sustainability. This paper aims to share Sunway University's experience in evaluating the different aspects of student experience that have changed post pandemic, managing the changing needs of its students, and the mechanisms for holistically monitoring student experience in Sunway University.

Keywords Quality assurance; higher education; student experience

BACKGROUND

The higher education landscape has been changing rapidly in the past decades due to a number of factors. This was largely contributed by the advancement of technology and impact of globalisation which, among others, brought about increasing differentiation of higher education institutions to suit different needs, the transformation of general curriculum to bridge the skills gap required by industry, and the rise in student and staff mobility (Staley & Trinkle, 2011). The change is expected to continue for the next decade as the role of society and economy continue to change due to digital disruption (Adams, 2018). The digital era has forced institutions to respond to the changing needs of students and the industry and to constantly come up with new business models. New opportunities emerged from this endeavour. Institutions are beginning to look into online education alternatives and offering a blended learning experience through technology.

The COVID-19 pandemic which has hit all corners of the world has brought about another disruptive change to the higher education landscape. Lockdown was imposed by many countries to mitigate the rise of COVID-19 cases, which required higher education institutions to close campuses for a long period. However, in order to avoid disruption to students' education, the conventional way of face-to-face teaching was shifted online. Institutions which had not responded fast enough to digitalisation prior to the pandemic struggled to respond to the new learning environment when lockdown was imposed. Some lecturers were not prepared with the tools and pedagogical skills to take their teaching online. Some students—even though they were more technology savvy and able to adapt to new technology faster—were baffled and not prepared to receive their learning online. In addition, institutions had to swiftly roll out a new plan to engage and deliver other services to students electronically without detrimentally affecting student experience and ensure the outcomes still match students' expectations.

Now that we enter the endemic phase, in general, it is observed that more people are getting comfortable with the experience they gained during lockdowns. Work from home (WFH) seems to be the current new normal. In higher education, online or blended learning is becoming increasingly important and a preferred method than just having the face-to-face option.

Automation of services to ensure fast response and service delivery is trivial. Institutions had to carefully pivot their approach in ensuring service quality is maintained in the changing higher education landscape.

This paper aims to share Sunway University experience in evaluating the different aspects of student experience that have changed post-pandemic, managing the changing needs of its students, and the mechanism in holistically monitoring student experience in Sunway University.

QUALITY OF STUDENT EXPERIENCE IN HIGHER EDUCATION

Article 11 of the World Declaration on Higher Education published by the United Nations mentioned that higher education quality is a multi-dimensional concept, which encompasses many areas ranging from teaching, research, staffing, equipment, services, and the academic environment. It added that stakeholders should be an integral part of the institutional evaluation process. Students who are the main stakeholders of higher education institutions should then be consulted on their perception of the higher education quality being provided. Quality is the distinguishing characteristic guiding students and higher education institutions when receiving and providing higher education (Mahbub, 2017). Previous studies have found that student satisfaction on service quality and the retention rate in higher education have a positive relationship (Mohamed Ali, 2020; Mallika Appuhamilage, K. S. & Torii, H., 2019). A study by Mallika Appuhamilage and Torii (2019) revealed that loyalty, services, and perceived value have a positive direct relationship to student satisfaction. This shall also lead to higher advocacy and propensity to recommend the institutions to others.

The notion of student satisfaction on the quality of education is related to student experience. Petre et al. (2006) introduced the concept of total customer experience (TCE) and claim that it influences customers' perceptions of value and service quality and as a result affects customer loyalty (p. 189). Nadiri et al. (2009) stated that the concept of service quality in the higher education environment is related to student satisfaction and student experience (p. 523).

They claimed that students' needs and perceptions related to service quality should be pre-determined and addressed in order to attract, serve, and retain students.

MEASURING STUDENT EXPERIENCE IN SUNWAY UNIVERSITY

Sunway University measures its service quality through multiple channels, which include quality of student performance, employability rate, feedback from student representation in academic governance and management committees, programme audits, e-feedback system, and feedback from periodic surveys. Student feedback plays a pivotal role in improving the overall service quality and student experience in the higher education institution.

This paper focuses on how it tracks and benchmarks student opinions across the entire student experience journey, comparing student satisfaction across different student groups to identify specific areas for improvement by using the i-graduate's Student Barometer (ISBSB). Sunway University started to track yearly feedback from all students using the Student Barometer since 2014. The Student Barometer tracks and benchmarks student opinions anonymously across the entire student journey, compares student satisfaction levels and identifies specific areas of key importance to them. It compares the decision-making, expectations, perceptions, and intentions of students from application to graduation (i-graduate, n.d.). Students are questioned about their arrival, learning, engagement, living, support, recommendation, application, and choice of institution. The i-graduate Student Barometer global benchmarks produced over the two-year period of the Student Barometer cycle helped the university to see how it fares in those respective areas globally. Students rate their satisfaction based on Likert scale of 1 to 4, from "very dissatisfied" to "very satisfied", and provided open-ended comments on the various aspects of their student experience.

CHANGING TRENDS IN STUDENT EXPERIENCE

Findings from the International Student Barometer (ISB) 2021 conclude that employability remains key for students in many aspects, which include decision-making in choosing an institution, in deciding whether the

programme is good value for money, or in recommending the institution to prospective students (Ripmeester, 2022). Globally, 96% of students say their study decision-making is driven by Future Career Impact which has been the key element driving the decision of international students since 2018. This is also true for Sunway University students, both local and international, who were surveyed through the Student Barometer (ISBSB) in 2018, 2019, and 2021, as below:

Table 1 *Student barometer (ISBSB)—Percentage of Sunway University students rating employability as key element in choosing institution*

Decision making elements	2018 (n=2422)	2019 (n=1871)	2021 (n=3414)
Future career impact	96%	98%	98%
Earning potential	94%	96%	97%

Additionally, the survey observed that 97% students indicate that the cost of education remains in the top five of key decision-making factors in choosing an institution, and has increased by 2% from 2019. Globally, there is also an increasing trend of concern over cost of study as indicated by the Student Barometer (ISBSB) though not as high as that in Malaysia. This may be due to the financial challenges that arose from the impact of the pandemic (Table 2).

Table 2 *Student barometer (ISBSB)—Percentage of students rating cost of study as important in choosing an institution*

Year	Malaysia ISBSB	Global ISBSB
2018	95%	76%
2019	95%	77%
2021	97%	84%

While future career remains the key importance in choosing an institution, it is important for institutions to understand that students shall expect

institutions to prepare them well towards their career goals. Accordingly, their perception of services received should be constantly gauged and monitored.

Despite the concern over the impact of the pandemic, it is encouraging to note that the satisfaction of Sunway University students on their overall learning experience and whether their learning experience helps them to get a job showed an increase of 4% in 2021 compared to that of 2019 and was also higher than that of 2018, as in Table 3.

Table 3 *Student barometer (ISBSB)—Percentage of Sunway University students who are satisfied with their learning experience*

Learning Satisfaction	2018 (n=2422)	2019 (n=1871)	2021 (n=3414)
Question: Learning that will help me to get a job	87%	85%	89%
Question: Learning Overall	87%	84%	88%

In 2020, due to the COVID-19 pandemic, Sunway University postponed the Student Barometer survey and, in replacement, carried out the COVID-19 Response Barometer to gauge the effectiveness of the university’s response to the pandemic and to understand students’ reaction to the online learning experience. The survey was anonymous and administered after a full lockdown and campus closure, when a hybrid mode of delivery was carried out and students were allowed to either continue learning online or attend classes on campus. On a Likert scale of 1 to 4, on average, 80% out of 1090 respondents felt satisfied with the University’s response to COVID-19. However, the satisfaction rate of students in the Hospitality and Creative Arts disciplines were slightly lower at 78% and 75% respectively. As in Figure 1, students in both disciplines also rated a much lower satisfaction in the online learning provided, at 66% for Creative Arts (SOA) and 72% for Hospitality (SOH). In addition, the survey showed that 71% of students from both the Hospitality and Creative Arts fields were concerned about being able to complete their studies (either “somewhat” or “very” concerned); 3% higher than the average

percentage of students from other disciplines. This may be due to a preference for face-to-face classroom sessions due to the practical nature of both disciplines.

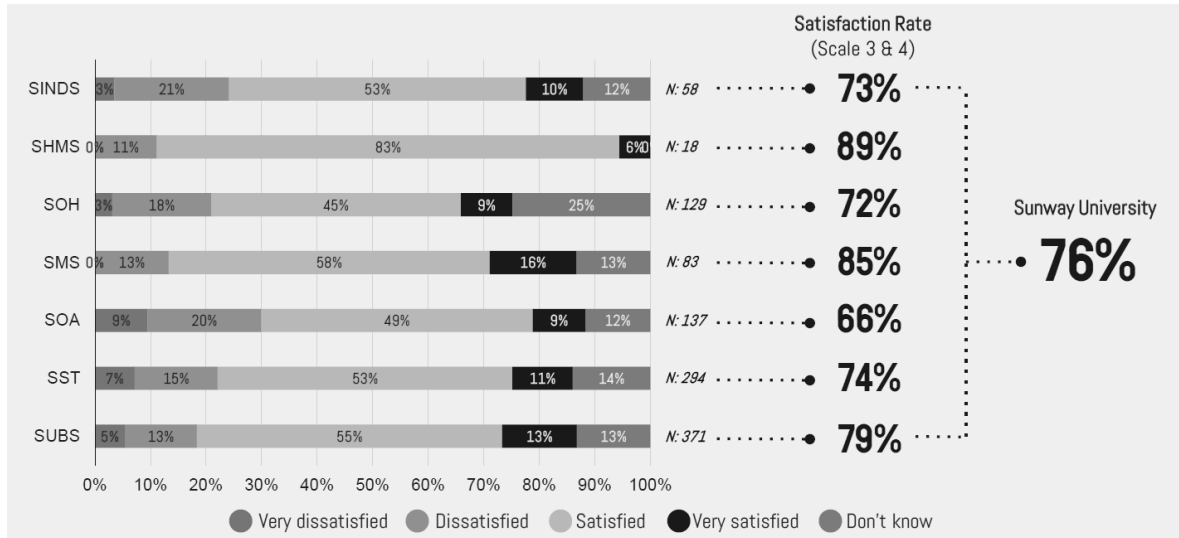


Figure 1 COVID-19 Response barometer (2020): Overall online learning satisfaction

The analysis of open-ended comments among students in both disciplines show a range of concerns, the majority of which revolves around their perception that online learning is less effective than conventional learning. Students highlighted that they were unable to maintain focus during the online classes, they faced unreliable internet connection during online sessions, lecturers unreadiness to teach practical content online, and a drop in output quality due to the absence or the lack of good equipment or software at home.

An early research during the pandemic indicates that the loss of direct social engagement and face-to-face communication negatively impacts students' online study experience (Adnan & Anwar, 2020). Berezina et al. (2021) mentioned that different disciplines may require different approaches to teaching and learning. They further suggested that even though the online learning is becoming popular and seems to be the future teaching and learning trend, students are most likely to prefer an approach that blends traditional delivery approaches with online access to recordings. The COVID-19 Response Barometer indicates that most students preferred to have the pre-recorded lectures and recordings of live sessions continue when on-site studies resume (Table 4).

Table 4 *COVID-19 Response barometer (2020)—List of online activities students would like to continue when on-site studies resume*

Online Activities	
Lectures	30%
Tutorials	24%
Assignments and group work	18%
Tests and exams	22%
Live classes online only	10%
Live classes in a lecture hall you can attend remotely online	21%
Pre-recorded lectures you can watch any time	41%
Recordings of live sessions	41%
Additional recorded materials	29%
Online project work with other students	11%
Online consultations with lecturers	25%

A separate study shows that during the pandemic, initial student fear and negative attitudes regarding online learning changed, indicating that over time, students' perceptions of online learning may improve through first-hand experience (Unger & Meiran, 2020). In 2021, Sunway University resumed the Student Barometer to identify changes in student satisfaction of the service quality and areas for improvement. 86% of 3414 students who responded are satisfied with their online learning experience, noticeably higher than the 76% overall satisfaction rate in 2020 gauged through the COVID-19 Response Barometer. Table 5 below illustrates the increased satisfaction of students in the Hospitality and Creative Arts disciplines of their online learning experience in 2021 compared to that of 2020.

Table 5 *COVID-19 Response barometer (2020) vs Student barometer (ISBSB 2021)—Comparison of online learning satisfaction among Hospitality and Creative Arts students*

Learning Element	Creative Arts		Hospitality	
	2020	2021	2020	2021
Online Tutorials	70%	90%	83%	92%
Online Lectures	70%	92%	83%	94%
Online learning resources and library facilities	63%	82%	66%	89%
Online Assignments	52%	86%	71%	86%
Online Tests and exams	74%	91%	76%	89%
Online Group work	52%	75%	71%	81%

On the other hand, in terms of living experience, there was a drop of students' satisfaction in the social elements of their living experience compared to that of the pre-pandemic period as shown in Table 6.

Table 6 *Student barometer (ISBSB)—Percentage of Sunway University students who are satisfied with their living experience: Social elements*

No.	Living - Social Elements	2018	2019	2021
1	Host friends	91%	91%	89%
2	The social activities (organised events)	87%	88%	86%
3	Making friends from other countries	84%	84%	79%
4	Home friends	80%	78%	74%

As not all country borders were opened when the survey was conducted, and some students chose to continue their learning online as they were given the option, the physical social interaction among students was either absent or reduced significantly. This supports some of the empirical findings that students' academic and social concerns were significant during the pandemic. Having social contact and interaction with others is key to student happiness and well-being. As highlighted by Steenhart (2022) in i-graduate's 2021 Global Student Experience Report, it is not surprising that international students' happiness with their life at their institution decreased between 2019 and 2020, since social contact became more difficult in COVID times. Nevertheless, according to the Student Barometer 2021, 88% of international students at Sunway University mentioned they are happy with their life at the institution, an increase of 3% from 2019. In addition, a significant decrease of 17% in stress or anxiety level of both local and international students in 2021 is observed compared to that of 2019 as in Figure 2 below. It is interesting to note that the stress or anxiety level of students in 2021 is quite similar to that in 2018.

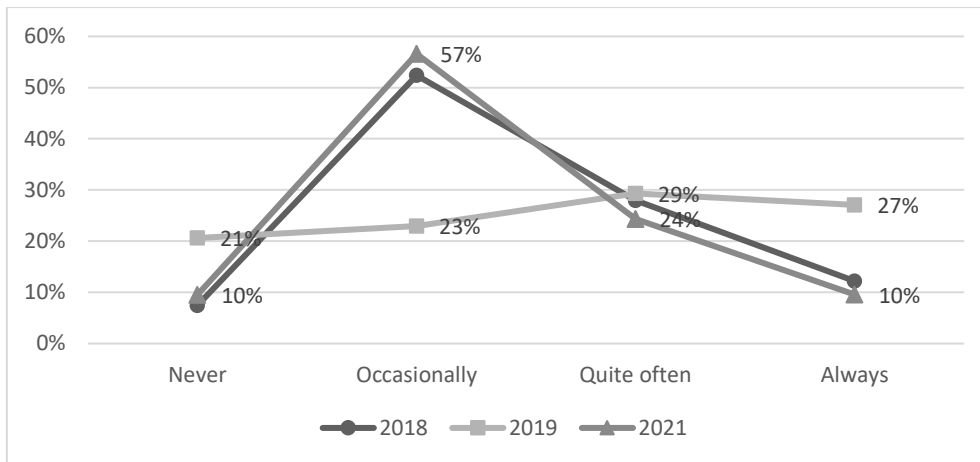


Figure 2 *Student barometer (ISBSB)—Trend in stress or anxiety levels in 2018, 2019, and 2021*

In terms of support services, satisfaction rate of “Support Overall” in Student Barometer (2021) show an increase of 2% in 2022 to 93% compared to that of 2019. Support services rated include IT and system support, library services, career advisory services, student services, counselling services, and others. An increase of 5% satisfaction rate to 96% is noted on IT services which implies that students are happy with the IT infrastructure provided by the university in responding to the changes in the teaching and learning delivery imposed by the pandemic.

DISCUSSION AND CONCLUSIONS

The findings presented here suggest that certain expectations of students in the quality of education and services they experience have changed as we enter into the endemic phase of COVID-19. Students are more receptive to online learning even though they prefer the conventional method to remain with certain elements of their learning. Social elements of student experience are lacking or lost during full online learning; however, the findings indicate that those are not that integral to determine the student level of happiness in the university. Nevertheless, the lack of social elements may induce stress among students and impact their academic performance. Strategic interventions from the institution is vital in addressing these concerns as students may feel lonely and tensed during the pandemic. Institutions need to ensure that adequate support is provided for their students during the pandemic, in particular during the full online teaching phase. One-to-one or group meetings with

students to address their concerns should be conducted. Concerns to be addressed may range from academic issues to support services, counselling, and well-being matters. Such platforms will also provide opportunities for students to connect with their peers and for them to support each other. During the pandemic, Sunway University ensured that e-communication platforms were established and online social activities were carried out to enable students to still connect with the staff members and their peers. Periodic online communication sessions with certain targeted groups of students who need help were also established.

In addition, the findings above also suggest that Sunway University has been responding well to the pandemic in terms of providing the learning support and other student services support. The abrupt change of teaching and learning delivery and other aspects of student experience during the full lockdown period has brought about a positive impact to the university and its community. Some of the new initiatives that emerged during the pandemic continue till today as good practices. From the open-ended comments, it is observed that the readiness of the technological platform for online learning pre-pandemic, plus all the additional support provided during the pandemic and as we are easing our way to normality, are the contributing factors to Sunway University students' high satisfaction rate on the services received. Nevertheless, in order to sustain quality student experience, it is important for universities to continuously evaluate the post-pandemic student experience, and to continue what worked before and improve on what did not.

Over the years, the education industry has been experiencing a rapid change in the adoption and increased use of technology. Industrial Revolution (IR) 4.0 has had a profound impact on the education system since the pre-pandemic period, with institutions adopting new methods and technologies to improve teaching and learning, and deploying automation and digitalisation in all other aspects of services provided. The Education 4.0 framework emerged in response to IR 4.0 which embraces a life-long learning process made possible through the use of technology or devices to acquire knowledge (Halili et al., 2021). The advancement of technology and globalisation has brought about changes to people's aspirations, expectations, and behaviour.

Accordingly, higher education institutions need to be attuned to the changing expectations of students in the quality of services provided. Understanding students' satisfaction on services received is important in order to gauge perceived service quality delivered by institutions.

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REFERENCES

- Adams, S. (2018, July 5). Changing landscape of higher education. LinkedIn.
<https://www.linkedin.com/pulse/changing-landscape-higher-education-simon-adams/>
- Adnan, M., & Anwar, K. (2020). Online learning amid the COVID-19 pandemic: Students' Perspectives. *Journal of Pedagogical Research*, 2(1), 45–51.
<https://doi.org/10.33902/JPSP.2020261309>
- Al-Maskari, A., Al-Riyami, T., & Kunjumammed, S. K. (2022). Students academic and social concerns during COVID-19 pandemic. *Education and Information Technologies*, 27(1), 1–21. <https://doi.org/10.1007/s10639-021-10592-2>
- Berezina, E., Gill, H., & Dahlan, S. (2021). Will online learning become a new norm in higher education? ICEMT 2021: 2021 5th International Conference on Education and Multimedia Technology, 120–126. <https://doi.org/10.1145/3481056.3481086>
- Halili, S.H., Sulaiman, S., Sulaiman, H., & Razak, R. (2021). Embracing industrial revolution 4.0 in universities. IOP Conference Series: Materials Science and Engineering, 1088. <https://doi.org/10.1088/1757-899X/1088/1/012111>
- Hussin, A. A. (2018). Education 4.0 made simple: Ideas for teaching. *International Journal of Education and Literature Studies*, 6(3). <https://doi.org/10.7575/aiac.ijels.v.6n.3p.92>
- i-graduate. (n.d.). Student barometer. <https://www.i-graduate.org/student-barometer>
- Mahbub, R. (2017). Quality assurance for higher education: Challenges in sustaining continuous quality improvement for Malaysian universities. INTED 2017: 11th International Technology, Education and Development Conference, 5204–5210. <https://doi.org/10.21125/inted.2017.1214>

- Mallika Appuhamilage, K.S., & Torii, H. (2019). The impact of loyalty on the student satisfaction in higher education: A structural equation modeling analysis. *Higher Education Evaluation and Development*, 13(2), 82–96. <https://doi.org/10.1108/HEED-01-2019-0003>
- Mohamed Ali, O. (2020). The roles of relationships and service quality as drivers of customer loyalty: An empirical study. *Open Journal of Social Sciences*, 8(4), 14–32. <https://doi.org/10.4236/jss.2020.84002>.
- Nadiri, H., Kandampully J., & Hussain, K. (2009), Students' perceptions of service quality in higher education. *Total Quality Management & Business Excellence*, 20(5), 523–535, <https://doi.org/10.1080/14783360902863713>
- Petre, M., Minocha, S., & Roberts, D. (2006), Usability beyond the website: An empirically-grounded e-commerce evaluation instrument for the total customer experience. *Behaviour and Information Technology*, 25(2), 189–203. <http://dx.doi.org/10.1080/01449290500331198>
- Ripmeester, N. (2022). Student employability and labour mobility: The benefits of addressing employability. The global student experience—2022 insights and analysis from the world's largest student survey [White paper]. i-graduate. <https://f.hubspotusercontent00.net/hubfs/2007157/i-graduate/ISB%20Whitepaper%20Jul%202021.pdf>
- Staley, D., & Trinkle, D. (2011, February 7). The changing landscape of higher education. Educause Review. <https://er.educause.edu/articles/2011/2/the-changing-landscape-of-higher-education>
- Steenhart, K. (2022). International student happiness and wellbeing—How it's tracking with the return towards pre-COVID normality. The global student experience—2022 insights and analysis from the world's largest student survey [White paper]. i-graduate. <https://f.hubspotusercontent00.net/hubfs/2007157/i-graduate/ISB%20Whitepaper%20Jul%202021.pdf>
- Unger, S., & Meiran, W. (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 (IJTES)*, 4(4), 256–266.

ASSURING QUALITY IN CLASSROOM PRACTICE THROUGH REFLECTION IN ACTION: TECHNIQUES

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ABSTRACT

Learning outcomes are often stated in quality assurance documents, yet there can be a gap between what the written aims proclaim and the actual learning during classroom interaction. While quality assurance is often detailed in written documentation, the learner uptake of content and acquisition of skills may be more dependent on engagement, active learning and productive use of target content, than on prescribed guidance and planned teacher aims (Moore, 2014). This brief paper suggests that addressing the challenge of how much quality in-depth learning occurs and how much involvement and engagement there is can be addressed through reflective practice and, specifically, “reflection in action” (Farrell, 2021). Practical techniques are described.

Keywords Quality assurance; higher education; reflective practice; reflection in action

INTRODUCTION

Learning outcomes are often stated in quality assurance documents, yet there can be a gap between what the written aims proclaim and the actual learning during classroom interaction. While quality assurance is often detailed in written documentation, the learner uptake of content and acquisition of skills may be more dependent on engagement, active learning and productive use of target content, than on prescribed guidance and planned teacher aims (Moore, 2014). This brief paper suggests that addressing the challenge of how much

quality in-depth learning occurs and how much involvement and engagement there is can be addressed through reflective practice and, specifically, “reflection in action” (Farrell, 2021). Practical techniques are described.

REFLECTION

Any assumptions on which quality teaching and learning are based and elaborated, as with policy, will be channelled in the act of teaching, through an educator’s sense of teacher identity and their views of pedagogy enacted in the facilitation of the learning process (Beauchamp & Thomas, 2009). The assumption made in this paper is that facilitators of learning are interested in self-improvement, and see interactivity and experiential learning as central to quality education. Working on the assumption that we as educators are ongoing learners, there is much room for reflection so that we build self-improvement as part of assuring quality “at the chalk face” through reflection or knowing oneself (Sachs, 2005).

According to Farrell (2007):

Reflective practice means that teachers must subject their own beliefs of teaching and learning to critical examination, by articulating these beliefs and comparing these beliefs to their actual classroom practices to see if there are any contradictions between practice and underlying beliefs. (Farrell, 2007, p.9).

Earlier work established reflective approaches as part of learner centredness. Dewey (1933) encouraged practitioners to reflect after the action, or “reflection-on-action,” whereas Schön (1983, 1987) encouraged practitioners to reflect during action, or “reflection-in-action”. Schön wanted to encourage practitioners to reflect while they engaged in teaching and learning.

In building on the work of these oft-cited pioneers, Farrell (2007) states that reflection-in-action, as a heightened awareness of the situation during the lesson, depends on how an educator sees the nature of fostering quality education. Such reflective practice is built on teacher acceptance of the importance of interaction and co-construction of meaning, as opposed to being a transmitter for receivers or listeners in a transmission-dominated environment. The notion that teaching is often viewed and enacted as an act

of transmission of knowledge is well documented, as is the reality that such a view puts the teacher at the centre of teaching, but not necessarily at the centre of quality learning (Concannon-Gibney, 2021; Loughran ,2007). One way of improving the range of interaction and learning in terms of uptake is to consider how much teacher talk there is, as opposed to time and space for learners' talk or learner responses. We now turn to teacher talk, a well-researched starting point for reflection.

THE QUALITY OF CLASSROOM TALK

While many acknowledge that a lecture is a common mode of imparting content in tertiary education, it is well known that elongated extensive listening does not usually equate to learners internalising or understanding concepts, both online and face to face (Hu & Li, 2017; Moore, 2014). This leads us to other contexts in which *teacher talk* has been defined as a complex mix of information giving, scaffolding learning or management of the classroom which can tend to take up a considerable amount of interaction time (see Juuti et al., 2020 for a full typology). While teacher talk plays an important role in scaffolding learning, research has shown that there can be a dominance of stereotype questions and periods of listening which extend learners' attention spans beyond effective absorption of ideas (Cummings et al., 2017). Essentially, it is useful to consider that listening to teacher talk beyond 10–15 minutes in a formal learning situation involves learners in extended concentration, which may not involve in-depth acquisition of concepts or skills.

The simple task of noting how much teacher talk over a lesson period there is, can provide data about how much time and space we provide for learners to discuss and internalise or to respond in their own terms – if online through such tools as Socrative, Kahoot and interactive whiteboards. I use a simple note pad with a timeline for the teaching and learning session to note my teacher talk time, which often exceeds the planned allocation. Being aware of timing and limiting the teacher talk ensures transitions, develops “chunking” and triggers reflections in action that are based on the need to provide a task after 10–15 minutes, so that learners engage with concepts and respond by demonstrating internalisation of content or skills. Often such a task to reinforce or extend delivered content will be questioning.

QUESTIONING TO BUILD ENGAGEMENT AND TALK

The importance of questioning in developing quality learning is not new. Yet it is interesting that, while the phrase “critical analysis” is often quoted in learning outcomes, less attention is paid to developing awareness of questions and question types among learners as well as educators. A classic and useful way to reflect on question types is to use a list of six well-known categories and to tick each question type off as you go through a lesson. The ticking off of question types while teaching also provides “wait time” so that there is time for learners to respond, while providing the educator with data for reflection. The following Socratic questions, adapted from the University of Michigan’s online resources, also facilitate reflection:

1. Questions for clarification:

- Why do you say that?
- How does this relate to our discussion?
- Can you put that in other words?

2. Questions that probe assumptions:

- What could we assume instead?
- How can you verify or disapprove that assumption?

3. Questions that probe reasons and evidence:

- What would be an example?
- What do you think causes X to happen? Why?
- Do you think that intonation is used to signal questioning?

4. Questions about viewpoints and perspectives:

- What would be an alternative?
- Would you explain why it is necessary or beneficial, and who benefits?
- What are the strengths and weaknesses of...?

5. Questions that probe implications and consequences:

- What generalisations can you make?
- What are the consequences of that assumption?
- How does X link to what we learned before?

6. Questions about the question:

- What was the point of this question?
- Why do you think I asked this question?
- What does...mean?

Adapted from University of Michigan. *The Six Types of Socratic Questions*.

Such questions can also be practised in group interaction and can be successfully used in both online and face-to-face peer discussion. In this time of blended learning, the use of peer discussion and personal response systems can also assist in fostering engagement with and between large groups in the lecture hall (Ashwin et al., 2015). Questioning and self-questioning remain essential if we as educators are to understand how much quality learning, rather than transmission teaching, has taken place.

CONCLUSION

It has been suggested that a concern in quality assurance is addressing the gap between espoused and documented aims with interaction in teaching and learning. The bottom line is that only the facilitator of learning or an observer of his or her learning management will know what is going on in terms of achieving outcomes. Therefore, one role of reflective practice in building quality is to the develop self-awareness through reflection-in-action and reflection-on-action. Two aspects of many in the teaching/learning complexity which are focused on in this brief paper, are that of being aware of the time spent on teacher talk and actively developing a range of question types drawing on Socratic techniques, so as to build greater interactivity within quality learning.

REFERENCES

- Ashwin, P., Boud, D., Coate, K., Hallett, F., Keane, E., Krause, K-L., Leibowitz, B., MacLaren, I., McArthur, J., McCune, V., & Tooher, M. (2015). Reflective teaching in higher education. (Reflective teaching). Bloomsbury Academic.
- Beauchamp, C., & Thomas, I. (2009) Understanding teacher identity: An overview of issues in the literature and implications for teacher education. *Cambridge Journal of Education*, 39(2), 175–189. DOI: 10.1080/03057640902902252
- Concannon-Gibney, T. (2021). Moving beyond the transmission of knowledge in the lecture hall: a self- study. *Professional Development in Education*.
<https://doi.org/10.1080/19415257.2021.1876152>

- Cummings, H. A., Neyers, K., & Molitor, S. (2017). Measuring student attention in the second language classroom. *Language Teaching Research*, 23(1), 107–125. <https://doi.org/10.1177/1362168817713766>
- Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*. D.C. Heath & Co Publishers.
- Farrell, T.S.C. (2007). *Reflective language teaching: From research to practice*. Bloomsbury.
- Farrell, T.S.C. (2018). *Reflective language teaching: Practical applications for TESOL teachers*. Bloomsbury.
- Hu, M., & Li, M. (2017) Student engagement in online learning: A review. 2017 International Symposium on Educational Technology (ISET), 39–43. <https://doi.ieeecomputersociety.org/10.1109/ISET.2017.17>
- Juuti, K., Loukomies, A. & Lavonen, J. (2020). Interest in dialogic and non-dialogic teacher talk situations in middle school science classroom. *International Journal of Science and Mathematics Education*, 18, 1531–1546. <https://doi.org/10.1007/s10763-019-10031-2>
- Loughran, J. J. (2007). Researching teacher education practices. *Journal of Teacher Education*, 58 (1), 12–20. DOI: 10.1177/0022487106296217
- Moore, J. (2014). Effects of online interaction and instructor presence on students' satisfaction and success with online undergraduate public relations courses. *Journalism & Mass Communication Educator*, 69, 271–288. DOI: 10.1177/1077695814536398
- Sachs, J. (2005). Teacher education and the development of professional identity: Learning to be a teacher. In Denicolo, P., & Kompf, M (Eds.), *Connecting policy and practice: Challenges for teaching and learning in schools and universities* (pp. 5–21). Routledge.
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- Schön, D. A. (1987). *Educating the reflective practitioner*. Jossey-Bass.
- The six types of socratic questions. University of Michigan. Retrieved 13 July, 2022, from <http://websites.umich.edu/~elements/probsolv/strategy/cthinking.htm>

CONCEPTUAL MODELING FOR ONLINE PEDAGOGY: A CASE OF PRACTICAL SUBJECTS

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ABSTRACT

The coronavirus pandemic has hastened unanticipated "instant transitions" to remote learning at colleges and universities across the country. Previous studies on online education between 2021 and 2022 were primarily teacher-centric, focusing on the effectiveness of online teaching with little emphasis on learner conditions as well as enabling and motivating factors. This study aims to address key questions on how the online pedagogy framework looks like when student learning conditions and subject nature are considered, and how can different subjects be evaluated for suitability and effectiveness prior to adapting online approaches. This study argues that the key factor for success in teaching practical skills online is first to recognise and acknowledge the difference between a controlled and an uncontrolled environment. Conceptual modelling suggests that academics and institutional management must carefully evaluate the subjects/programs based on the three Cs: 1) Control—close monitoring of the performance of skills due to the high risks involved, as practical results are greatly dependent on precise specifications of materials used; 2) Capacity—unique and specialised utensils, equipment, materials, workstation, and space that are required in facilitating the practice; 3) Coaching—close evaluation and correction of students performing complex tasks and processes, as well as their mastery of a particular skill.

Keywords Practical; online; teaching; learning; pandemic

INTRODUCTION

Online education is a pedagogical innovation that frequently presents a significant challenge for faculty in the majority of, if not all, disciplines in higher education (Mansbach & Austin, 2018). The coronavirus pandemic has hastened unanticipated "instant transitions" to remote learning at colleges and universities across the country. Teaching staff and administrators alike quickly recognised the need to replicate the teaching and learning experiences of the face-to-face classroom in the digital environment (Wong, 2020). However, many faculty members from various academic institutions, particularly those teaching practical subjects, have faced instructional challenges during this transition. We recognise the distinction between intentionally designed instruction, commonly referred to as "online pedagogy", and "crisis pedagogy", the mandated remote learning transition that has recently occurred. Prior studies have revealed several gaps: 1) there have been few studies on practical-based online teaching; 2) studies have been largely teacher-centric, with little emphasis on learner-centered studies; and 3) there have been no clear studies assessing the feasibility, suitability, and acceptability of subject nature and online delivery. Several key questions remained unanswered as a result of these gaps: 1) What does the online pedagogy framework look like when student learning conditions and subject nature are considered? And 2) how can different subjects be evaluated for suitability and effectiveness prior to adapting online approaches?

LITERATURE REVIEW

Previous studies on online education between 2021 and 2022 were primarily teacher-centric, focusing on the effectiveness of online teaching with little emphasis on learner conditions as well as enabling and motivating factors. For example, Hofer et al. (2021) defined emergency online teaching and learning, and established a relationship between CoP-concepts and the integrative framework for learning activities involving technology in higher education. Their research suggested that regulation process scaffolding or communication platforms could be potential artefacts of an online teaching and learning CoP. Similarly, Mahmood's (2021) research on instructional strategies, particularly in developing countries, suggested that maintaining a slow voice and practising vocal functions by teachers; sharing resources prior

to the class which aids in creating interactive online classes; receiving feedback from students, offering flexible teaching and assessment policies; and recording online lectures and receiving support from teaching assistants are all important features.

Ma et al. (2021) examined the relationship between teacher self-efficacy and the effectiveness of technology application in determining the success of online teaching in a more specific manner. Their conclusion was that teaching self-efficacy for online instruction did not significantly increase, whereas it did significantly increase for technology application. The major associated factors were identified as a lack of experience in online teaching, separation of teachers and students, the school administrative process, and poor student academic performance (Mahmud et al., 2021). On the other hand, two researches by Peimani and Kamalipour (2021) and Lapitan et al. (2021) have taken a more specific focus on subject-based effectiveness in view of online teaching. Both studies recognised the unique nature of different subjects would require different approaches in online teaching delivery as opposed to a fixed framework of online teaching. An exploratory study with a qualitative approach conducted by Peimani and Kamalipour (2021) concluded that it is critical to move beyond fixed pedagogical frameworks in order to harness the productive capacities of adaptive teaching. Similarly, Lapitan et al's (2021) case study on online teaching of chemistry found that students' learning experiences, academic performance, and instructor observations had a positive impact on both students and instructors. The identified challenges were internet connection stability and the instructor's familiarity with readily available internet-based teaching tools such as video conferencing software. They suggested that instructors improve their interaction with students in order to maintain student interest and engagement during online classes.

Another stream of studies focused on emotional factors in determining the effectiveness of online teaching (e.g., Naylor and Nyanjom, 2021; Lei & So, 2021; Tandon, 2021). According to Naylor and Nyanjom (2021), teaching is inextricably linked to one's beliefs, values, commitments, and relationships with students. A shift in instruction and pedagogy has the potential to sever these deep and personal bonds, eliciting an emotional response. The study's goal was to investigate the nature and significance of emotions among university educators transitioning to online teaching. Their findings suggest a dynamic relationship between the types of emotional responses and the level

of institutional support. Four emergent educator orientations are presented based on the type of emotional response and the amount of support—futuristic, ambivalent, disillusioned, and cautious. Similar studies by Lei and So in 2021, which compared teachers' and students' emotional support by sampling the tourism and hospitality programmes in China, revealed the same notions. Tandon's (2021) study developed a theoretical model that highlights the determinants of online teaching adoption during the COVID-19 outbreak. The study's findings revealed that performance expectancy and facilitating conditions had a positive impact on behavioural intention and attitude. However, effort expectations did not drive teachers' adoption of online learning. Social influence, on the other hand, had an insignificant relationship with attitude but a significant relationship with behavioural intention. Attitude had a significant influence on both behavioural intention and actual use.

Only two prominent studies (i.e., Wang et al., 2021; Khan et al., 2021) specifically criticised the effectiveness of teaching practical-based subjects using online pedagogy, despite having relatively few samples drawn from practical-based online teaching. Wang et al. (2021) intended to assess the current status of online undergraduate education in dental medicine in mainland China. During the COVID-19 pandemic in China, 97 percent of the 42 dental colleges polled opened online courses, with 74 percent using live broadcast as the primary teaching method. In most dental schools, fewer specialised practical curriculums were set up online in comparison to theoretical courses, resulting in lower student satisfaction. The main issue in online education, according to the majority of schools, is the difficulty in ensuring students' learning motivation. A study on general medical education by Khan et al. (2021) revealed similar challenges. Specifically, they discovered that approximately 62–80 percent of students were satisfied with online practical teaching or agreed with the benefits of various online tools used in teaching sessions. However, the main barriers perceived in online practical laboratory teaching were the lack of face-to-face interaction, non-experiential learning and adaptation to newer technology.

CONCEPTUAL FRAMEWORK/MODEL

The underpinning theory of this study's conceptual framework is based on several theoretical perspectives of the Learner-Centered Pedagogy (LCP). The origins of the LCP can be traced back to pragmatic theories of constructivism,

transformism, and humanism. Such theoretical linkage implies that the LCP is a collection of theories rather than a single theory (Mushi, 2004). The pragmatic paradigm's learning theories emphasise participatory teaching methods to improve student learning. In other words, learning theories play an important role in assisting teachers in developing an effective pedagogical strategy that will improve student learning (Shah, 2019). Understanding how these theoretical perspectives promoted LCP practices to bring about the effectiveness of online learning is therefore equally important, as explained in the development of the conceptual framework.

The key factor for success in teaching practical skills online is first to recognise and acknowledge the difference between a controlled and an uncontrolled environment. Before the COVID-19 pandemic, teaching and learning for practical subjects, whether in the field of hospitality, arts, medical or life sciences, were mainly host-centric; that is, they were focused on equipping faculty members with the necessary tools and enhancing campus infrastructure—classroom, learning centres, and laboratories. This made teaching and learning more controllable via standardised and uniformed environments.

For obvious reasons, the movement control orders due to the pandemic have caused many to reflect on the uncontrollable environment, that is, students' self-learning environment. The issue now is no longer about the “reaching-out” mechanism, thanks to massive efforts in advancing the remote infrastructure (i.e., IT applications, online teaching and learning platforms). What remains a great challenge for programmes such as culinary arts, hotel management and events management, which heavily focus on practical skills, is the readiness and feasibility of a guest-centric environment—students' home learning spaces, equipment, workstation, utensils, and materials. Because they are present to us, we experience events, instances, aspects, parts, and wholes. We can experience them through our senses. Experiencing these aspects raises one's awareness of a specific phenomenon or situation. According to Marton et al. (2004, p. 19), awareness is the "totality of a person's experiences of the world at each point in time." Previous experiences with a phenomenon heighten a person's awareness of instances or aspects of the phenomenon in question. In fact, an individual's consciousness is constantly changing, and each phenomenon is experienced against the backdrop of one's previous experiences (Marton & Tsui, 2004).

Because different learners have different experiences with the same phenomenon, they may have varying awareness levels of it. As a result, they may concentrate on different aspects of the same phenomenon and, thus, perceive it differently (Marton & Booth, 1997). This is the starting point for the variation theory, which states that learning is defined by the learner's dynamic structure of awareness. In this view, learning is also associated with discernment, variation, and simultaneity (Ingerman et al., 2009); to know a particular phenomenon is to discern its critical features at the same time.

According to the variation theory, in order to determine the extent to which subjects can be taught online, academics and institutional management must carefully evaluate the subjects/programs based on the three Cs:

1. **Control**—close monitoring of the performance of skills due to the high risks involved, as practical results are greatly dependent on precise specifications of materials used;
2. **Capacity**—unique and specialised utensils, equipment, workstation, and space that are required in facilitating the practice;
3. **Coaching**—close evaluation and correction of students performing complex tasks, processes and mastery of a particular skill.

The above criteria should be mapped against the students' learning environment in deciding the suitable mode of teaching and learning for practical subjects. Hence, the following (Table 1) as the *model for online consideration for practical subjects* is proposed.

Table 1 *Online practical model*

Practical nature (e.g.)	Degree of dependency on the practical setting or nature			Teaching & Learning Mode	Effectiveness depends on
	<i>Control</i>	<i>Capacity</i>	<i>Coaching</i>		
Type I	Low	Low	Low	Online	Course guide/self-learning materials
Type II	Medium	Low	Low	Online/Hybrid	Observable risks & hybrid ratio
Type III	Medium	Medium	Low	Online/Hybrid	Observable risks & hybrid ratio
Type IV	Medium	Medium	Medium	Hybrid	Hybrid ratio & degree of complexity
Type V	High	Medium	Medium	Hybrid/FTF	Prioritise FTF, minimise hybrid
Type VI	High	High	Medium	Hybrid /FTF	Prioritise FTF, minimise hybrid

Note. FTF – face-to-face learning; Online – distance learning over the Internet; Hybrid – a mix of FTF & online learning (Chong, 2022)

CONCLUSION

The proposed online practical model can be used as a foundation for future empirical studies. It also serves as a measurement tool for determining the suitability, acceptability, feasibility, and effectiveness of a subject or module when considering online teaching and learning. Through flexible learning and activities, this research will add to the body of knowledge of online distance learning. Understanding the 3Cs (Control, Capacity, and Coaching) has the potential to provide Malaysian universities with flexible learning opportunities across a variety of courses. Furthermore, the research aims to make practical contributions to the education sector, specifically the Ministry of Education. The findings of the study could be one of the recommendations considered by the Malaysian Qualifications Agency (MQA) when developing an institutional framework to allow for flexible learning for different subjects or programmes.

REFERENCES

- Hofer, S. I., Nistor, N., & Scheibenzuber, C. (2021). Online teaching and learning in higher education: Lessons learned in crisis situations. *Computers in Human Behavior, 121*. <https://doi.org/10.1016/j.chb.2021.106789>.
- Ingerman, Å., Linder, C., & Marshall, D. (2009). The learners' experience of variation: Following students' threads of learning physics in computer simulation sessions. *Instructional Science, 37*(3), 273–292.
- Khan, A. M., Patra, S., Vaney, N., Mehndiratta, M., & Chauhan, R. (2021). Rapid transition to online practical classes in preclinical subjects during COVID-19: Experience from a medical college in North India. *Medical Journal Armed Forces India, 77*, S161–S167.
- Lapitan Jr, L. D., Tiangco, C. E., Sumalinog, D. A. G., Sabarillo, N. S., & Diaz, J. M. (2021). An effective blended online teaching and learning strategy during the COVID-19 pandemic. *Education for Chemical Engineers, 35*, 116–131.
- Lei, S. I., & So, A. S. I. (2021). Online teaching and learning experiences during the COVID-19 pandemic: A comparison of teacher and student perceptions. *Journal of Hospitality & Tourism Education, 33*(3), 148–162.

- Ma, K., Chutiyami, M., Zhang, Y., & Nicoll, S. (2021). Online teaching self-efficacy during COVID-19: Changes, its associated factors and moderators. *Education and Information Technologies, 26*(6), 6675–6697.
- Mahmood, S. (2021). Instructional strategies for online teaching in COVID-19 pandemic. *Human Behavior and Emerging Technologies, 3*(1), 199–203.
- Mansbach, J., & Austin, A. E. (2018). Nuanced perspectives about online teaching: Mid-career and senior faculty voices reflecting on academic work in the digital age. *Innovative Higher Education, 43*(4), 257–272.
- Marton, F., & Booth, S. (1997). *Learning and awareness*. Lawrence Erlbaum.
- Mahmud, M. M., Yaacob, Y., Ahmad, R., Mustamam, N. I., Saparman, M. S., Ishak, N. S., ... & Sharif, M. N. M. (2021). Challenges and Opportunities of the Covid-19 Pandemic: A Lesson Learnt. *International Journal of Asian Social Science, 11*(11), 511–521.
- Marton, F., Runesson, U., & Tsui, A. B. M. (2004). The space of learning. In F. Marton & A. B. M. Tsui (Eds.), *Classroom discourse and the space of learning* (pp. 43–62). Lawrence Erlbaum.
- Mushi, P. A. K. (2004). *From didactic to facilitative approach: Establishing conditions for effective teaching and learning in higher education*. Dar es Salaam University Press.
- Naylor, D., & Nyanjom, J. (2021). Educators' emotions involved in the transition to online teaching in higher education. *Higher Education Research & Development, 40*(6), 1236–1250.
- Peimani, N., & Kamalipour, H. (2021). Online education and the COVID-19 outbreak: A case study of online teaching during lockdown. *Education Sciences, 11*(2), 72.
- Shah, R. K. (2019). Effective constructivist teaching learning in the classroom. *Online Submission, 7*(4), 1–13.
- Tandon, U. (2021). Factors influencing adoption of online teaching by school teachers: A study during COVID-19 pandemic. *Journal of Public Affairs, 21*(4).
<https://doi.org/10.1002/pa.2503>
- Wang, K., Zhang, L., & Ye, L. (2021). A nationwide survey of online teaching strategies in dental education in China. *Journal of Dental Education, 85*(2), 128–134.
- Wong, J. (2020, April 10). How will the pandemic change higher education? Chronicle of Higher Education. *The Chronicle of Higher Education*.
<https://www.chronicle.com/article/How-Will-the-Pandemic-Change/248474>

SUPPORT STUDENT LEARNING THROUGH DIAGNOSTIC ASSESSMENT

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ABSTRACT

Post-pandemic teaching and learning took on a new appearance and posed a challenge to the quality of education in Malaysia. Although face-to-face sessions have resumed at the university level, online and hybrid courses continue to be offered. For private universities with students of diverse racial and national backgrounds, the pressure to evaluate the quality of student work is rarely examined. Henceforth, the purpose of this study is to assess the technique and quality of evaluation for the subject of Creative Thinking and Idea Generation, which is 100 percent coursework based. Based on last semester's teaching experience, it was determined that the present assessment was difficult for students to work on and comprehend. Local and international students have varying perspectives, which impact the calibre of their work. This paper explores the challenges students experience, as well as provides evaluation measures and a good rubric so as not to compromise the course learning objectives (CLO). Since local and international students have varying degrees of comprehension, diagnostic assessment is deemed necessary prior to deciding the subject's assessment. Assessment feedback provided through this writing is critical since it influences decisions concerning grades, Cumulative Grade Point Average (CGPA), and students' eligibility for scholarships and their ability to continue receiving student loans via the Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN).

Keywords Assessment; diagnostic; creative; holistic rubric

INTRODUCTION

In recent years, higher educational institutions in Malaysia have seen a continuous influx of students. Since October 2021, Education Malaysia Global Services (EMGS) has reported receiving 40,000 applications from international students, a significant rise from the 19,000 applications received before the epidemic. The Malaysian Ministry of Education anticipates enrolling 250,000 international students by 2025. This could prove to be challenging as students from different educational backgrounds and linguistic proficiency could congregate in one course and class, resulting in universities having to adapt to a variety of syllabuses and curricula. Therefore, before educators can teach any new information, they must develop an informal diagnostic assessment to evaluate the capacities of different students and, later, develop standardised diagnostic assessments. This standardised assessment will help educators to determine students' level of knowledge. According to Shim et al. (2017), diagnostic testing is a tool that can be used by educators to conduct early detection of students' learning capacities. Diagnostic testing also allows educators to utilise intervention or remedial instructions to help weaker students succeed in their programmes by first assessing and identifying their strengths and shortcomings.

Carpenito (2006) asserts that the term “diagnostic” is more frequently employed in the context of medicine since medical diagnosis is meticulous and critical in nature to ascertain the underlying cause of a certain problem. The application of diagnosis in the field of education, however, can be focused on an instructional strategy in which tests are used to give teachers pertinent data about a student's past knowledge, abilities, and any kind of preconceived notions or misconceptions about the subject or material (Geller & Yovanoff, 2009). Therefore, diagnostic tests can be viewed as a type of evaluation that is focused on identifying students' areas of strength and weakness (Zhao, 2013). Shively et al. (2018), in their article of assessing creativity via diagnostic assessment, highlighted a key point that is often ignored in assessments today. As more student-centered pedagogies are introduced in classrooms, students are assessed via project-based learning, or even design-based learning, in which they are to produce a particular product. By providing an example of students having to build a car using a mousetrap, Shively et al. (2018) indicated how a typical assessment would get the educator to evaluate students based on their

final product. By evaluating merely the final product, the educator failed to take into consideration:

development of creative or critical thinking throughout the process. While the distance may be easy to assess, what is easy to assess may not represent what actually matters. The distance, speed, and appearance of the car do not provide a valid gauge on the students' development of thinking processes and further, does not accurately convey the importance of those cognitive skills to the students' product. (p.149)

Specifically for project-based learning assessments, educators need to design effective assessments by highlighting to students what matters. As educators, we are so used to curriculum design which highlights the end goals and also assessment brief with course learning outcomes and what should the students be able to do and understand (Wiggins & McTighe, 2011). The end goals should be used as a guide by educators to develop assessments, and these assessments in return should be utilised to provide students' learning experiences. When there is consistency between goals, assessments and learning experience, the curriculum validity and efficacy increases. In project-based learning, goals such as creativity and critical thinking can be primary; hence, assessments can be designed by keeping these two elements in mind. In the 21st century, learning stresses on critical thinking, creativity, collaboration, and communication. Educators from all fields could keep in mind of these elements when necessary in designing their assessments. On the other hand, educators teaching theoretical subjects could design assessments with specific rubrics that can easily be understood by students. However, educators teaching creative subjects struggle to come up with assessments and rubrics, as creativity is subjective and what the educator feels and believes is creative might not be the case for the student. Hence, what is considered creative in terms of assessment and rubric needs to be defined very clearly, so that both educator and student are aware of what is required and important.

Based on this study, it is important for educators to break down creativity and critical thinking into measurable components so that students can receive constructive feedback and grow. Many educators assess creativity with a single rubric row of "creative" and "not creative" or indirectly with "design and execution". In creative subjects, both aesthetics and creativity matter. It is a multidimensional construct that cannot be judged solely on aesthetics. Furthermore, students are unable to see how they can improve their creative thinking when the terms "creative" and "not creative" are used so casually.

Creativity can be operationalised through fluency, flexibility, elaboration, originality, and usefulness in a social context (Guilford, 1950; Runco & Jaeger, 2012; Shively et al., 2018). If students are assessed on their ability to generate a variety of ideas, they will be evaluated on their fluency; their adaptability will be judged on their ability to build on previously proposed ideas; their originality will be appraised on their ability to come up with something new that solves a current social problem. Students' creativity process and critical thinking needs to be assessed all along the way, rather than just looking at the final product handed in. A well-designed rubric can assist students in knowing what is considered creative and what is meant by critical thinking, and how they can develop these skills. Researchers in the current study anchored the study on the Design Thinking Model (DTM). DTM as a model that can be easily used for project-based learning. This model specifically focuses on both creative and critical thinking skills. The model was initially proposed in seven stages back in 1969 by Herbert Simon. The model has been used and adapted across various fields ever since. When it comes to academia, the model is looked at in five different stages in a systematic nonlinear process. The five stages can be looked in the form of empathise, define the problem, ideate, prototype, and also test (d.school, 2009). The flexibility of the model allows one to revisit and repeat any of the steps if they find that they are unhappy with what they have worked on, and the stages do not necessarily have to take place sequentially. In terms of the current study, the model fits right in as students are able to revisit their mind map, idea generation or story structure; characters; and even unconventional design any step of the way. For example, some groups might find that the characters which they have designed need to be changed a little as their story structure has now changed, so they are able to revisit the ideate stage and rework on their characters.

DTM allows students to work on real-life solutions which can truly help solve some common social problems faced by many. By empathising and engaging with people who are affected by some common social problems such as pollution or environmental destruction, students are able to think out-of-the-box and look at the social issue from a broader perspective, and critically think of the needs of the society. Via DTM, students are also encouraged to positively think of how they can help solve a particular problem. This process allows them to think of many different solutions, directly working on their creative fluency and also the flexibility of any possible solutions, rather than just complaining about a certain social problem or why the existing ways are not working. Since DTM is a process-based model, it takes into consideration

the process students go through in order to develop solutions. By constantly reflecting, assessing and facing roadblocks, students together with their educator can continue to go back and forth in the different stages in DTM to further enhance their ideas. As stated by Haught-Tromp (2017), roadblocks have often facilitated learners to lean on their creative process more.

In the context of the current study, the researchers looked at the subject called Creative Thinking and Idea Generation. The reason why this subject was chosen was that it is a project-based paper in which students are required to work on a project (i.e., comic book with unconventional design) which can help highlight solutions to any social problem faced by society. The researchers also believe that the subject's simplistic rubric does not take into consideration what is considered creative and not creative. This is an inter-faculty paper (i.e., students from the Engineering, Medicine, and Business faculties can take it up as an elective paper) and students from the Creative faculty take it up as a compulsory paper. The educator is often left with a huge number of students who have different ideas and definitions of creative and critical thinking. Standardised assessments often fail in measuring these cognitive skills, and educators often end up emphasising other skills for assessments (Moon et al., 2002). Therefore, by performing a diagnostic assessment to ensure what is considered creative and not creative and providing specific feedback to students orally in each consultation after viewing their work, the researchers believe that students would be able to understand better what is required and would be able to provide some ingenious suggestions to solve social problems.

MATERIALS AND METHODS

As mentioned earlier, this research focuses on a subject called Creative Thinking and Idea Generation, which is based on 100 percent coursework. There were 156 students who took up the subject in the January 2022 trimester. Students were given three assignments, out of which two were individual and one group. For the current study, researchers decided to pick the group assignment (i.e., comic book with unconventional design) to be assessed diagnostically. This is because the group assignment carries the highest weightage (i.e., 50 percent) and the assignment would require them to

work together as a group, which can further foster critical thinking. The assignment needs to be done within 10 weeks. Each week, the students had to sit in their groups, work on the assignment and show progress to the lecturer. The lecturer then assessed and provided feedback to the students on areas that required more work.

The researchers grouped previous semester's comic book assignments into novice, developing, and expert categories. The comic books were grouped based on the marks that were given (Grade A – Expert, Grade B – Developing, and Grade C – Novice). Each category had three comic books, and each comic book was filled with feedback on what was good, what could have been improved further and what suggestions were not adhered to. This allowed students to understand what may or may not be considered a good comic book. Students could also see the attempt made by their seniors in the past in trying to relate their story concept to social issues, and how the design of their comic book added value to the theme of the story. They could also see the sort of unconventional designs that added the element of engagement between readers and the story concept which enhanced the story value further. The common issues seen in the comic book assignments were a lack of creativity and poor teamwork. Students often felt uninspired and not creative because they could not draw or colour. This is a common misconception stated by many students to the lecturer during consultations in the past. In addition to their misconception, the existing rubric for the comic book assignment were limited in explanation which left the students unclear about the expected outcomes of the assignment. As seen in Table 1, the rubric is not well defined as it does not highlight the expected performance required from the students in terms of their creativity and critical thinking skills.

Table 1 *Old version of rubric*

Activities	Percentage (%)
Research in the form of a Mind map	5%
Idea Generation (15 Approved Concepts: 1% per Approved Idea)	15%
Idea Development (Weekly Development Assessment)	15%
Game Concept/Story Concept	5%
Execution	10%
TOTAL	50%

As stated earlier, the levels of mastery were grouped into three categories, namely novice, developing and expert. Novice would simply mean more work was required in which the story concept was not able to highlight the social issues well, no specific solution was given to solve the social issues, and students did not fulfil the unconventional design requirement. Whereas developing would mean the comic book highlighted social issues via the story concept, some solutions proposed were good to solve the social issues, and the unconventional designs did add some value to the story concept. The expert definition would mean students were able to highlight social issues via the story concept well, plenty of solutions were proposed to solve the issues, and the unconventional designs were truly well thought out and added value to the story concept by promoting engagement and interactivity with the readers.

Therefore, the researchers developed an early diagnostic process (Table 2) to aid in eliminating the misconceptions highlighted by students and to provide comprehensive feedback on the assignment each week. Students were briefed on this process at the beginning of the May 2022 trimester, and the educators applied these stages accordingly. In Stage 1 (Week 1), the educators (the researchers) showed comic book samples from previous semesters, proposed a few problems, brainstormed solutions, gave students incomplete drawings and gave them instructions to complete the drawings based on their imagination. This stage assessed students' comprehension of creativity, communication and teamwork; their ability to find multiple solutions to a problem to further hone their critical thinking skills; and their creativity in completing the drawing. In Stage 2 (mid-semester), the researchers continued to monitor the students' development and offered consultations and feedback. This assisted the students in improving their assignments based on the rubric and specific feedback.

Table 2 *Early diagnostic process*

Stage	Process	Justifications
Stage 1 (first week of the semester)	Students were shown samples of creative and non-creative assignments from previous semesters.	To assess students' understanding of creativity.

Stage 2 (mid- semester)	Proposed a few problems and instructed students to brainstorm inexpensive and timely solutions in groups.	To understand how well students communicated and worked as a team. This exercise encouraged creative thinking by requiring students to come up with multiple solutions to a problem.
	Gave each student an incomplete drawing and instructed them to complete it using their imagination.	To dispel the notion that students lacked creativity, as they were able to complete the drawing not due to their drawing skills, but rather their imagination.
	Each week, researchers continued to monitor students' development and offer consultations and feedback.	To ensure students knew how to improve their assignments based on rubric.

RESULTS

The old rubric is a holistic rubric, which means that it basically provides one single score to assess students' performance on the particular task (Table 1). Additionally, it does not provide targeted feedback to students, which simply means that students will not know if they have performed well or poorly in the particular assignment. The requirements for each criterion are not specified in the previous rubric because that one takes a more holistic approach. For instance, what must be done in order to create a mind map, what characteristics define a good mind map, and so on. The educator is unable to evaluate students at different levels based on the work that they submit due to the limitations of this rubric. For illustration, the educator will have a difficult time choosing a single best description to use as a rubric for evaluating students who submit mind maps of varying degrees of complexity. As a result, this holistic rubric was unable to provide students with enough details as to what is required of them and what is considered an expert mind map. In short, this rubric is highly inflexible, and neither students nor educators can use it to comprehend, evaluate, or enhance the work that has to be done.

Based on the diagnostic test and DTM model, researchers created a rubric to help students understand how they are being assessed and enhance their creativity and idea creation (Table 3). This new rubric can also assist educators in conducting objective and methodical assessments of the work produced by students. In light of this, it can be deduced that despite the subjectivity inherent in the nature of creativity, the new rubric displays not only the quantity and quality of work produced by the group but also their creative potential.

Table 3 *Improved version of rubric*

Criteria	Total Marks	Weight	Novice 1	Developing 2	Expert 3
Mind Map (Fluency)	5	1.65	The target audience and relevancy of the theme to the target group were not taken into consideration by the students, who only contributed one to three items pertinent to the theme to their mind maps.	Students thought about two themes, assessed the target audience in terms of demographics, and added one to five aspects to the theme in a mind map.	Students thought about three themes, analysed the demographics and psycho-graphic of the target audience, and added 1–8 items to the mind map that were pertinent to the theme.
Idea Generation (Flexibility)	15	5	Students thought of only three-story ideas based on the approved mind map. All the ideas lacked conflict and had unfinished ideas.	Based on a mind map that was accepted, students explored seven tale ideas; some of these ideas lacked conflict, while others provided incomplete thoughts.	Based on a mind map that had been approved, students thought about ten story ideas; all the ideas had conflict and finalised concepts recommended.
Idea Development (Originality, Elaboration)	15	5	Students replicated and refined one accepted premise from an existing story, adding basic details and enhancing their story concept to demonstrate uniqueness.	Combining a few accepted ideas, students created an intriguing story concept, improved it with a few elements, and showed their creativity.	Students created a unique idea by merging most of the accepted thoughts, and they added numerous significant aspects to their story concept to

					demonstrate originality.
Overall Story Concept (Specific Creativity Strategy)	5	1.65	Students randomly selected and implemented a creative thinking strategy, unable to leverage the strategy to improve their overall story concept.	Students selected and implemented a creative thinking strategy to develop their ideas, explained how the strategy supported their creativity.	Students deliberately selected and implemented a creative thinking strategy to develop their ideas, explained how the strategy supported their creativity.
Execution (Usefulness)	10	3.3	Students unconventional design ideas were merely designed to meet assessment criteria and do not add value to the overall story concept, ideas suggested do not solve any social/political/economical problem suggested in comic.	Students unconventional design ideas added some value to the overall story concept, ideas suggested somewhat solve social/political/economical problem suggested in comic.	Students unconventional design ideas added significant value to the overall story concept, ideas suggested solve social/political/economical problem suggested in comic.
Total	50				

DISCUSSION

Creative thinking and critical thinking are considered a part of cognitive skills, and all students are required to master these complex cognitive skills to face the challenges of today. However, assessing these skills can be quite challenging. In the context of this study, the researchers analysed the technique and quality of evaluation as well as the types of challenges that students face to avoid jeopardising the course's learning objectives (CLO).

The diagnostic test's initial phase allowed the researchers to illustrate what creativity meant (Table 2). A common misperception among students is that they must be skilled at drawing and colouring. However, creativity is mostly reliant on one's imagination. Students need to spend more time examining the natural world, their surroundings, and both material and non-material forms

of culture to envision their own creative potential. Finally, effective performance depends on collaboration and active communication. The stage one diagnostic test allowed researchers to assess students' shortcomings and abilities, in order to design specific instructions with a clearly defined and scaled rubric, so students know exactly what is expected of them and which aspect of the assignment is given more priority.

Table 2 demonstrates, in brief, the significance of diagnostic exams administered at the beginning of the semester, so that students are aware of the course's requirements. In line with this, discussions with students who may be anxious or fearful of terms such as "creativity", "critical thinking", and 'idea generation' can be held from the outset. Students were able to determine for themselves how they should contribute individually and collectively to achieve a high grade in the topic by analysing a variety of examples of creative work of varying quality. This enabled students to visualise what will transpire in class over the next 14 weeks, reducing the likelihood of misunderstanding or feeling overwhelmed by the assessment.

In addition, stage two is essential for monitoring students' growth. To encourage students to think critically and creatively on all their assessments, it is crucial that they receive constant consultations to discuss problems and receive constructive feedback. To ensure that students were aware of how they were being evaluated, an enhanced version of the rubric was made based on Table 3. The mind map, idea generation, idea development, overall story concept, and execution make up the five criteria. The overall mark is 50 and weight is given along with the level or quality of work that is considered novice (low), developing (average) and expert (high). For instance, the marks were calculated as follows: 3 (marks) x 1.65 (weight) = 4.95/5 if the group received three marks for the mind map.

Weighted rubric (Stevens & Levi, 2013) is a form of analytic rubric which allows educators to assess certain concepts more heavily than others. For example, in the current subject, idea generation and idea development are two elements which would truly test the students' creativity level. Hence, the current weighted analytic rubric is designed by weighing these two elements more heavily compared to other elements. For example, Group A can turn in excellent 10 completed story ideas based on their approved mind map with interesting conflicts. Hence, they will get the highest weight in the rubric, that

is $3 \times 5 = 15$. This way, the weighted rubric is able to clearly communicate to the student's which aspect of the assessment is more important and which weight they should be striving for to achieve. Each criterion (columns) and levels (rows) of achievement are weighted differently. As educators, we can assign points (such as 0, 1, 2, 3, 4) to assess students' performance in each area. This form of rubric becomes useful in providing feedback to students about their strengths and weaknesses.

Compared to Table 2, the former holistic version of the rubric, students barely comprehend the subject's requirements, let alone implement them. Each of the specified requirements is not supported by comments, explanations, or arguments that would enable students to grasp what they must execute. In addition to this, the outdated grading system does not offer students tailored feedback, operating under the presumption that students are expected to be aware. However, the dilemma is how students may enhance their work if they cannot evaluate the extent to which their work results satisfy the standards. Therefore, this diagnostic test can assist students in understanding what idea generation entails and how creativity should be stressed in their work. From the standpoint of the educator, the previous rubric is ineffective for evaluating student work since it lacks a clear guideline. In contrast, Table 3 outlines in full each of the evaluative criteria, as well as the level of job quality and weighted scores that will be determined.

CONCLUSION

When students hear the word comic book, they often draw on their understanding of the typical comic book which they have grown up reading. Hence, when they are told to create a comic book with an unconventional design, their comprehension of that assignment can be rather daunting. However, specific feedback during consultation each week and a clearer rubric can certainly help in providing a better understanding as to what and how it can be done. Diagnostic assessment allows instructors to grade students effectively, and students not only get deserving grades but also explore their creative and critical thinking skills. Diagnostic assessment allows students to engage creatively in their assessment, and instructors have the flexibility to design assessments and rubrics. In the process of fulfilling the assessment, students scaffold each other's knowledge, and

this improves their creative minds and teamwork. Students' perceptions of what constitutes creativity may differ from the teacher's, making it difficult for educators who teach creative subjects to construct assessments and rubrics. Therefore, it is vital to specify what is deemed creative in terms of evaluation and rubric so that instructors and students know what is necessary and crucial.

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REFERENCES

- Carpenito, L. J. (2006). *Handbook of nursing diagnosis* (11th ed.). Lippincott Williams & Wilkins.
- d. School. (2009). *Bootcamp Bootleg*. <https://dschool.stanford.edu/resources/the-bootcamp-bootleg>
- Geller, K.L.R., & Yovanoff, P. (2009). Diagnostic assessments in mathematics to support instructional decision making. *Practical Assessment, Research & Evaluation*, 14(16), 1–11.
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5, 444–454. <https://doi:10.1037/h0063487>
- Haught-Tromp, C. (2017). The green eggs and ham hypothesis: How constraints facilitate creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 11, 10–17. <https://doi.org/10.1037/aca0000061>
- Moon, T. R., Brighton, C. M., & Callahan, C. M. (2002). State standardized testing programs: Friend or foe of gifted education? *Roeper Review*, 25, 49–60.
- Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, 24, 92–96. <https://doi:10.1080/10400419.2012.650092>
- Shim, G.T.G., Shakawi, A.M.H.A., & Azizan, F.L. (2017). Relationship between students' diagnostic assessments and achievement in a pre-university mathematics course. *Journal of Education & Learning*, 6(4), 364-371. <http://doi.org/10.5539/jel.v6n4p364>
- Shively, K., Stith, K. M., & Rubenstein, L. D. (2018). *Gifted Child Today*, 41(3), 149–158. <https://doi.org/10.1177/1076217518768361>
- Stevens, D. D., & Levi, A. (2013). *Introduction to rubrics: an assessment tool to save grading time, convey effective feedback, and promote student learning* (2nd ed.). Stylus.

Wiggins, G., & McTighe, J. (2011). *The understanding by design guide to creating high-quality units*. Association for Supervision and Curriculum Development (ASCD).

Zhao, Z. (2013). Diagnosing the English-speaking ability of college students in China – validation of the diagnostic college English speaking test. *RELC Journal*, 44(3), 341–359. <https://doi.org/10.1177/0033688213500581>

PROJECT-BASED LEARNING IN A FINAL-YEAR ACTUARIAL COURSE

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ABSTRACT

Project-Based Learning (PBL) is an innovative learning approach that teaches many strategies critical for success in the 21st century. PBL activities are meant to develop real-world skills that prepare students for employment. The learning method may improve critical thinking, creativity, communication, and collaboration. This paper proposes a PBL design in a final-year actuarial course, specifically for the subject Ratemaking & Loss Reserving for General Insurance. The dataset for this paper is a compilation of reflective essays from students in the March and August 2020 semesters. A thematic analysis was used to identify emergent themes or particular words and expressions that the students tended to use. PBL was incorporated into the course using six steps: ideas, investigation, development, feedback and revision, report, and presentation. Students mainly expressed positive opinions about using the PBL method in developing the needed skills to prepare them for employment. They have learned or strengthened their soft skills, which include critical thinking, communication, collaboration, employability, creativity, and time management. These are all essential skills that cannot be taught but learned through experiential endeavours. Besides mastering the curriculum content, students could experience its practicality in a simulated corporate scenario. This study provides an example of a project-based final-year actuarial course that can promote 21st-century skills among students and prepare them for employment. The lessons learnt may assist other educators interested in implementing PBL in a specialised subject in higher education.

Keywords Project-based learning; higher education; actuarial course

INTRODUCTION

“Read the material, memorise the notes and solutions, and reproduce everything during exams.” This is the way of traditional learning that many people, especially Asians, have been taught since young. But is this authentic learning? How much of the information can be absorbed or applied? This form of traditional paper-based, rote learning or teacher-led instruction that presents facts, discourages creativity and increases passivity and non-participation among students (Issa & Khataibeh, 2021).

Project-Based Learning (PBL) is an innovative learning approach that teaches many strategies critical for success in the 21st century (Bell, 2010). This learning approach involves students applying their knowledge and skills by completing projects in a student-centred classroom (Laverick, 2019). PBL engages students through the act of inquiry (Leat, 2017) and encourages critical thinking. It is different from a traditional teacher-centred setting, where students are rarely given the opportunity to put their ideas into action in authentic environments (Laverick, 2019). In this approach, instructors create a classroom environment of creativity and engagement, where students can share their ideas and work. Students collaborate in groups, share their work with peers, and reflect on the processes through which they complete their projects (Cooper & Murphy, 2016).

PBL emphasises 21st-century skills learning, including critical thinking, communication, collaboration, and creativity (Bell, 2010). PBL activities are meant to develop real-world skills that prepare students for employment. In PBL, students are required to become producers of new information rather than mere consumers of the information already in existence. Research evidence shows that through PBL, students become better researchers, problem solvers, and higher-order thinkers (Gültekin, 2005). There is also evidence that PBL effectively develops critical thinking skills and academic achievement (Dimmitt, 2017; Issa & Khataibeh, 2021).

PBL is rather similar to problem-based learning. However, problem-based learning begins with a problem. Students conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem (Savery, 2006). By contrast, PBL begins with assigning tasks that will lead to the creation of a final product. In the PBL design, the

instructor sets goals for the long term and uses a process approach to assist students in completing their projects (Laverick, 2019). The process used to complete the project should be relevant and applicable to each respective discipline in creating a good final product (Nguyen et al., 2020). An instructor's role in PBL is as a facilitator where the instructor guides students in a collaborative environment through the completion of the project.

This paper aims to propose a PBL design in a final-year actuarial course, specifically for the subject Ratemaking & Loss Reserving for General Insurance. Many 21st-century skills are not measurable through standardised tests (Bell, 2010). Educators have commonly reported attempting to develop the learning of these skills, yet they could not effectively assess them (Hixson et al., 2012). With PBL, assessment is authentic, and skills attained are measured through self-evaluation and reflection. As students learn from their processes, they reflect on how well they contributed, collaborated, and communicated in a group as they solve real-world problems.

MATERIALS AND METHODS

The participants of this study were final-year actuarial students in the School of Mathematical Sciences at Sunway University who registered in the Ratemaking and Loss Reserving for General Insurance course in the March 2020 and August 2020 semesters. During this period of two semesters, there were 25 and 90 students respectively. The dataset for this paper is a compilation of reflective essays from students. This study was carried out using qualitative data analysis. According to Mason (2002), data could be read literally, interpretively, or reflexively (p. 148). For this study, literal data was employed with the actual written statements. Thereafter, a thematic analysis was used to identify emergent themes or particular words and expressions that the students tended to use (Patton, 2014). These themes were discussed in relation to 21st-century skills attainment.

PBL was incorporated into the course by introducing a group project where students played different roles in their own start-up insurance company. They were given the flexibility to decide on the structure of their company. They were then tasked with designing a new general insurance product currently

unavailable in Malaysia using business and ratemaking concepts in calculating pricing. They could use their creativity for the design and, simultaneously, learn about entrepreneurship and work with others as they would in the real world.

The project was conducted throughout the whole semester of 14 weeks to allow students to achieve the final goal of a business pitch and proposal. A PBL design consisting of six steps was implemented, and a timeline was given for every step, which helped students to gain better insight and led to a gradual momentum toward the product.

Step 1: Identification of project ideas

Brainstorming was conducted openly in the class on a collaborative platform to encourage active participation. It was a significant first step at the beginning of the semester, as the students were still in the early stage of getting to know their coursemates. Posting ideas anonymously helped them to express themselves candidly. Students remained anonymous as they commented without reservations on each new idea listed on the padlet.

Step 2: Investigation of ideas through an inquiry process

After brainstorming, the groups would then decide on the new product for their insurance company. They needed to conduct extensive research and reading before presenting the initial plan's brief details. Their peers would assess and ask probing questions to challenge the feasibility of the product. This exercise allowed students to learn from one another by providing constructive feedback and sharpening their questioning skills. As the question and answer session was implemented immediately after the sharing, they were compelled to be quick in their thinking to assess their peers' project framework.

After the verbal presentation in class, students provided a more detailed description of their project ideas on another collaborative platform, Microsoft OneNote, to invite formal written feedback from peers and the lecturer. Formal critique sessions allowed students to learn from one another's work

and feedback in a structured, safe context, including the critique of the process and the product (Patton, 2012). In addition, the second round of critique sessions also gave students ample time to investigate other groups' products thoroughly.

Step 3: Ideas development and modification

Open discussions stretched over a few weeks while groups continued to research and analyse the comments and questions contributed by their peers. Considerable effort was involved in finding data from various sources and reading news or other articles to supplement justifications for their assumptions. Besides that, market and industry analyses were done by identifying their target market and carrying out market research to ensure the uniqueness of their products, by exploring products associated with theirs and doing a side-by-side comparison of their competitors. Additional information was then added to provide more comprehensive technicalities.

Step 4: Feedback and revision

Students evaluated their group members with the guidance of some pointers given in a form in order to include honest comments on each member, and then discussed the issues within their groups. Groups were expected to express their encouragement or dissatisfactions and solve any internal disagreements within the group. Sincere heart-to-heart talks among members ensured effective team dynamics and the identification of social loafers or other issues for early intervention.

Step 5: Project report preparation

The second half of the semester focused more on preparing a business proposal comparable to a corporate business proposal. Students needed to include the technical calculations learned in the subject content, company plans, operational and marketing strategies, industry analysis, costing, and financial management. Thus they needed to clearly understand the course syllabus to apply to the computations in Microsoft Excel. They also needed to be updated on the current trends and happenings in the industry.

However, the way they did the calculations would be slightly different as no actual data was available. This step was challenging because it was completely different from what they learned from the textbook, where they were given all the data and just needed to apply the formulas for the calculations. At this point, students had to use logical reasoning and assumptions to make up the values of the data. They would have to refer to their analysis of statistics from various sources, for instance, the Department of Statistics Malaysia, Insurances Services Malaysia, financial statements from companies' annual reports or data from other countries. Critical thinking was involved here to match the required data and make adjustments based on the available data.

Step 6: Project presentation

At this last stage, students pitched their ideas to the class who played the roles of investors and customers. The students who would now be the simulated stakeholders would evaluate the products, critique them, and decide if they fulfil their requirements from an investor and customer perspective. The presenters were expected to convince the investors that their new products were suitable investments and could maintain favourable profits at least for the next three years, including long-term sustainability. For customers, the presenters would try to persuade them to buy the products based on the values and worth of the premium and coverage, along with additional perks.

At the end of the pitching session, each team was obligated to submit their formal business proposal in writing and comment on the products as an investor and a customer based on referenced studies and statistics, to provide an extensive evaluation of each new product. This last task helped to reinforce their critical thinking realistically, moving from a protected student mindset to the actualisation of adulthood in a corporate world.

FINDINGS & DISCUSSION

The findings were based on the students' reflective essays submitted at the end of the semester to assess whether students benefitted from this project. Students mainly expressed positive opinions about using the PBL method in developing the needed skills to prepare them for employment.

These are some of the compilations of literal comments from past students in their reflective essays, along with the themes identified.

Table 1 *Students' comments and themes*

Students' Comments	Themes
"My critical thinking has strengthened over the semester, and this skill will help me in my future job."	Critical thinking Employability
"My creativity, critical thinking, and communication skills have improved."	Creativity Critical thinking Communication
"The assessment of this course provided a wholesome learning curve in terms of applying what we have learnt from this course and other essential soft skills as well as critical thinking that would equip us for our working life."	Critical thinking Employability
"Tell me and I forget, teach me and I may remember, involve me and I learn" would be the quote to best describe the subject. I have realised the significance of experiential studies, attention to detail, and being forward-looking. Through group projects, I have also learnt the importance of teamwork and time management, teaching me to be cooperative, understanding, responsive, and to plan ahead."	Critical thinking Collaboration Time management Problem-solving

<p>“One of the skills I have developed throughout this project is critical and logical thinking skills from multiple perspectives towards the practicality of a product, especially during the Q&A sessions in the Pitching Ideas Session. Listening to the questions raised by my classmates strongly sparked the idea to use their questions to evaluate our products. It has also taught me that those questions are what the consumers usually want to know which I can apply these concepts in my future workplace too.”</p>	<p>Critical thinking Creativity Problem-solving Employability</p>
<p>“During this assignment, I have learnt that I need to have good judgements and mature thinking to come out with relevant information. Upon that, I need to know more about what is happening in the industry and out of the industry.”</p>	<p>Critical thinking Problem-solving</p>
<p>“In a nutshell, this subject has taught me many soft skills which can be applied in my next semester or when I start working. It was a very different experience because the emphasis was not on tests or exams but rather on the knowledge we could use to apply in our assignments. It was a very hands-on subject in which a lot of time and effort must be put into completing our assignments.”</p>	<p>Employability Problem-solving Time management</p>
<p>“I have learned to think outside the box and to be independent when completing allocated tasks. This subject has taught me to be proactive in searching for solutions and this should also be applied in the corporate world. We must start viewing things differently like an adult from different perspectives.”</p>	<p>Critical thinking Problem-solving Employability</p>
<p>“In my opinion, the experience and skills gained from the ratemaking assignment are useful in my future endeavours as it relates to real-world application. For instance, soft skills such as business writing and PowerPoint design are essential to communicate my message clearly and professionally in the workplace. In addition, presentation skills are also applicable and essential in the workplace, especially in corporate sectors.”</p>	<p>Employability Communication</p>

<p>“I feel this is a better way to evaluate students because when it is traditional exams, I often just memorise everything without truly understanding the application of the content learnt. In such instances, I would easily forget what was taught after a couple of months, and this defeats the purpose of learning the subject in the first place. Overall, I am very satisfied and thankful for what I have achieved and learnt by taking this subject.”</p>	<p>Critical thinking</p>
<p>“In previous courses, most of the learning method is like making us memorise all the contexts/concepts and then during the exam, we just spit it out. Right after the exams, we would obviously forget all the knowledge that was memorised; hence, the learning outcome will be significantly minimised. Ratemaking, on the other hand, did not spoon-feed us and provided us with hands-on experience and I feel that by completing the assignments, I have truly prepared myself mentally for the challenges that I would be facing in my future working environment.”</p>	<p>Critical thinking Problem-solving Employability</p>

The themes most frequently observed from students’ literal comments were skills learned throughout the project implementation. The main themes identified were critical thinking, communication, collaboration, creativity, problem-solving, time management, and employability. These students could reflect and articulate that they have improved or equipped themselves with these 21st-century skills, which would benefit them in gaining employment. These are all essential skills that cannot be taught but learned through the experiential endeavours of a PBL approach (Bell, 2010; Dimmitt, 2017). These results suggest that students find value in the tasks within the PBL design and are able to relate its applicability to a “real-world” setting (Virtue & Hinnant-Crawford, 2019). Through PBL, students could experience its practicality in a simulated corporate scenario besides mastering the curriculum content.

CONCLUSION

This study provides an example of a project-based final year actuarial course that can promote 21st-century skills among students and prepare them for employment. Project-based learning is not something easily implemented in an Asian context where students are used to being spoon-fed from pre-school years. However, PBL is the way forward in this new generation of self-directed learning and intrinsic motivation to explore real-world challenges actively. Hence, teaching and learning should be geared towards more independent and experiential learning, replacing conventional classroom lectures. The PBL approach intentionally develops students' soft skills to close the gap between academic and professional endeavours. With the advancement of technological tools, employability skills will take priority over factual or technical knowledge that technology can easily replace.

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REFERENCES

- Bell, S. (2010). Project-based learning for the 21st Century: Skills for the future. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 83(2), 39-43. <https://doi.org/10.1080/00098650903505415>
- Cooper, R., & Murphy, E. (2016). *Hacking project based learning: 10 easy steps to PBL and inquiry in the classroom (Hack Learning Series)*. Times 10.
- Dimmitt, N. (2017). The power of project-based learning: Experiential education to develop critical thinking skills for university students. *CBU International Conference Proceedings*, 5, 575. <https://doi.org/10.12955/cbup.v5.988>
- Gültekin, M. (2005). The effect of project-based learning on learning outcomes in the 5th grade social studies course in primary education. *Kuram ve Uygulamada Egitim Bilimleri*, 5(2), 548. <http://ezproxy.sunway.edu.my/login?url=https://www.proquest.com/scholarly-journals/effect-project-based-learning-on-outcomes-5th/docview/237020474/se-2?accountid=147680>

- Hixson, N. K., Ravitz, J., & Whisman, A. (2012). *Extended professional development in project-based learning: Impacts on 21st century skills teaching and student achievement*. West Virginia Department of Education, Division of Teaching and Learning, Office of Research.
- Issa, H. B., & Khataibeh, A. (2021). The effect of using project-based learning on improving the critical thinking among upper basic students from teachers' perspectives. *Pegem Journal of Education and Instruction*, 11(2), 52–57.
- Laverick, E. K. (2019). *Project-based learning*. TESOL International Association.
- Leat, D. (2017). *Enquiry and project based learning: Students, school and society*. Routledge.
- Mason, J. (2002). *Qualitative researching* (2nd ed.). Sage.
- Nguyen, H., Wu, L., Fischer, C., Washington, G., & Warschauer, M. (2020). Increasing success in college: Examining the impact of a project-based introductory engineering course. *Journal of Engineering Education*, 109(3), 384–401.
<https://doi.org/https://doi.org/10.1002/jee.20319>
- Patton, A. (2012). *Work that matters: The teacher's guide to project-based learning*. Paul Hamlyn Foundation.
- Patton, M. Q. (2014). *Qualitative research & evaluation methods* (4th ed.). Sage.
- Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, 1(9–20).
<https://doi.org/http://dx.doi.org/10.7771/1541-5015.1002>
- Virtue, E. E., & Hinnant-Crawford, B. N. (2019). “We’re doing things that are meaningful”: Student perspectives of project-based learning across the disciplines. *Interdisciplinary Journal of Problem-Based Learning*, 13(2).

NAVIGATING LEADERSHIP AND SUSTAINING HIGHER EDUCATION AMID COVID-19 CRISIS

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ABSTRACT

Background The COVID-19 pandemic is an extraordinary phenomenon that has brought about unprecedented challenges to even the most experienced leaders in navigating the ongoing uncertainties. The higher education sector was significantly impacted, coupled with complex challenges in ensuring continuity of teaching, learning, research, and other core functions in spite of campus closures. Nevertheless, with leaders and followers working hand in hand, the pandemic has highlighted the importance of both leadership and followership complementing each other. This paper aims to highlight some leadership best practices derived from the recent literature written in the context of battling the COVID-19 pandemic, and contextualising their significance for the higher education sector. This is a review paper of existing body of knowledge on the scope covered in this paper. The literature shows there is no one-size-fits-all leadership style, especially amid this pandemic. Nevertheless, leaders who have excelled exhibit these actions: courage, compassion, empathy, connectedness, and vulnerability. They remain honest concerning challenges and share their uncertainties while offering hope in a realistic manner. Navigating this complex new reality cannot be fulfilled by any prior training, strategic planning knowledge, operational experience, or former decision-making skillsets. Leaders need to have a clear vision, be open-minded and continue to engage actively with their followers to optimise organisational outcomes.

Keywords COVID-19; leadership best practices; crisis management; higher education

INTRODUCTION

In early 2020, and over just a few months, COVID-19 forced everyone to change and adapt to new ways of managing daily life. The pandemic was a ‘supernova’ creating unprecedented chaos globally, with no area spared, including international travel, economic growth, social life, and education (Harris & Jones, 2020; Pounder, 2021). This pandemic is undeniably one of the most severe crises in this era for higher education institutions (HEI), with leadership playing a crucial role to maintain a robust institution amid the resulting challenges (Antonopoulou, Halkiopoulos, Barlou, & Beligiannis, 2021; Pounder, 2021). Leadership teams were thrown into a crisis of ensuring continuity of teaching, learning, research, and other core functions in spite of campus closures (Gedro, Allain, De-Souza, Dodson, & Mawn, 2020; Menon & Motala, 2021). In these unprecedented times, no playbook exists to guide a leader to be effective, resilient, and inclusive, especially within higher education leadership. Nevertheless, certain basic values and leader characteristics become more prominent, especially in this unique period (Kalina, 2020).

Based on the recent literature, a leader’s soft skills are needed more than ever in walking through and leading others during these turbulent times. This paper highlights the essential leadership characteristics that came to the forefront during COVID-19: ability to act with boldness and good judgement, ability to express empathy, and ability to collaborate effectively. These principles are then applied to real-life examples among HEIs, which enabled leadership teams to lead their respective institutions in weathering the pandemic.

LITERATURE REVIEW

Ability to Act with Boldness and Good Judgement

In a crisis, leaders must act swiftly, coupled with good judgement; all the options and respective consequences must be carefully considered. Nevertheless, no one knows the best solutions, best actions, and their side effects. This unprecedented pandemic is indeed a perfect storm with imperfect leadership responses, as leaders walk a tightrope with no guides to fall back on (Harris & Jones, 2020). Good leaders are informed by, but not dictated by,

their expert advisors, who do not hold all the solutions as well; such leaders rely on their own critical reasoning and judgement to make and abide by their decisions (Gerada, 2021). At all times, a leader must “say what they do, and do what they say”. A leader who always makes decisions based on core values will exhibit a consistent pattern in crisis response decisions during extraordinary times. Value-based decisions provide assurance to followers and the public, which is the cornerstone for effective crisis response (Roberts, 2020). Good leadership creates an environment for team members to still work effectively and productively amid the chaos (Leaver, 2021).

Moreover, crisis management is rooted in complex decision-making situations exacerbated by time pressure, risk, and uncertainty (Pounder, 2021). Amid battling with COVID-19, leaders play a crucial role in keeping teams together as well as managing crises and unforeseen circumstances. Maintaining a strong team is supported by putting people at the centre of all decisions and actions, realising that everyone has potential and providing an environment where people are motivated to perform at their best (Leaver, 2021). In such disruptive times, leaders cannot emulate leadership practices used in a period of stability and calm (Harris & Jones, 2020).

In HEIs where large groups of different stakeholders are at hand, focusing on the immediate need, pulling together resources, and setting clear policies are important. Leaders must have the courage to be strong, be decisive, experiment, and risk unpopularity, balancing the needs of both staff and students (Gedro et al., 2020; Nugroho, Paramita, Mengistie, & Krupskyi, 2021). For instance, when the pandemic hit, HEI leaders had no choice but to make quick top-down decisions to ensure teaching and learning continued. Nevertheless, this was mitigated by increasing stakeholder consultation when structures were put in place (Menon & Motala, 2021). Transitioning to remote work and online learning was not perfect, but faculty, support staff, and students’ oneness in resilience ensured virtual classes were running and students were engaged (Gedro et al., 2020). In line with this, faculty members had access to just-in-time support to reach leaders for unstructured online meetings, instrumental in creating a supportive virtual work environment (Gedro et al., 2020). The pandemic has called for leaders to be both task- and relationship-oriented to foster satisfactory staff performance while ensuring favourable outcomes, especially for students, are delivered accordingly (Pramono, Wijaya, Melati, Sahudin, & Abdullah, 2021).

Ability to Express Empathy

Empathy is an emotional response in relation to another person's difficult situation, aimed at improving the situation by focusing on the well-being of that person (Lemos Lourenço, Rosalia Ribeiro Silva, & Santana Galvão Oliveira, 2021). An empathetic person is able to "feel with" others, and essentially putting themselves in the other person's shoes. Empathy opens the way to understand the other person's perspectives, concerns, and priorities. Leaders must use empathetic language to address issues and problems that people need to deal with and provide emotional support. It is crucial that empathy expressions are supported by actions that align with those expressions. Such empathetic leadership instils trust and motivates followers, leading to enhanced growth among team members (Hofmeyer & Taylor, 2021; Lemos Lourenço et al., 2021).

Empathy is also at the forefront of responsible leadership, as leaders consider the impact of their actions on various stakeholders. Responsible leaders are relationship-oriented, transparent, and humanistic, as well as make rational choices by empathising with individuals (Pounder, 2021). At all times, leaders must remain calm, well-informed of the situation, trustworthy, transparent, flexible, adaptive, and positive, as well as be willing to ask difficult questions and make tough decisions (even with limited information). The unprecedented disruption level and uncertainty has a long-lasting effect on individuals. Leaders must take time to recognise and address employees' personal and emotional concerns. In fact, leaders who are competent, supportive, compassionate, and show sincere care for employees' well-being help to maintain teamwork, minimise burnout, and keep employees loyal and committed to persevere in achieving the organisation's missions even during these uncertain times (Hofmeyer & Taylor, 2021; Kalina, 2020). In turn, teams possess high resilience, effectiveness, and morale, which will improve the organisation's services, with better customer satisfaction and fewer complaints (Hofmeyer & Taylor, 2021).

In HEIs, leading with love, care, and compassion while driving the exponential shift and urgency of effective instructional continuity through remote learning and support for students was crucial. This ability requires leaders to strike a fine balance in caring for their people while working within the legal framework and regulatory constraints in response to COVID-19 (Menon &

Motala, 2021; Nugroho et al., 2021). Although online learning and remote working was not ideal for all courses, this leadership trait enabled the provision of the essential support for staff and students under untenable conditions (Gedro et al., 2020). As leaders learnt to listen and prioritise the needs of followers and students, HEIs reported improved student engagement during remote teaching where support helplines were also put in place. This showed that all stakeholders' morale was not only maintained, but boosted through seeing leaders' self-sacrificial behaviours, providing reassurance and motivation (Menon & Motala, 2021). Effective multi-directional communication also enabled leadership to effectively respond to actual needs and ground-level changes (Nugroho et al., 2021). This was particularly crucial during COVID-19 where physical and mental well-being of staff and students were vital to maintain a sense of togetherness and common purpose (Nugroho et al., 2021).

Ability to Collaborate Effectively

Crisis and change management have now become a leader's must-have skills. In disruptive times like this, routine problem solving or occasional firefighting are things of the past (Harris & Jones, 2020). Especially during this COVID-19 pandemic that has brought about swift and extreme change, leaders must all the more build trust where subordinates balance between these two elements: respect for hierarchy and adapting to a pandemic requiring collaboration, which often calls for responsiveness to the leader's direction (Francisco & Nuqui 2020). As leaders are engaged in constant crisis and change management, support and collaboration from all staff is much needed. With unprecedented change brought about by this pandemic, high levels of trust are needed, which serve as the binding force, ensuring issues are addressed collectively.

The pandemic has necessitated distributed or shared leadership, requiring leaders at all levels to practise connected, collaborative, creative, and responsive leadership to navigate their respective organisations through this crisis (Harris & Jones, 2020). Shared leadership can help organisations gain competitive advantage as it fosters autonomy among team members, which enables commitment and trust of the leader in team members. It promotes collaboration, thus strengthening relationships and team effectiveness. It is important to note that shared leadership does not represent weak or a lack of

leadership; instead, this type of leadership involves teams depending on several team members, which is crucial in boosting team performance, especially in high-pressure situations and uncertainty amid the COVID-19 crisis (Salas-Vallina, Ferrer-Franco & Herrera 2020). Amid the uncertainty of the pandemic, with leaders facing unfamiliar problems with little or no ready answers, it became even more important to delegate leadership and empower others, since a single person might be unable to handle it (Salas-Vallina, Ferrer-Franco & Herrera 2020). Through dispersion of leadership functions, as opposed to the traditional top-down leadership, dependency is avoided and optimum results can be achieved (Gerada, 2021).

It is evident that in crisis management, leaders must emphasise relationship management by being approachable and inviting participation from the relevant parties, which will motivate everyone to collaborate in finding creative ways to solve issues (Pounder, 2021). One constraint is low change acceptance, attributed to leaders' tendency to put people's emotional experiences on the sidelines. This stems from leaders operating from implicit mental models that focus largely on organisational factors, rationality, and logic, with little attention to how these affect individuals' emotions (Francisco & Nuqui 2020). Moreover, a highly sensitive environment exists during a crisis, as leaders must make critical decisions with often little and evolving information. Although crisis management involves overcoming threats, opportunities arise for leaders to have an open mind and build up capacity to lead under extreme and unfavourable conditions (Pounder, 2021).

With the added stress of COVID-19, new normal leadership is pertinent due to its holistic approach. It can be defined as “a focus on people, human resources, mentoring, learning, healing emotions; a leader who is a facilitator, never top down, conscious of leadership development; a healthy working environment, respect, exchange of ideas, a creative class; trust through sharing, teams, embracing equality, diversity, slack, tolerance; vision, and commitment to the vision, through talent, technology, storytelling; and a dynamic interplay between all stakeholders, employees, customers, investors, shareholders” (Francisco & Nuqui 2020).

In HEIs, leaders must use creative approaches to reimagine teaching and learning (Menon & Motala, 2021). Ensuring instructional continuity is of utmost importance, and collaborative approaches are critical in ensuring a

coordinated group response to fast-changing ground conditions for both staff and students (Gedro et al., 2020). HEI leaders had to quickly repurpose established structures, systems, and processes, and transition to an emergency remote teaching plan, while ensuring no compromise in academic or management governance (Menon & Motala, 2021). Moreover, the linkage with industry via student internships required leaders to exercise creativity in sustaining these activities during the pandemic, which is crucial to ensure the relationship between HEIs and the job market is minimally impacted. Research and publication collaborations also had to continue by using resources in creative ways without physical visit required (Nugroho et al., 2021). Faculties that were down with ill staff saw students being swiftly reassigned, in which a sense of community, continuity, and connection built up by leaders through regular check-ins, was vital to get staff on board for these immediate changes (Gedro et al., 2020). In addition, quick response but examined from multiple angles was enabled by HEI leadership that ensured academics, support staff and students were represented in the committee structures, promoting an integrated approach and a unified common purpose on teaching and learning continuity. In spite of resistance from academics and students to online delivery at the start, consultation and information sharing enabled informed decision-making and receptiveness (Menon & Motala, 2021). Keeping the flow of constant communication and clarity of direction with stakeholders is fundamental for leadership in securing buy-in to deliver the HEI's mandate, vision, and direction (Menon & Motala, 2021; Nugroho et al., 2021).

FINAL REFLECTIONS AND CONCLUSION

One positive outcome from the pandemic experience is the spotlight on importance of both physical and mental health (Leaver, 2021). With leaders shouldering these heavy responsibilities, self-care and consideration must be the top priority for leaders. They should put their own health and wellbeing first, so they will be able to strengthen their resilience and then help others weather the challenges during and post-COVID. As leaders are increasingly managing others' emotional states, including anxiety and frustration, leaders must practise self-care to ensure they themselves are in a stable emotional state (Gerada, 2021; Harris & Jones, 2020; Hofmeyer & Taylor, 2021). These steps will enable leaders to rest and recharge, especially psychologically for the next

stage (Gerada, 2021). Self-care is a joint responsibility between an organisation and employees, which can be enabled through corporate leadership and support structures that create a positive work culture conducive to self-care practices. The benefits are evident to both customers and staff well-being (Hofmeyer & Taylor, 2021).

Navigating this complex new reality cannot be fulfilled by any prior training, strategic planning knowledge, operational experience, or former decision-making skillsets. Hence, the focus should be on the current situation by listening to several sources and being open-minded to accept differing viewpoints (Kalina, 2020). In a crisis, silence is never golden: leaders look to followers, and followers look to leaders. Hence, effective two-way communication is crucial. Effective leadership communication ensures the overall goals of communication are carefully considered, by putting forward a consistent and clear message (Roberts, 2020). In the higher education sector that operates in a complex environment with competing stakeholder needs, ensuring that resources were equitably allocated went a long way to facilitate teaching and learning continuity. In fact, the pandemic resulted in new bonds developed among all stakeholders: academics, students, support staff as the collegiality relationship deepened in the dire circumstances. This success was fostered through frequent and open communication channels, proven valuable in keeping all stakeholders informed and supported (Menon & Motala, 2021). Across all circumstances, one thing remains, which is leaders must always have a clear vision. Focus must be devoted to aligning employees with the organisation's mission, culture, and core values. In drawing up strategies to maximise outcomes of any circumstances, leaders must focus on their organisation's strengths while being cognisant of the weaknesses as well (Kalina, 2020).

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REFERENCES

- Antonopoulou, H., Halkiopoulos, C., Barlou, O., & Beligiannis, G. N. (2021). Transformational leadership and digital skills in higher education institutes: During the COVID-19 pandemic. *Emerging Science Journal*, 5(1), 1–15. <https://doi.org/10.28991/esj-2021-01252>
- Gedro, J., Allain, N. M., De-Souza, D., Dodson, L., & Mawn, M. V. (2020). Flattening the learning curve of leadership development: Reflections of five women higher education leaders during the Coronavirus pandemic of 2020. *Human Resource Development International*, 23(4), 395–405. <https://doi.org/10.1080/13678868.2020.1779911>
- Gerada, C. (2021). Reflections on leadership during the Covid pandemic. *Postgraduate Medicine*, 133(7), 717–720. <https://doi.org/10.1080/00325481.2021.1903218>
- Harris, A., & Jones, M. (2020). COVID 19 - school leadership in disruptive times. *School Leadership & Management*, 40(4), 243–247. <https://doi.org/10.1080/13632434.2020.1811479>
- Hofmeyer, A., & Taylor, R. (2021). Strategies and resources for nurse leaders to use to lead with empathy and prudence so they understand and address sources of anxiety among nurses practising in the era of COVID-19. *Journal of Clinical Nursing*, 30(1–2), 298–305. <https://doi.org/10.1111/jocn.15520>
- Kalina, P. (2020). Resilient and inclusive healthcare leadership: Black Swans, COVID-19, and beyond. *The International Journal of Health Planning and Management*, 35(6), 1611–1613. <https://doi.org/10.1002/hpm.2983>
- Leaver, R. B. (2021). Courage and leadership in a post-COVID world. *International Journal of Urological Nursing*, 15(1), 3–4. <https://doi.org/10.1111/ijun.12261>
- Lemos Lourenço, M., Rosalia Ribeiro Silva, M., & Santana Galvão Oliveira, R. (2021). University social responsibility and empathy in organizations during COVID-19 pandemic in Brazil. *Social Responsibility Journal*, 18(4), 806–824. <https://doi.org/10.1108/SRJ-09-2020-0371>
- Menon, K., & Motala, S. (2021). Pandemic leadership in higher education: New horizons, risks and complexities. *Education as Change*, 25(1). <https://doi.org/10.25159/1947-9417/8880>
- Nugroho, I., Paramita, N., Mengistie, B. T., & Krupskyi, O. P. (2021). Higher education leadership and uncertainty during the COVID-19 pandemic. *Journal of Socioeconomics and Development*, 4(1). <https://doi.org/10.31328/jsed.v4i1.2274>

- Pramono, S. E., Wijaya, A., Melati, I. S., Sahudin, Z., & Abdullah, H. (2021). COVID-driven innovation in higher education: Analysing the collaboration of leadership and digital technology during the pandemic in UiTM Malaysia and UNNES Indonesia. *Asian Journal of University Education*, 17(2), 1–15.
- Pounder, P. (2021). Responsible leadership and COVID-19: Small island making big waves in cruise tourism. *International Journal of Public Leadership*, 17(1), 118–131. <https://doi.org/10.1108/IJPL-08-2020-0085>
- Roberts, R. (2020). COVID-19, leadership and lessons from physics. *The Australian Journal of Rural Health*, 28(3), 232–235. <https://doi.org/10.1111/ajr.12649>

**EDUCATION IN EMERGENCIES: EMERGING SUCCESSFULLY
WITH RESILIENCE**

A CASE STUDY IN THE PRE-UNIVERSITY DEPARTMENT AT SUNWAY COLLEGE JOHOR BAHRU

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ABSTRACT

COVID-19 has caused a global emergency in education which exacerbated the inequalities in the education system. The EiE policy monitoring framework was developed to help policymakers structure the Agents, Teaching and Learning, and Systems factors to build a resilient education system. Integrating these three factors across the three management phases of preparedness, response, and recovery will help build a resilient education system. To achieve long-term educational goals, the Pre-University Department through the Project Revolution (ProRev) initiative became the central pillar at Sunway College Johor Bahru in its effort to remain resilient throughout the pandemic. Inaugurated in 2015, ProRev prioritises the use of differentiated pedagogies and technologies in the classroom and drives contemporary standards and policies. This study aims to explicate whether the ProRev initiatives applied pre-, during, and post-pandemic has helped to drive a resilient education system in the Pre-University Department by employing the correct Agents, Teaching and Learning, and Systems factors. An online survey according to the EiE framework was conducted post-pandemic among all 28 ProRev members from the Pre-University Programmes, focusing on gathering feedback on the effectiveness of

ProRev initiatives in building a resilient education system. All 25 questionnaire items focusing on the three management phases received positive mean responses with a mean value of above 3.99. 100% of the respondents also indicated that ProRev initiatives have helped them become more resilient teachers. This study concludes that ProRev is the driver of a resilient education system for the Pre-University Department and aided in the successful emergence from the COVID-19 pandemic.

Keywords Resilience; emergencies; preparedness; response; recovery

INTRODUCTION

Emergency is defined as either man-made (e.g., gun violence), natural disasters, communicable diseases or political conflicts (Tarricone, Mestan, & Teo, 2021, CRC, 2008, Webster, Ginnetti, Walker, Coppard, & Kent, 2008). The importance of education in emergencies cannot be overstated, as it ensures dignity, sustains life and mitigates the psychosocial impact of conflict and disaster. Communities prioritise education even in times of crisis (Inter-agency Network for Education in Emergencies [INEE], 2010). Thus, to emerge successfully from the COVID-19 pandemic, an educational system must be resilient. A community is resilient if it is able to “bounce forward” following an emergency (Houston et al., 2015). In addition, Bruneau et al. (2003) defined resilience as the ability of a system (e.g., an infrastructure, an urban area, or a social community) to mitigate hazards and consequences of hazards, in terms of loss of performances of the system and time needed for a full recovery of the initial performances.

Tarricone et al. (2021) recently presented an EiE Policy Monitoring Framework that can help educational institutions and educators develop strategies to build a resilient education system. This framework highlights that a resilient education system has three management phases during emergency situations: preparedness, response, and recovery (See Figure 1 and Table 1). Tarricone et al.

stated that “The preparedness (or readiness) phase plays a critical role when dealing with a crisis, as it includes policies and plans on what actions should be taken during and after an education emergency” (p. 8). Preparedness also entails “continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action” (DHS, 2017, as cited in Staupe-Delgado & Kruke, 2018, p. 9). In terms of the COVID-19 pandemic, teachers are required to be prepared to teach and convey information using various communication platforms, with extensive utilisation of online teaching and learning technologies (Tarricone et al., 2021).

Hence, the preparedness of the teachers to switch to online teaching and learning following the COVID-19 pandemic can be measured using a pre-validated survey tool titled ‘Teachers’ Readiness for Online Learning Measure, TROLM (Hung, 2016; Tayyib et al., 2020). The TROLM model focuses on four factors: self-directed learning (SDL), institutional support (IS), communication self-efficacy (CSE), and learning-transfer self-efficacy (LTSE). According to Loyens, Magda, & Rikers (2008), self-directed learning is a process in which learners take initiative and responsibility for establishing personal learning goals, identifying resources for learning, selecting learning strategies, and monitoring personal performance. Self-efficacy is one’s assessment of the self’s ability to complete a task successfully (Schiefele, 1991; Zimmerman, 2000). Philipsen (2018) stated in his survey that a higher degree of perceived institutional support can affect teachers’ self-efficacy and their digital capital.

The second management phase is the response phase. This describes the “policies, plans, and actions that seek to address priority areas so that some form of education can continue” (Tarricone et al., 2021, p. 21). Hence, the rate at which the priority areas of teaching and learning and assessments can continue is the best measurement of the responsiveness to a crisis. The final management phase is the recovery phase where educational institutions emphasise on “returning students to their pre-emergency learning trajectories and continuing learning” (Tarricone et al., 2021, p. 22).

Governing the success of these management phases are three factors: Agents, Teaching and Learning, and Systems. Agents refer to entities that can make decisions and act over the course of emergency management phases. Teaching and Learning refer to all activities and resources that are directly related to how the teacher teach and how students learn and are assessed. Systems refer to the central processes, practices, networks, and relations (Tarricone et al., 2021, p. 2). A resilient education system is built on successfully managing these key factors during the preparedness phase which will in turn enact effective response and recovery measures for the successful emergence from the COVID-19 pandemic.

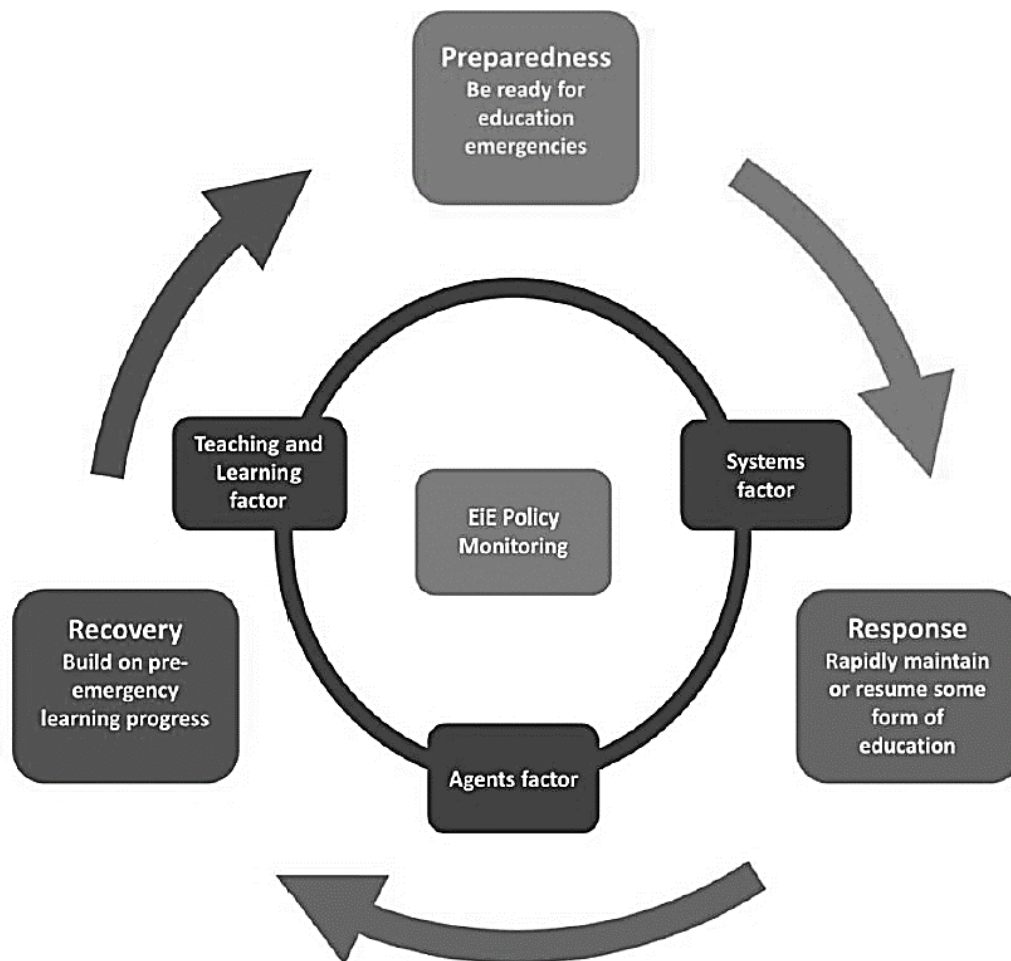


Figure 1 *EiE Policy Monitoring Framework for building a resilient education system*
 Note. Sourced from Tarricone et al. (2021, p. 3)

Table 1 *Factors and sub-factors relevant to building a resilient education system*

Systems	Teaching and Learning	Agents
<ul style="list-style-type: none"> • Planning for education in emergencies • Collaboration and coordination • Communication • Information, communication and technology infrastructure • School buildings and protocols • Monitoring 	<ul style="list-style-type: none"> • Curriculum • Television, radio, and print materials • Digital technology • Blended learning • Assessment and learning progress 	<ul style="list-style-type: none"> • National, state, and local governments • Intergovernmental organisations and non-government organisation (NGOs) • Schools • Teachers • Communities • Families • Children

Note. Sourced from Tarricone et al. (2021)

PROBLEM STATEMENT

The key concern then is the resilience of an educational institution during an emergency, like the COVID-19 pandemic. A resilient education system is prepared, responds well, and recovers successfully through any crisis. A non-resilient educational system, on the other hand, has detrimental effects on students' wellbeing, mental health, and social and emotional learning, and there would be unequal learning outcomes among the learners (Tarricone et al., 2021). In addition, a disrupted educational system denies the learners the transformative effects of quality education, tarnishes the reputation of the educational institution, and from a worse perspective, undermine peace, stability, and unity of the nation (Tarricone et al., 2021). Hence, the question remains as to what policies and standards should educational institutions undertake to ensure that the education system remains resilient in the face of any crisis or emergencies.

OBJECTIVE

The Pre-University Department at Sunway College Johor Bahru embarked on an initiative called Project Revolution (ProRev) since 2015. The objectives of ProRev are two-fold, namely to support the use of differentiated teaching pedagogies and to drive the usage of technologies in the classroom. The end result that ProRev is aiming to achieve is that the students are equipped with all the 21st Century Skills needed to survive in the marketplace. Thus, the objective of this paper is to deliberate whether the ProRev initiatives applied pre-, during and post-pandemic have helped to ensure that the education system at the Pre-University Department is prepared, responds rapidly, and recovers well from the pandemic. The list of activities pre-, during and post-pandemic can be found in Appendix A, and the details of some of the important initiatives are expounded in the materials and methods section. A positive response for preparedness, responsiveness, and recovery means that the ProRev initiatives have the appropriate Agents, Teaching and Learning, and Systems factors, which in turn help in building resilience to emerge from a crisis like COVID-19 (Tarricone et al., 2021).

MATERIALS AND METHODS

In terms of the Systems factor, ProRev's core committee has annual plans that enhance preparedness, response, and recovery during emergencies. These plans mainly focus on using contemporary teaching pedagogies in the classroom. To ensure that these plans come to fruition, ProRev has driven the building of strong ICT infrastructures such as smart classrooms, learning management system, hardware, and software required for teaching using technologies in the classroom. ProRev's core committee also provides a channel of communication among all stakeholders at Sunway College Johor Bahru.

The initiatives under the Teaching and Learning factor are plentiful. ProRev has initiated numerous training sessions, workshops, forums, sharing sessions, and demonstrations to train the teachers in the use of differentiated teaching pedagogies while using

technologies in the classroom. Some of the notable work would be the iPad Project, where students and lecturers were given iPads to be used in the classroom. Another applicable work was the MOODLE training programme, where the lecturers were trained to create aesthetically beautiful and functional learning management pages. During the pandemic, ProRev continued to support the needs of the teachers for timely transitions to online teaching and learning by establishing comprehensive standards and conducting extensive training sessions. Due to the ProRev initiatives, priority areas such as e-assessments, e-examinations, and e-learning could continue despite the COVID-19 lockdowns.

As for the Agents factor, the ProRev team engages the assistance of various groups of people to obtain high-level support for emergency preparedness, response, and recovery. These include top management, school leaders from various departments, parents, and students alike. For example, the building of smart classrooms requires high budget allocations and approval from top management. In addition, the implementation of the online e-assessments and examinations requires extensive support from IT staff and examinations personnel. In fact, the strong support of parents and students played a vital role in the success of e-examinations, as these families must prepare the right proctoring equipment and setup at home. Hence, by placing these Agents, Teaching and Learning, and Systems factors systematically, it is ProRev's hope that it would build a resilient education system at the Pre-University Department in Sunway College Johor Bahru.

A questionnaire was distributed post-pandemic, via Google Forms, to 28 lecturers from the Pre-University Programmes. Their responses were not anonymous, and these 28 lecturers make up all the lecturers at the Pre-University department who are involved in the ProRev initiatives. The 25 questionnaire items and a 5-point Likert scale were adapted according to the EiE Monitoring Framework. The responses were quantitatively analysed to determine whether the ProRev initiatives have helped to ensure that the education system at the Pre-University Department is prepared, responds quickly and recovers well from the pandemic. Questionnaire items testing the preparedness were also adopted

from the TROLM model where 3 is the mid-point value showing the neutral position. Any value that is 3.5 and above indicates a high level of readiness (Tayyib et al., 2020). A positive response for preparedness, responsiveness, and recovery means that ProRev initiatives have effectively driven resilience into the system through the Agents, Teaching and Learning, and Systems factors.

RESULTS

All 28 ProRev members participated in the survey, giving a 100% response rate. Table 2 shows the descriptive statistics of all items in the survey.

Table 2 *Feedback on the ProRev initiative in building a resilient education system*

Questionnaire Items	Likert Scale					Mean	sd
	1 SD	2 D	3 N	4 A	5 SA		
Item 1–5: Communication self-efficacy (CSE)	%	%	%	%	%		
ProRev initiatives help me to:							
• respond confidently to students' questions via the online platform	0	0	36	46	18	3.82	0.72
• conduct different types of online activities via the online platform	0	0	11	64	25	4.14	0.59
• effectively communicate with students via the online platform	0	4	21	46	29	4.00	0.82
• express myself naturally via the online platform	0	11	14	57	18	3.82	0.86
• improve my digital literacy	0	0	7	68	25	4.18	0.55
Item 6–14: Institutional support (IS)							
ProRev initiatives have provided the following institutional support:							
• relevant training	0	0	7	57	36	4.29	0.60
• strong support from the ProRev core committee	0	0	14	50	36	4.21	0.69
• manageable and acceptable goals	0	0	7	68	25	4.18	0.55
• stable peer support	0	0	11	61	29	4.18	0.61
• motivation to use different types of online learning applications or tools	0	0	21	57	21	4.00	0.67
• solutions to overcome challenges	0	4	29	50	18	3.82	0.77
• efficient IT support	0	4	29	39	29	3.93	0.86

• proper platform for online assessments and examinations	0	0	11	61	29	4.18	0.61
• a clear channel of communication	0	0	21	57	21	4.00	0.67
Item 15–17: Self-directed learning (SDL)							
As a learner in the ProRev team, I can:							
• manage my learning progress well	0	0	0	57	43	4.43	0.50
• adapt quickly to different modes of teaching and learning	0	4	0	64	32	4.25	0.65
• manage my time well	0	11	0	50	39	4.18	0.90
Item 18–21: Learning Transfer Self-efficacy (LTSE)							
After following through all the ProRev initiatives, I am prepared to:							
• share ideas with others	0	0	0	75	25	4.25	0.44
• transfer the knowledge gained to my teaching	0	0	0	71	29	4.29	0.46
• set higher expectations for my teaching	0	0	0	57	43	4.43	0.50
• take on challenges faced during teaching	0	0	0	57	43	4.43	0.50
Item 22: Response							
ProRev team has conducted briefings, trainings and provided manuals during the course of the pandemic. These initiatives help to address priority areas, so that teaching & learning, assessments and examinations can continue despite the lockdown.	0	0	0	54	46	4.46	0.51
Item 23–24: Recovery							
Post-pandemic, the ProRev initiatives focus:							
• on returning students to their pre-emergency learning environment	0	11	0	43	46	4.25	0.93
• overcoming challenges faced by teachers and students	0	4	0	39	57	4.50	0.69
Item 25:							
ProRev initiatives has helped me to become a more resilient teacher.	0	0	0	57	43	4.43	0.50

Note. SD: Strongly disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree, sd: Standard deviation

Items 1–21 in Table 2 test for the preparedness phase. All 21 items for preparedness received a positive response with a mean value of above 3.50 (minimum = 3.82). The standard deviation across all the questionnaire items is also low (<0.9), which indicates that the data is clustered closely around the mean. Table 2 also shows the

descriptive statistics for the response (Item 22) and recovery (Item 23 and 24) phases. The overall mean score for both phases is above 4.0, showing that the department has responded and recovered well from the pandemic.

Table 3 shows the overall mean score for the four domains in the preparedness management phase.

Table 3 *Descriptive analysis of the preparedness domains*

Domain	Survey Item No.	Mean	Level of Readiness Scale Range
Communication self-efficacy (CSE)	1–5	3.99	3.5–5 (High)
Institutional support (IS)	6–14	4.09	
Self-directed learning (SDL)	15–17	4.29	
Learning Transfer Self-efficacy (LTSE)	18–21	4.35	

Mean Interpretation: Low = 0–2.5, Moderate = 2.6–3.4, High = 3.5–5.0

DISCUSSION

The first domain in the preparedness phase is communication self-efficacy (CSE). The highest scoring item in CSE is that the ProRev initiatives improve the digital literacy of the teachers (Mean: 4.18, sd: 0.55). This is in line with the study of Gummess (2019) which states that “the increase of self-efficacy is the barometer indicating the success of a professional development activity which in turn influence other variables including digital literacy”. The emphasis on the usage of technology in the classroom begun as early as 2015 when the iPad Project was launched. Other technologically driven initiatives such as e-assessments and feedback, gamification methods, annotation and collaboration using cloud storages, and the extensive usage of learning management systems also created a strong base of digital literacy for the teachers. Another noteworthy evidence of good self-efficacy is that the teachers were able to conduct different types of online activities during the lockdown (Mean: 4.14, sd: 0.59). Some of the novel online activities that were very successful include science practical sessions, e-examinations with proctoring, and online marking and moderation. These activities quickly enabled the teachers and students to transition smoothly to fully online classes within the first two months from the commencement of the lockdown.

The IS domain had an overall mean of 4.09. The highest scoring item in the IS domain is that the ProRev team conducted relevant training sessions. The ProRev’s core committee conducted training and demonstration sessions at least thrice yearly, and the knowledge gained throughout the years provided timely assistance to the teachers at the onset of the pandemic. It is also heartening to note that the ProRev members felt that there was a strong support from the ProRev core committee (Mean: 4.12, sd: 0.69) throughout the course of the pandemic. Thorpe (2015), the top official of Blackboard, a major learning management system, also found that a solid infrastructure and the presence of strong support from administrative leadership can help teachers integrate technology effectively. A breakthrough system of e-assessments and e-examinations with proctoring (Mean: 4.18, sd: 0.61) which were created within the first two months from the commencement of the

lockdown also showed that the ProRev initiatives have driven quick response so that priority areas can continue despite the crisis.

In the SDL domain, the teachers were able to manage their learning progress well, including being able to cope with the different types of learning modality. This important finding indicates that the ProRev initiatives have helped the teachers to be prepared and resilient to the abrupt switch to online teaching. Enochs, Riggs, & Ellis (1993) also supported this finding by stating that when teachers' self-efficacy in their ability to use computers were increased through appropriate professional development, incorporating technology into their teaching strategies were more likely to happen.

The last domain is LTSE, and this domain received the highest overall mean score of 4.35. This means that the teachers not only felt equipped to handle online teaching and learning, but they were also confident to transfer the knowledge to others. Two items in this section with the highest score (Mean: 4.35, sd: 0.50) are the ability of the teachers to set higher expectations for their teaching and to take on challenges. The positive response in all domains in the preparedness phase shows that the ProRev initiatives have indeed created a resilient education system by employing the correct Agents, Teaching and Learning, and Systems factors in place.

Item 22 measures the responsiveness of the teachers in addressing priority areas during the lockdown. These priority areas include teaching and learning, and assessments and examinations. From the survey, the teachers felt that the ProRev initiatives have effectively assisted (mean = 4.46, sd = 0.51) in the smooth transition to online teaching and learning and the conduct of e-assessments and e-examinations despite the lockdown. The high agreement rate in this category shows that the comprehensive standards and extensive training sessions conducted were highly effective. This is further supported by the study of Adam-Turner (2017) which states that faculty forums and workshops can foster digital literacy with more technopedagogically adept faculty, in this case the ProRev core committee cross-training other faculty like the ProRev team members.

The last management area is the recovery phase. The ProRev initiatives for the recovery phase are to ensure that the teachers continue to explore new and forefront teaching pedagogies while keeping the students' health and wellbeing a priority. In the recovery phase, the results established that ProRev initiatives post-pandemic is on the right track to return the students to their pre-emergency learning environment (mean = 4.25, sd = 0.93). However, since the college is still in the recovery phase, the evaluation is premature and, hence, shows a slightly higher standard deviation than the other phases of management.

Finally, 100% of the respondents have clearly indicated that the ProRev initiatives have helped them to be more resilient teachers. It is also reassuring to note that the pass rates and the percentages of students getting As during the pandemic were comparable to the results prior to the pandemic. This means that the effectiveness of online teaching and learning was at par with the effectiveness of face-to-face instructions.

CONCLUSION

A resilient education system is vital to minimise the impact of the highly disruptive nature of a crisis, and this is an uphill task for educational institutions. This study confirms that the Pre-University Department through the ProRev initiatives has successfully managed the key factors—Agents, Teaching and Learning, and Systems—during the preparedness phase and this in turn enabled effective response and recovery measures for successful emergence from the COVID-19 pandemic. These methodologically planned initiatives by the ProRev team were effective in driving a resilient education system, and this brings about a positive impact on students' wellbeing.

Finally, having a resilient educational system is the key to a successful emergence from any emergencies and crisis. Hence, it is vital that ProRev continues to plan for agility and resilience by empowering agents, emphasising on the readiness to deploy multiple teaching and

learning modalities as well as putting in efficient systems and infrastructures in preparation for future emergencies.

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REFERENCES

- Bruneau, M., Chang, S. E., Eguchi, R. T., Lee, G. C., O'Rourke, T. D., Reinhorn, A. M., Shinozuka, M., Tierney, K., Wallace, W. A., & Von Winterfeldt, D. (2003). A framework to quantitatively assess and enhance the seismic resilience of communities. *Earthquake Spectra*, *19*(4), 733–752. <https://doi:10.1193/1.1623497>
- Enochs, L. G., Riggs, I. M., & Ellis, J. D. (1993). The development and partial validation of microcomputer utilization in teaching efficacy beliefs instrument in a science setting. *School Science and Mathematics*, *93*(5), 257–263. <https://doi:10.1111/j.1949-8594.1993.tb12240.x>
- Gumness, G. (2019). *Faculty initiative and the role of self-efficacy in raising digital literacy: A study* (Publication No. 27540970) [Doctoral dissertation, University of St. Francis College of Education]. ProQuest Dissertations & Theses Global.
- Hung, M.-L. (2016). Teacher readiness for online learning: Scale development and teacher perceptions. *Computers & Education*, *94*(C), 120–133. <https://doi:10.1016/j.compedu.2015.11.012>
- Inter-agency Network for Education in Emergencies. (2010). *Minimum standards for education: Preparedness, response, recovery*. <https://inee.org/resources/inee-minimum-standards>
- Loyens, S. M. M., Magda, J., & Rikers, R. M. J. P. (2008). Self-directed learning in problem-based learning and its relationships with self-regulated learning. *Educational Psychology Review*, *20*, 411–427. <https://doi.org/10.1007/s10648-008-9082-7>
- Philipsen, B. (2018). *Teacher professional development for online and blended learning in adult education and training* (10.13140/RG.2.2.13695.87205) [Doctoral dissertation, Vrije Universiteit Brussel].

- Schiefele, U. (1991). Interest, learning, and motivation. *Educational Psychologist*, 26(3–4), 299–323. <https://doi.org/10.1080/00461520.1991.9653136>
- Staupe-Delgado, R., & Kruke, B. I. (2018). Preparedness: Unpacking and clarifying the concept. *Journal of Contingencies and Crisis Management*, 26(2), 212–224. <https://doi.org/10.1111/1468-5973.12175>
- Tarricone, P., Mestan, K., & Teo, I. (2021). Building resilient education systems: A rapid review of the education in emergencies literature. *Australian Council for Educational Research*. <https://doi.org/10.37517/978-1-74286-639-0>
- Tayyib, N. A., Ramaiah, P., Alshmemri, M. S., Alsolami, F. J., Lindsay, G. M., Alsulami, S. A., & Asfour, H. I. (2020). Faculty members' readiness implementing e-learning in higher education Saudi Universities: A cross-sectional study. *Indian Journal of Science and Technology*, 13(25), 2558–2564. <https://doi.org/10.17485/IJST/v13i25.828>
- Thorpe, L. (2015). *Six characteristics to increase technology adoption*. https://es.blackboard.com/Images/spain/es/Six_Characteristics_To_Increase_Technology_Adoption_tcm54-30261.pdf
- Webster, M., Ginnetti, J., Walker, P., Coppard, D., & Kent, R. (2008). *The humanitarian costs of climate change*. Feinstein International Center. <https://fic.tufts.edu/assets/humanitarian-cost-of-climate-change-2008.pdf>
- Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25(1), 82–91.

APPENDICES

Appendix A List of ProRev Initiatives

Pre-Pandemic		
Year	Theme	Initiative
2015	iPad Project	The introduction of the usage of iPad in the Monash University Foundation Year (MUFY) programme
2016	Introduction to Bring Your Own Device (BYOD)	Introducing the usage of technology in the class for all Pre-University staff Workshops: Introducing annotation, collaboration, feedback and

		<p>assessments, infographics, mind mapping and using technology in the classroom</p> <p>Special Project: Upgrading the college's WIFI system</p>
2017	M-Learning	<p>Inclusion of all Pre-University staff in BYOD activities where staff are divided into groups to implement technologies and applications previously introduced</p> <p>These includes <i>Cloud Storages, OneNote, OneDrive, Vizia, Socrative, Plickers, Kahoot, Socrative</i> and etc.</p> <p>Workshops: Introduction to Mobile learning Incorporating digital technologies into various pedagogies Gamification and digital games-based learning Making learning visible through digital forms of assessments Introduction to BYOD and its roles in shaping 21st century learning Annotation & collaboration</p> <p>Special Project: Setting up of 21st Century Classroom</p>
2018	Assessment and Feedback	<p>Forum & Poster Presentation: Rethinking Pedagogy for the Digital Generation</p> <p>Workshops: Introduction to Assessment and Feedback Gamification & Assessment-based sharing Project-based learning & Enquiry-based learning</p> <p>Special Project: Completion of 21st Century Classroom</p>
2019	Gamification maximizing impact on learning	<p>Sharing Session: Pilot Study Sharing Session (PS): Gamification to maximize impact on learning</p> <p>Demonstration: Gamification efforts in the classroom</p>

		<p>Workshops: Visible Learning: Maximize impact on learning Demo of a good gamification activity in class Part 1 & Part 2</p> <p>Special Project: MOODLE theme discussion start-up</p>
2020	Student Centered learning, Personalised Learning for Greater Knowledge, Skills and Dispositions	<p>Using MOODLE in the classroom</p> <p>Workshops: Student Centered Learning (using MOODLE as the platform) Video Making Using Movie Maker</p> <p>Special Projects: Introduction to advanced functions in the MOODLE platform. Designing MOODLE pages Part 1 & Part 2</p>
During-Pandemic		
Month & Year		Initiative
March 2020	Introduction to online classes	<p>Workshops: Recording video lectures and YouTube uploads</p>
April 2020	Creation of Operating standards for MOODLE	<p>Workshops: Using MOODLE, guidelines to conducting online classes, creating standardised MOODLE pages</p>
May 2020	<p>Operating Standards: Conducting e-exams using Exam.net and Safe Exam Browser (SEB) Online Invigilation and Proctoring using Google Meet and <i>Apowersoft</i> Online Screen Recording</p> <p>Workshops: Conducting e-examinations with proctoring</p>	
June 2020	Hybrid classes	<p>Sharing Session: Video-sharing session on classroom activities</p>
January 2021	<p>Operating Standards: Microsoft Teams guide</p> <p>Workshops: Standardising the conduct of online classes using Microsoft Teams</p>	

February 2021	Forum: Overcoming difficulties faced during online classes
	Workshops: Exploring more advanced features of MOODLE
March 2021	Workshops: Overcoming students' lack of motivation during online classes
May 2021	Forum: Lecturers share the outcome of their preliminary research on ways to overcome specific issues faced during online classes
July 2021	Operating Standards: Sitting for internal e-assessments
	Workshops: Conducting internal e-assessments
November 2021	Sharing session: Lecturers share the final output of their research on ways to overcome specific issues faced during online classes

Post-Pandemic		
Date	Theme	Initiative
February 2022	Interdisciplinary Teaching and Learning (ITL)	Resuming face to face classes with strict SOP for health and prevention of COVID-19
		Workshops: Introduction to ITL Part 1 & Part 2
		Sharing Session: Interdisciplinary Teaching and Learning Sharing Session

RECALIBRATING AN EDUCATOR'S QUALITY COMPASS WITH TOTAL QUALITY MANAGEMENT

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ABSTRACT

Background Learner-centred education suggests the attainment, sustainability, and enhancement of quality of organisational purpose in a multi-dimensional and holistic approach. Educators as primary drivers of quality assurance facilitate the achievement of relevant learning outcomes through instruction, research, and extension to satisfy the advancing needs of stakeholders. Capacitating educators to personify a good quality culture boosts the whole quality management system of HEIs.

Aim This paper aims to contribute to educators' understanding on quality assurance in higher education in light of Deming's management philosophy of Total Quality Management (TQM).

Methods An overview of the existing literature around quality assurance on higher education is provided and analysed alongside the ASEAN University Network Quality Assurance (AUN-QA) eight-criteria assessment model at the programme level.

Findings Understanding Harvey and Williams' (2010) quality assurance "value systems" is gained through discussions on process control, continuous improvement, commitment, and breakthrough with Deming's key TQM principles of purpose, cooperating systems, leadership, methods and processes, and improvement.

Conclusion Educators are guided by their own quality compasses that require frequent recalibration. Deepening their understanding and transcending from knowledge to practice of a quality culture through quality assurance contributes immensely to the greater humanitarian goal of sustainable development. TQM principles serve as the bedrock of quality assurance. Key TQM themes are associated with the AUN-QA assessment model for programme level using the perspective of an educator. Further studies may validate these connections and extend empirical studies to the other quality points of TQM.

Keywords Higher education; educator; total quality management; quality assurance; sustainable development

INTRODUCTION

Academia provides society with a platform for robust discussions on sustainable development (Jucker, 2002; Comoli, Gelmini, Minutiello, & Tettamanzi, 2021; Omazic & Zunk, 2021; Liu, Bao, Zhao, Sang, & Fu, 2022; Veidemane, 2022). Carrying out the core activities in teaching, research, operations, and public service (Jung, Wong, Chen, Baigaltugs, & Belawati, 2011; Comoli et al., 2021; Zwoliński et al., 2022), higher education institutions (HEIs) are responsible for giving guidance that produces significant economic, environmental, and societal impacts to both internal and external stakeholders (Albia & Chan, 2017; Mattah, Kwarteng, & Mensah, 2018; Mukhaiyar, Muskhir, Hambali, & Dolly, 2019; Zuhairi, Raymundo, & Mir, 2020; Ali & Bansal, 2021; Mulyono, Sahlan, Sholihah, Rusmingsih, & Atanjuani, 2021; Veidemane, 2022).

The United Nations' (UN) 2030 Agenda for Sustainable Development (SD) highlights the 17 main development challenges for humanity as agreed upon by the member states. Omazic and Zunk (2021), Tanaka (2021), Liu et al. (2022), Timbi-Sisalima, Sánchez-Gordón, Hilera-Gonzalez, and Otón-Tortosa (2022), Veidemane (2022), and Zwolińska, Lorenc, and Pomykała (2022) agree with many scholars that education and learning act as the primary vehicle integrating the principles, values, and principles of sustainable

development towards growth beyond what is conventionally known to be purely economic by businesses (Comoli et al., 2021).

Hence, Education for Sustainable Development (ESD) promoted by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1992 stirred the growing interest of many researchers (Jucker, 2002; Comoli et al., 2021; Omazic & Zunk, 2021; Liu et al., 2022; Timbi-Sisalima et al., 2022; Veidemane, 2022; Zwolińska et al., 2022). HEIs started to adopt the University Sustainability Reporting (USR) patterned from the Global Reporting Initiative (GRI) framework that concentrates on the non-financial issues and is getting increased attention from all sectors. The ESD concept and USR practices received a wider recognition from which a more comprehensive quality management in the education sector has emerged (Comoli et al., 2021).

Following a more systematic approach towards sustainability (Sirat, 2017; Veidemane, 2022), the higher education ecosystem focuses its attention on the learners of today (De Jager & Nieuwenhuis, 2005; Harvey & Williams, 2010; Danielson, Nguyen, & Wigal, 2016; Mattah et al., 2018) who will eventually become the decision-makers of tomorrow (Yung, Hill, Chen, Tsai, & Chen, 2017; Mulyono et al., 2021; Rais et al., 2021; Liu et al., 2022; Zwolińska et al., 2022). The tall orders for HEIs to align with their purpose (De Jager & Nieuwenhuis, 2005; Armstrong & Laksana, 2016), improve (Madden, 2012; Rais et al., 2021), evaluate or assess their present status (Harvey & Williams, 2010; Jung et al., 2011; Yung et al., 2017; Li, Li, Han, & Ma, 2022) and plan (Tun & Ye, 2019; Mulyono et al., 2021; Timbi-Sisalima et al., 2022; Veidemane, 2022; Zwolińska et al., 2022) educational service along the lines of inputs, process and outputs, present the crucial phase of quality management—a means to achieve sustainability.

Quality in higher education is an ongoing debate as it continues to transform in varying contexts. Previous research describes the dynamic (De Jager & Nieuwenhuis, 2005), multi-dimensional (Nuangjamnong, 2014) and multi-level concept of quality that meets or exceeds expectations of customers on the products and services they consume (Rais et al., 2021), people they engage with (Tun & Ye, 2019), processes they undergo (De Jager & Nieuwenhuis, 2005) and the environment where they interact (Comoli et al., 2021). Harvey and Williams (2010), Ali and Bansal (2021), and Rais et al. (2021) highlighted

quality as fitness for purpose permitting HEIs to outline their goals through their mission and vision statements.

Rais et al. (2021) discusses two approaches in business and academia associated with the quality of product or service. “Quality Control” identifies and excludes parts or the whole output that are not conforming with the standards after the production process, while “Quality Management” enforces standards before and during the production process. This is called “Quality Assurance” in higher education. Nuangjamnong (2014), Armstrong and Laksana (2016), Sirat (2017), Mattah et al. (2018), Tun and Ye (2019), Zuhairi et al. (2020), Ali and Bansal (2021), Chaiya and Ahmad (2021), Mulyono et al. (2021), Tanaka (2021), and Timbi-Sisalima et al. (2022) concur with many researchers on having a deep understanding of the elements of quality assurance being essential in assessing the development of HEIs.

De Jager and Nieuwenhuis (2005) illustrates the core principles of Total Quality Management (TQM) as applied to Outcomes-Based Education (OBE). TQM is management philosophy anchored on the 14-point quality management model of Professor William Edwards Deming, an American electrical engineer, statistician and management consultant. The attainment of the intended outcomes translated into the determination and satisfaction of customers’ needs by forming a facilitating system that yields to the expected results is the heart of TQM (Harvey & Williams, 2010; Nuangjamnong, 2014; Mulyono et al., 2021; Rais et al., 2021). Harvey and Williams (2010) cite in their study the five major Deming quality themes that adaptable to HEIs—purpose (Jung et al., 2011), cooperative systems (Mattah et al., 2018), leadership (Armstrong & Laksana, 2016), methods and processes (Zwolińska et al., 2022), and improvement (Danielson et al., 2016).

This paper aims to understand quality assurance in higher education in light of Deming’s management philosophy of Total Quality Management (TQM).

METHODS

This paper provides an overview of the existing literature around quality assurance in higher education. Adopting the ASEAN University Network Quality Assurance (AUN-QA) eight-criteria assessment model at the

segment of the many stakeholders of HE, Danielson et al. (2016), Mattah et al. (2018), Zuhairi et al. (2020), and Zwoliński et al. (2022) support past studies on taking educational service quality from the perspective of students. Among the quality indicators that students use to measure satisfaction, the quality of academic staff is considered to be equally, if not, the most important element (Armstrong & Laksana, 2016; Chan & Kanjanawasee, 2016). This brings to light the significant role of educators as drivers of quality (Albia & Chan, 2017). With such responsibility, it is imperative for educators to deepen their understanding of quality assurance.

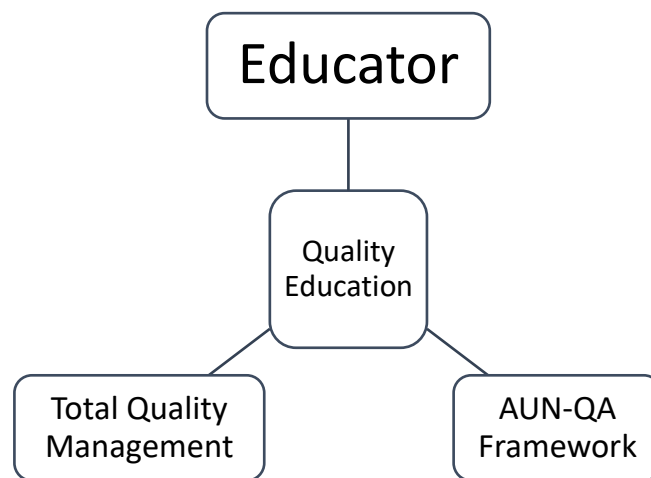
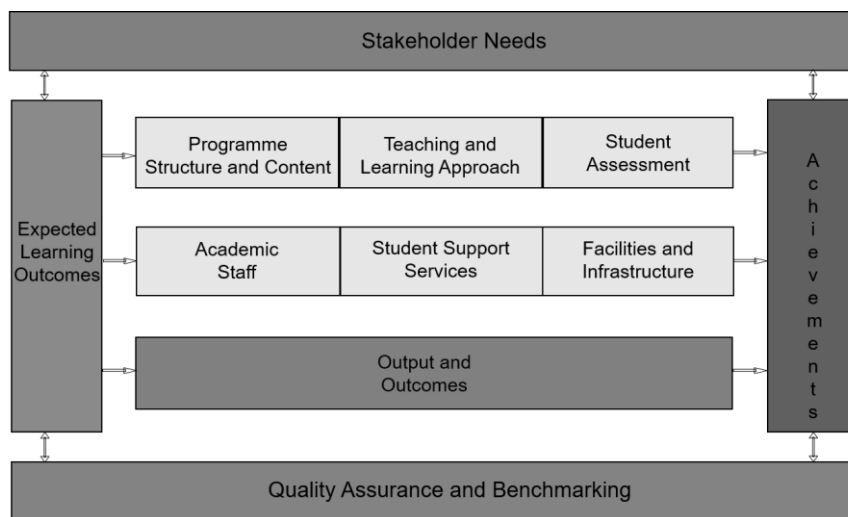


Figure 2 *Analytical Approach*

ASEAN University Network Quality Assurance (AUN-QA)

Zuhairi et al. (2020) refers to adherence to rules, procedures, and standards as process control, the central element of a QMS anchored on fitness for purpose (Rais et al., 2021). Nuangjamnong (2014) defines standards to be a holistic representation of quality in all aspects of institutional quality assurance that satisfy the necessity for public accountability, financial viability, and academic credibility. The ASEAN University Network Quality Assurance (AUN-QA) promotes the establishment of HE quality assurance that allows mutual recognition among member institutions which are diverse in terms of culture and resources (ASEAN University Network Quality Assurance, 2020). Tun and Ye (2019) discuss the common experience of educators on quality assurance that vary according to teachers' age, educational qualifications, academic rank, years of service in the HEI, and gender. Results showed a low perception of teachers of internal quality assurance.

The ASEAN University Network Quality Assurance (AUN-QA) Assessment Model at the Program Level Version 4.0 (ASEAN University Network Quality Assurance, 2020) is currently adopted by several HEIs in the region. Grounded on the fulfilment of the needs of the internal and external stakeholders with a focus on continuous improvement, AUN-QA recognised and targeting-to-be-recognised HEIs follow the “Plan-Do-Check-Act” (PDCA) cycle in assessing and enhancing their programmes along the context of the eight-criteria model. Further, the Version 4.0 guideline is grouped into programme (expected learning outcomes, programme structure and content, teaching and learning approach, and student assessment), resources (academic staff, student support services, facilities, and infrastructure), and results (output and outcomes).



Source: AUN-QA Assessment Model at the Program Level Version 4.0

Figure 3 *AUN-QA Assessment Model at the Program Level (Version 4.0)*

Table 1 presents the perceived counterparts among the various quality assurance indicators presented by the reviewed literature. With the AUN-QA Framework as the baseline, the related quality indicators were matched with the eight programme-level assessment criteria. The functional aspect of the quality indicators in terms of the academic programme, resources, and results are evident in the literature. The QA frameworks, though translated in different ways depending on context, set the minimum parameters that HEIs should pay attention to. Some may tend to more specific and the others, more encompassing as other elements are subsuming in major themes, taking for

instance, Timbi-Sisalima et al.'s (2022) self-assessment model for virtual education which has a more elaborate criterion for facilities and infrastructure.

Table 1 Author's matching of Quality Assurance factors according to literature reviewed

No.	AUN-QA Framework	Armstrong & Laksana (2016)	Chan & Kanjanawasee (2016)	Mattah et al. (2018)	Tun & Ye (2019)	Ali & Bansal (2021)	Timbi-Sisalima et al. (2022)
	Assessment Criteria at the Program Level	Key Concepts for Internationalization	Internal Quality Assurance Indicators	Indicators of Service Quality	Factors of Internal Quality Assurance System at Program-level	Quality elements affecting quality assurance in HE (stakeholders' perspective)	Self-assessment Model for Virtual Education
1	Expected Learning Outcomes	Vision	Mission, Strategic Planning and Finance	Programs and Courses	Expected Learning Outcomes; Stakeholder Feedback	Institutional Mission and Educational Goals	Course Information on Program
2	Program Structure and Content	Internationalized curriculum with Content Teaching and Learning Process	Educational Programs		Program Specification; Program Structure and Content; Stakeholder Feedback	Curriculum; Student Progression	
3	Teaching and Learning Approach			Teaching and Learning Strategy; Quality Assurance of Teaching and Learning Process; Stakeholder Feedback	Teaching and Learning Process	Content and Learning Resources; Learning Strategies	
4	Student Assessment	Faculty experience in Teaching and Research	Quality of Academic Staff	Teaching Staff	Student Quality; Student Advise and Support; Student Assessment	Assessment Process	Electronic Assessment
5	Academic Staff	Leadership by Management Team; International Activities	Leadership: Customers and Support Services	Administrative/Supporting Staff; Services	Academic Staff Quality; Staff Development; Stakeholder Feedback	Quality of Academic Staff	Teaching Profile; Teacher Support
6	Student Support Services	Physical Facilities	Physical Facilities	Physical Facilities; Physical Environment	Support Staff Quality; Staff Development; Student Advise and Support; Stakeholder Feedback	Governance and Management; Quality of Administrative, Professional and Support Staff and Student Admission and Support Services	Organization; Student Support and Orientation; Admission; Inclusion and Diversity
7	Facilities and Infrastructure				Output; Stakeholder Satisfaction; Stakeholder Feedback	Infrastructure and Learning Resources	Technological Infrastructure and Equipment; Learning Management Platform; Assistance and Technical Support; Economy and Technological Financing
8	Output and Outcomes	Exchange Students; Graduates working internationally				Employability of Graduates	Knowledge Management; Research and Innovation

DISCUSSION

An educator personifies a ground-level quality manager in an HEI. Reiterative planning, doing, checking, and acting in the course of teaching, research, and public service along the eight-criteria AUN-QA assessment model is like recalibrating a compass. One's quality compass may have its own meaning of quality pointed in directions of differing forces, but through the PDCA method of quality assurance, reconfiguration may lead to a more reliable passage. That passage for the purposes of this discussion is towards sustainable development. The discussion proceeds based on the analytical approach presented in Figure 3. The main TQM themes applicable to HEIs are analysed with the AUN-QA framework, with emphasis on the role of educators.

Purpose

The TQM principle of purpose is found to be clear and straightforward in the AUN-QA framework. The transformative mission to deliver excellent HE services resonates among the components of the model presented in Figure 2. With the stakeholders as the pivot, all QA criteria revolve around a commitment to realise HEIs' purpose to attain their goals and produce outcomes, constantly enhance methods and processes, and sustain leadership at all levels. A purpose declared in an HEI's mission and vision statement is adjusted to become relevant to the requirements of the students, academic and support staff, alumni, parents, employers, and the society (Mulyono et al., 2021). It includes input-process-output value system implemented through the trifecta function of HEIs—teaching, research, and public service.

The AUN-QA framework's programme dimension is founded on the established statement of purpose of HEIs—in their mission and vision statements (Armstrong & Laksana, 2016; Chan & Kanjanawasee, 2016; Ali & Bansal, 2021). Living up to such a purpose in a naturally developed working culture and environment, educators could better assist the crafting of appropriate learning outcomes (Tun & Ye, 2019), designing better programmes and learning methodologies (Mattah et al., 2018; Timbi-Sisalima et al., 2022).

Cooperating Systems

The AUN-QA framework components are interrelated. One measure could not be treated alone. Rather, each among the eight criteria are analysed alongside the others. TQM's principle of breaking silos and barriers reinforces the QA framework. Say for instance, the expected learning outcomes set the direction of the programme structure and content, teaching and learning approach, and student assessment. It also dictates the quality of academic staff, nature and extent of students support services, and physical capital needed to deliver quality education. For the whole system to run smoothly as planned, the parts need to be configured in their best calibration according to their roles.

AUN-QA's PDCA cycle lends ease to managing a quality system which enables HEIs to iteratively plan and operate (Mulyono et al., 2021). Educators act as quality managers who continuously perform PDCA. They are responsible for adjusting their classes' learning outcomes, activities, and resources in attainment of the HEI's ulterior objective of academic excellence. This is a manifestation of TQM's principle of managing quality from the start or from the simplest unit of an organisation.

Leadership

HEIs' quality assurance initiatives are directed towards a transformational path. Jung et al. (2011), Danielson et al. (2016), Albia and Chan (2017), Comoli et al. (2021) and Rais et al. (2021) agree that decision-making is participatory in HEIs' quality management systems. This means that leadership is shared in all levels of management as suggested by TQM. One strategy for sustainable education is to empower educators to inspire and influence students to take learning into their hands (Jucker, 2002).

QA is most advantageous in cases of uncertainty (Liu et al., 2022). Ali and Bansal (2021) found a disconnection of vision and mission of many HEIs in Bahrain and their educational delivery. Cases like these are worsened by unclear government and management structures and activities. A good QMS that promotes participation, accountability, transparency, and autonomy would help HEIs avoid disorder. Educators serving as frontliners at the ground-level governance should take on the leadership to conduct self-assessment and TQM's change management (Tun & Ye, 2019).

Methods and Processes

To become sustainable, HEIs are suggested to devise strategies that would help them realise their purpose. TQM's cooperating or integrative systems allow HEIs to go interdisciplinary in terms of their programmes, teaching and learning approaches, researches, and extension services, among others. With this interdisciplinarity of achieving purpose, new notions of excellence are sought (Jucker, 2002) and more outcomes are attained (Sirat, 2017). ESD practices employ learning methods and practices like problem-based, active, and experiential learning (Zwolińska et al., 2022) that develop the sustainable competencies of students and educators (Liu et al., 2022).

TQM advocates the institution of systematic methods and processes that continuously improve quality and reduce waste (Tanaka, 2021). The AUN-QA framework focuses on the principle behind the manner of delivering educational service. However, to make it more measurable for decision-making purposes, these principles are translated into indicators that are monitored by HEI management to include educators. Taking an educator's class for instance, the teacher observes general HEI regulations and translates them into one's own class management set of policies. Administrative functions for student support services may also be given to educators. In that sense, educators act as intermediaries between the students and HEIs (Ali & Bansal, 2021). Being able to communicate directly with students and other stakeholders like employers or alumni, educators are placed in a better position to give feedback to and enhance the administrative realm of the quality system.

Improvement

Each dimension in the AUN-QA model has a quality enhancement component. This QA structure is designed to develop non-stop in a multi-dimensional facet. Continuous improvement closes the loop of QA and propels another cycle of PDCA. Grounded on stakeholder needs, academic programmes are vertically aligned to produce the expected outcome from taking the programmes. The verticality set the direction of QA. The upgrading of one component leads to the development of another in a cooperative system.

Nuangjiamnong (2014) compared the quality and benchmarking framework and discovered the challenge of information technology managers of learning management in applying the appropriate framework. The test lies on the type of the organisation, scope and structures of the framework, and intent for applying the framework. Additionally, this HEI dilemma may be rooted deficiency in understanding of the principles behind the frameworks. Benchmarking searches for the best practices or breakthroughs through observation and exchanges of information and execution of an improved practice. Quality frameworks are guided by analytical and systematic management models like Continuous Quality Improvement (CQI), Six Sigma's data-driven strategy to define, measure, analyse, improve and control (DMAIC) quality, and TQM.

AUN-QA and TQM challenge educators in redefining their notion of academic excellence. The collective question reverberates to HEIs who set the overall quality tone. To fulfil their mission, HEIs design their services in a manner that puts customer preference at the forefront. In dispensing the output, HEIs invest on the best inputs of human and physical capital to produce the best, gain customer satisfaction, and influence customer loyalty. Upon delivery, HEIs obtain reaction and analyse how their product performed. They analyse every bit of information from the feedback and come up with insights that would influence another round of service delivery. The cycle goes in a spiral transcending motion, attaining higher goals for every round. No matter how slow the progress is, higher education sustains its relevance to the growing needs for quality education.

CONCLUSION

Total quality management presents a solid bedrock for quality assurance. The competitiveness and dynamic state of the environment compels HEIs to move for endless advancement. Quality management systems evolve as the necessities for goods and services relentlessly transform from basic to sophisticated. Performance indicators also develop from one that is explicit to one challenging to measure. Regardless of context, quality assurance exerts persistent effort to search for the most realistic definition and measurement of quality through research. Indeed, quality lies on the eye of the beholder.

Quality management systems are as good as their components. The AUN-QA assessment model for programme level encompasses the quality elements of higher education. Expected learning outcomes, programme structure and content, teaching and learning approach, student assessment, academic staff, student support services, facilities and infrastructure, and outputs and outcomes are translated into similar concepts by other quality assurance frameworks, but all founded on the principles of total quality management. This paper discussed the association of key TQM principles with quality assurance in the eyes of the author as a management educator. Further studies may validate these connections and may extend empirical studies to the other quality points of TQM.

Educators are the prime movers of quality management. They are guided by their own quality compasses. Deepening their understanding and transcending from knowledge to practice of a quality culture through the healthy exercise of quality assurance would contribute immensely to the greater humanitarian goal of sustainable development.

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REFERENCES

- Albia, J. E., & Chan, S.-J. (2017). Understanding regionalisation in Philippine higher education. *Higher Education Evaluation and Development*, 11(2), 95–110. <https://doi.org/10.1108/HEED-07-2017-0003>
- Ali, S. A., & Bansal, A. (2021). An impact of assessing quality assurance, governance and management on higher education. *Turkish Journal of Computer and Mathematics Education*, 12(14), 1047–1069. <https://www.proquest.com/scholarly-journals/impact-assessing-quality-assurance-governance/docview/2623933338/se-2>

- Armstrong, N., & Laksana, S. (2016). Internationalization of higher education: Case studies of Thailand and Malaysia. *Scholar*, 8(1), 102.
<https://www.proquest.com/scholarly-journals/internationalization-higher-education-case/docview/2384109036/se-2>
- ASEAN University Network Quality Assurance. (2020). *Guide to AUN-QA assessment at programme level (Version 4.0)*. ASEAN University Network.
- Chaiya, C., & Ahmad, M. M. (2021). Success or failure of the Thai higher education development—Critical factors in the policy process of quality assurance. *Sustainability*, 13(17), 9486. <https://doi.org/10.3390/su13179486>
- Chan, S., & Kanjanawasee, S. (2016). Development of internal quality assurance indicators of Faculty of Education in Cambodia. *Scholar*, 8(1), 186.
<https://www.proquest.com/scholarly-journals/development-internal-quality-assurance-indicators/docview/2384109043/se-2>
- Cheung, K., Li, B., Benz, P., Chow, K. M., Ng, J. T. D., Kwok, W. Y. Y., Tsang, H., Leung, D. N. H., Lui, J. K. Y., Li, Y. N., So, E., & Leung, A. (2021). Prototype development of a cross-institutional credit transfer information system for community college transfer students. *Sustainability*, 13(16), 9398.
<https://doi.org/10.3390/su13169398>
- Comoli, M., Gelmini, L., Minutiello, V., & Tettamanzi, P. (2021). University Social Responsibility: The case of Italy. *Administrative Sciences*, 11(4), 124.
<https://doi.org/10.3390/admsci11040124>
- Danielson, S., Nguyen, H. H. D., & Wigal, K. D. (2016). Comparison of AUN-QA and ABET accreditation. *American Society for Engineering Education*.
<https://doi.org/10.18260/p.26531>
- De Jager, H. J., & Nieuwenhuis, F. J. (2005). Linkages between Total Quality Management and the outcomes-based approach in an education environment. *Quality in Higher Education*, 11(3), 251–260. <https://doi.org/10.1080/13538320500354150>
- Harvey, L., & Williams, J. (2010). Fifteen years of *Quality in Higher Education*. *Quality in Higher Education*, 16(1), 3–36. <https://doi.org/10.1080/13538321003679457>
- Jucker, R. (2002). “Sustainability? Never heard of it!?”: Some basics we shouldn’t ignore when engaging in education for sustainability. *International Journal of Sustainability in Higher Education*, 3(1), 8–18. <https://doi.org/10.1108/14676370210414146>
- Jung, I., Wong, T. M., Chen, L., Baigaltugs, S., & Belawati, T. (2011). Quality assurance in Asian distance education: Diverse approaches and common culture. *International Review*

of Research in Open and Distance Learning, 12(6). <https://www.proquest.com/scholarly-journals/quality-assurance-asian-distance-education/docview/1634475247/se-2>

- Li, Q., Li, M. Z., Han, J., & Ma, H. (2022). Quality assurance for performing arts education: A multi-dimensional analysis approach. *Applied Sciences*, 12(10), 4813. <https://doi.org/10.3390/app12104813>
- Liu, Y., Bao, T., Zhao, D., Sang, H., & Fu, B. (2022). Evaluation of student-perceived service quality in higher education for sustainable development: A fuzzy TODIM-ERA method. *Sustainability*, 14(8), 4761. <https://doi.org/10.3390/su14084761>
- Madden, M. L. (2012). *Exploring higher education regionalization through a study of the Asia Pacific Quality Network* (Order No. NR97417). [Doctoral dissertation, University of Toronto]. ProQuest Dissertations & Theses Global.
- Mattah, P. A. D., Kwarteng, A. J., & Mensah, J. (2018). Indicators of service quality and satisfaction among graduating students of a higher education institution (HEI) in Ghana. *Higher Education Evaluation and Development*, 12(1), 36–52. <https://doi.org/10.1108/HEED-10-2017-0006>
- Mukhaiyar, R., Muskhir, M., Hambali, & Dolly, V. P. (2019). Curriculum evaluation based on AUN-QA criterion for the case study of the Electrical Engineering Vocational and Educational (EEVE) study program. *Journal of Physics: Conference Series*, 1387(1). <https://doi.org/10.1088/1742-6596/1387/1/012039>
- Mulyono, M., Sahlan, A., Sholihah, T., Rusmingsih, D., & Atanjuani, E. S. (2021). Implementation of the Internal Quality Assurance System at UIN Malang Indonesia. *Turkish Journal of Computer and Mathematics Education*, 12(6), 941–949. <https://www.proquest.com/scholarly-journals/implementation-internal-quality-assurance-system/docview/2623927038/se-2>
- Nuangjamnong, C. (2014). Benchmarking frameworks for managing quality processes on learning management in Thailand. *AU-GSB E-Journal*, 7(2). <https://www.proquest.com/scholarly-journals/benchmarking-frameworks-managing-quality/docview/2384092736/se-2>
- Omazic, A., & Zunk, B. M. (2021). Semi-systematic literature review on sustainability and sustainable development in higher education institutions. *Sustainability*, 13(14), 7683. <https://doi.org/10.3390/su13147683>
- Rais, R. N., Rashid, M., Zakria, M., Hussain, S., Qadir, J., & Imran, M. A. (2021). Employing industrial quality management systems for quality assurance in outcome-based engineering education: A review. *Education Sciences*, 11(2), 45. <https://doi.org/10.3390/educsci11020045>

- Sirat, M. (2017). ASEAN's flagship universities and regional integration initiatives. *Higher Education Evaluation and Development*, 11(2), 68–80. <https://doi.org/10.1108/HEED-07-2017-0004>
- Tanaka, T. (2021). Recent trends of international validation and portability in Architectural Education. *Japan Architectural Review*, 4(2), 265–266. <https://doi.org/10.1002/2475-8876.12224>
- Timbi-Sisalima, C., Sánchez-Gordón, M., Hilera-Gonzalez, J. R., & Otón-Tortosa, S. (2022). Quality assurance in e-learning: A proposal from accessibility to sustainability. *Sustainability*, 14(5), 3052. <https://doi.org/10.3390/su14053052>
- Tun, A. Y., & Ye, Y. (2019). The relationship between teachers' demographic profiles and teachers' perception towards the internal quality assurance assessment at program level in two secondary high schools in Laiza and Mai Ja Yang townships, Kachin State, Myanmar. *Scholar*, 11(2), 329. <https://www.proquest.com/scholarly-journals/relationship-between-teachers-demographic/docview/2384107096/se-2>
- Veidemane, A. (2022). Education for sustainable development in higher education rankings: Challenges and opportunities for developing internationally comparable indicators. *Sustainability*, 14(9), 5102. <https://doi.org/10.3390/su14095102>
- Yung, A. C. H., Hill, C., Chen, K. H.-J., Tsai, S., & Chen, V. (2017). A comparative study of student mobility programs in SEAMEO-RIHED, UMAP, and Campus Asia: Regulation, challenges, and impacts on higher education regionalization. *Higher Education Evaluation and Development*, 11(1), 12–24. <https://doi.org/10.1108/HEED-08-2017-003>
- Zuhairi, A., Raymundo, M. R. D. R., & Mir, K. (2020). Implementing quality assurance system for open and distance learning in three Asian open universities: Philippines, Indonesia and Pakistan. *Asian Association of Open Universities Journal*, 15(3), 297–320. <https://doi.org/10.1108/AAOUJ-05-2020-0034>
- Zwoliński, G., Kamińska, D., Laska-Leśniewicz, A., Haamer, R. E., Vairinhos, M., Raposo, R., Urem, F., & Reisinho, P. (2022). Extended reality in education and training: Case studies in Management Education. *Electronics*, 11(3), 336. <https://doi.org/10.3390/electronics11030336>
- Zwolińska, K., Lorenc, S., & Pomykała, R. (2022). Sustainable development in education from students' perspective—Implementation of sustainable development in curricula. *Sustainability*, 14(6), 3398. <https://doi.org/10.3390/su14063398>

