



# Journal of Advanced Research in Applied Sciences and Engineering Technology

Journal homepage:  
[https://semarakilmu.com.my/journals/index.php/applied\\_sciences\\_eng\\_tech/index](https://semarakilmu.com.my/journals/index.php/applied_sciences_eng_tech/index)  
ISSN: 2462-1943



## Utilizing Online Quiz Assessment Tool to Provide Timely, Guided Feedback During COVID-19 Pandemic

Luqman Hakim Satiman<sup>1</sup>, Nadiatulhuda Zulkifli<sup>2,\*</sup>, Auwalu Usman<sup>3</sup>

<sup>1</sup> Faculty of Cognitive Sciences and Human Development, Universiti Malaysia Sarawak, Sarawak, Malaysia

<sup>2</sup> Faculty of Electrical Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia

<sup>3</sup> Department of Electrical Engineering, School of Technology, Kano State Polytechnic, Kano, Nigeria

### ARTICLE INFO

#### Article history:

Received 23 March 2023

Received in revised form 22 August 2023

Accepted 1 October 2023

Available online 13 December 2023

#### Keywords:

Guided Feedback; Online Assessment; Engineering Education

### ABSTRACT

The provision of timely feedback with useful guidance towards the correct solution is very important within the learning process of higher education students. This paper describes an implementation of timely feedback in a 3<sup>rd</sup> year electrical engineering undergraduate course, Communication Principles (SKEE 3533) that was carried out during COVID-19 pandemic. Given the substantial depth of this course syllabus, it is important that students receive sufficient feedback on their understandings on current topic before moving to the next. The implementation of this assessment technique is carried out using online quiz assessment through Google quiz platform. Two types of guided explanation are given in the feedback: text explanation for simple, conceptual based questions, and video explanation for design and calculation-based questions. For the latter, YouTube platform is used to perform the video-based explanation. Study on student feedbacks was carried out using a routine, official university's survey while the impact on student performances was analysed based on their acquired grades in the SKEE3533 course. Findings demonstrate positive outcomes from the routine university survey and course grades which revealed the method's potential in improving student satisfactions and performances on the assessment aspect of teaching component.

## 1. Introduction

The unprecedented COVID-19 pandemic has imposed a dramatic shift on how universities around the world function. Although online learning was not new to the university community, its adoption prior to the outbreak was still low [1]. However, as teaching and learning (T&L) still needs to resume despite the ongoing pandemic, all parties had to quickly adapt with the entirely new online T&L norm.

Given the nature of online education which physically separate students from their peers and lecturers, it is claimed that the importance of online assessment in this current higher education environment is even more prevalent [2,3]. A timely feedback in particular, is very valuable where research has revealed that learnings will be more effective if students are given feedback sooner upon submitting their work [4,5].

\* Corresponding author.

E-mail address: [nadiatulhuda@utm.my](mailto:nadiatulhuda@utm.my)

<https://doi.org/10.37934/araset.35.1.8896>

This paper aims to demonstrate the implementation of a timely, guided feedback in the quiz assessment of a third-year electrical engineering course, Communication Principles (SKEE 3533). In addition, an analysis was conducted using a routine survey to students on lecturers' T&L performances at the end of semester, focusing on the assessment component. The analysis is further strengthened by demonstrating overall student performances for the course where comparison was made between the session when the implementation took place and the previous three sessions.

## **2. Methodology**

It is widely acknowledged that feedback is necessary for student improvements, particularly in the areas of learning, assessment [6] and student performance [7]. In specific, feedback aims to enhance skills and knowledge by reducing errors and comprehension gaps [8]. Feedback is becoming more crucial especially during the current pandemic COVID-19 where the option for teaching and learning is primarily through online environment. As highlighted, students in this circumstance would feel lonelier because they have less opportunity to communicate with the lecturer compared to the typical face-to-face classroom [9,10].

Several prior studies have highlighted the importance of timely feedbacks through online assessment tool. It has been reported that timely feedbacks that are equipped with proper guidance or 'model answer' will enable students to amend their mistakes before moving on to the next assessment or topic [9]. This significantly will improve the student's understanding on the subject. This finding had been supported by [11] who found that timely feedback not only improved the student's learning process but also give positive emotion to student. In addition, [12] emphasized the vital role of quality feedback, claiming that systematic and constructive feedback would lead to producing an effective learning environment that yields positive outcomes on students' grades.

However, the importance of feedback is often undermined, especially in the higher education setting [13]. This condition occurred because feedback is sometimes given after course completion. Preferably, formative assessment should be well-planned such that students would receive feedback in time so that improvements can be made on their performance formal assessment such as final examinations.

Prior empirical studies before COVID-19 pandemic attempted to address the problem by using different types of tools such as standard multiple choice questions (MCQs) [14], evidence-effect-change (EEC) [11], class quizzes, discussion board posts [15] and video feedback [16]. However, only few researches reported the implementation of a timely, guided feedback practices that used established applications *e.g.*, YouTube and google form, within engineering-based higher educational courses. With the unprecedented hit by COVID-19 pandemic worldwide, it is increasingly important for lecturers to use more effective and efficient tool which is readily available to improve online assessment in higher education.

### *2.1 Theoretical Underpinning*

Feedback can be defined as information provided by an agent (e.g., teacher, peer, book, parent, self, experience) with the intention to improve performance or understanding [17]. In this study, lecturer acts as an agent to send the information to the students. The main purpose of the feedback is to provide the necessary advice to the student to improve learning process [18]. The feedback could allow the students to compare the current understanding or performance with the expectation set by the teacher. Through feedback students can recognize and correct their misconceptions and subsequently develop more effective strategies within the learning being addressed.

The theoretical base of the feedback is deeply rooted in the theories of learning [19]. Review of literature found various studies that have used these theories of learning. For instance, using social culture theory, several researchers claim that the feedback should be ongoing and should be given frequently and as soon as possible [20]. Meanwhile, [21] that used behaviouristic perspective suggested that feedback should be given immediately and/or timely. On the other hand, from a social constructivism perspective, [22] argued that the provider should consider that students should still recall their actions so that feedback is applicable to them. In addition, [23] that using social constructivism reported that feedback can be provided either immediate or delayed. Lastly, from the cognitive point of view, [24] suggested that feedback should be timed in an appropriate time frame.

Nevertheless, there is little attempt to provide theoretical grounding for timely feedback especially in engineering education [25]. As a result, the theoretical background for this study is based on the general literature about timely feedback rather than feedback in engineering education. It was not only until recently that research on feedback started to recognize the importance of discipline-specific context [26]. Up to now, specific feedback differences amid disciplines, and the unique feedback characteristics that exist within disciplines remain unknown [27].

### 3. Methods

By using the action research design, this project commences with a systematic plan on the composition of quiz questions based on the framework as shown in Table 1. The details on question composition are described in subsection 3.1 while subsection 3.2 demonstrates its implementation over google quiz and YouTube platforms. Student feedbacks were gathered through the official university's survey (known as e-PPP) that was routinely conducted at the end of every semester. Student's satisfaction towards the assessment was analysed where the current semester's performance was compared with the previous three semester's performances.

**Table 1**  
 Constructive Alignment Framework

Stage	Outcomes	T&L Activities	Assessment Task
1	Able to demonstrate good understanding on basic component of communication system, and mathematical skills <i>Topic 1 – Introduction</i>	Synchronous online lecture on related topics, example of suitable calculation problems or practical experiences. Submission of reflection in online learning platform per individual	Question composition: <ul style="list-style-type: none"> <li>• 2 MM concept</li> <li>• 4 MM calculation</li> </ul>
2	Able to distinguish noise sources and perform noise calculation <i>Topic 2 – Noise</i>	Synchronous online lecture on related topics, example of suitable calculation problems or practical experiences. Independent study using tutorial question sheet	Question composition: <ul style="list-style-type: none"> <li>• 1 MM Concept</li> <li>• 2 MM Calculation</li> <li>• 1 SH Calculation</li> </ul>
3	Able to demonstrate important concepts (modulation and multiplexing)	Discussion of selected tutorial questions in class through student participation	Question composition: <ul style="list-style-type: none"> <li>• 3 MM Concept</li> <li>• 1 Calculation</li> </ul>
4	with the aid of time-frequency domain analyses and evaluation of	Submission of reflection in online learning platform per individual	Question composition: <ul style="list-style-type: none"> <li>• 2 MM Concept</li> <li>• 2 SH Design</li> </ul>

5	communication system performance.  <i>Stage 3, Topic 3: Amplitude Modulation</i> <i>Stage 4, Topic 4: Frequency Modulation</i>	Question composition: <ul style="list-style-type: none"> <li>• 1 MM Concept</li> <li>• 4 SM Concept</li> <li>• 1 SH Concept</li> <li>• 1 SH</li> </ul> Calculation Question composition: <ul style="list-style-type: none"> <li>• 3 MM Concept</li> <li>• 2 SM Concept</li> <li>• 2 SH</li> </ul> Calculation
6	<i>Stage 5, Topic 5: Pulse Modulation</i> <i>Stage 6, Topic 6: Radio Digital Modulation</i>	Question composition: <ul style="list-style-type: none"> <li>• 3 MM Concept</li> <li>• 2 SM Concept</li> <li>• 2 SH</li> </ul> Calculation
7	<i>Stage 7, Topic 7: Multiplexing</i>	Question composition: <ul style="list-style-type: none"> <li>• 3 MM Concept</li> <li>• 2 SM Design</li> <li>• 1 SH Design</li> </ul>

\*MM = Multiple choice, moderate, SM = Subjective, moderate, SH = Subjective, high

The scores in this survey as shown in Table 2 are the averaged values against the maximum score of five, considering the following five criteria: teaching, delivery, assessment, relationship between lecturer and students, and application of generic skills. The score ranges from one to five where lowest score i.e., one indicates that a student is most dissatisfied with the item while the highest score i.e., five indicates that a student is most satisfied with the item. This analysis is subsequently followed by a more detail insight into the scores of each item within the assessment component itself to acquire students' satisfaction levels on its specific aspects such as return time and usefulness. Next, analysis based on students' final grade performances was conducted to understand the impact on student performances compared to the previous semesters.

**Table 2**  
 Comparison of e-PPP's  
 Assessment Scores

Semester	Score
20172018- 1	4.590
20182019-1	4.645
20192020-1	4.630
20202021-1	4.880

### 3.1 Constructive Alignment Framework

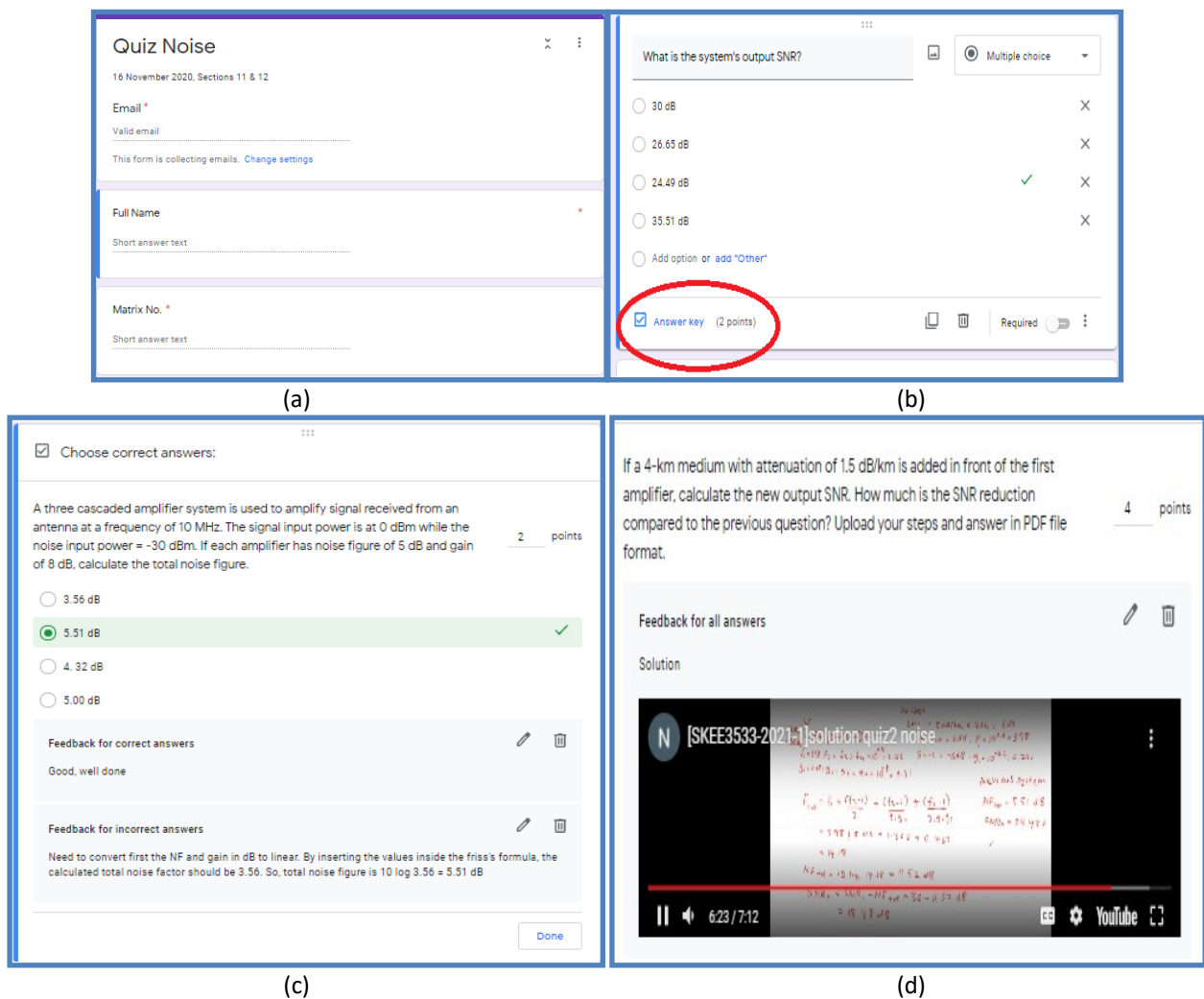
This course comprises seven topics where the design of quiz assessments for all the topics is based on the constructive alignment framework, as shown in Table 1. One-hour quiz was dedicated for each topic, with exception to topics 2 and 3, half an hour each due to time constraints. The quiz combined questions of moderate and high difficulty levels, in the form of either multiple choices or subjective, and either concept-, calculation- or design-based assessment approach.

### 3.2 Google Form Question Design with Integrated YouTube Video

Prior to the Pandemic COVID19 outbreak, quizzes were normally conducted face-to-face and manually marked. Occasionally, gamification approaches were held during teaching merely to bring excitement into the classroom atmosphere. The former allows more challenging questions to be assessed while the latter typically deals with easier concepts. Even though the former approach is

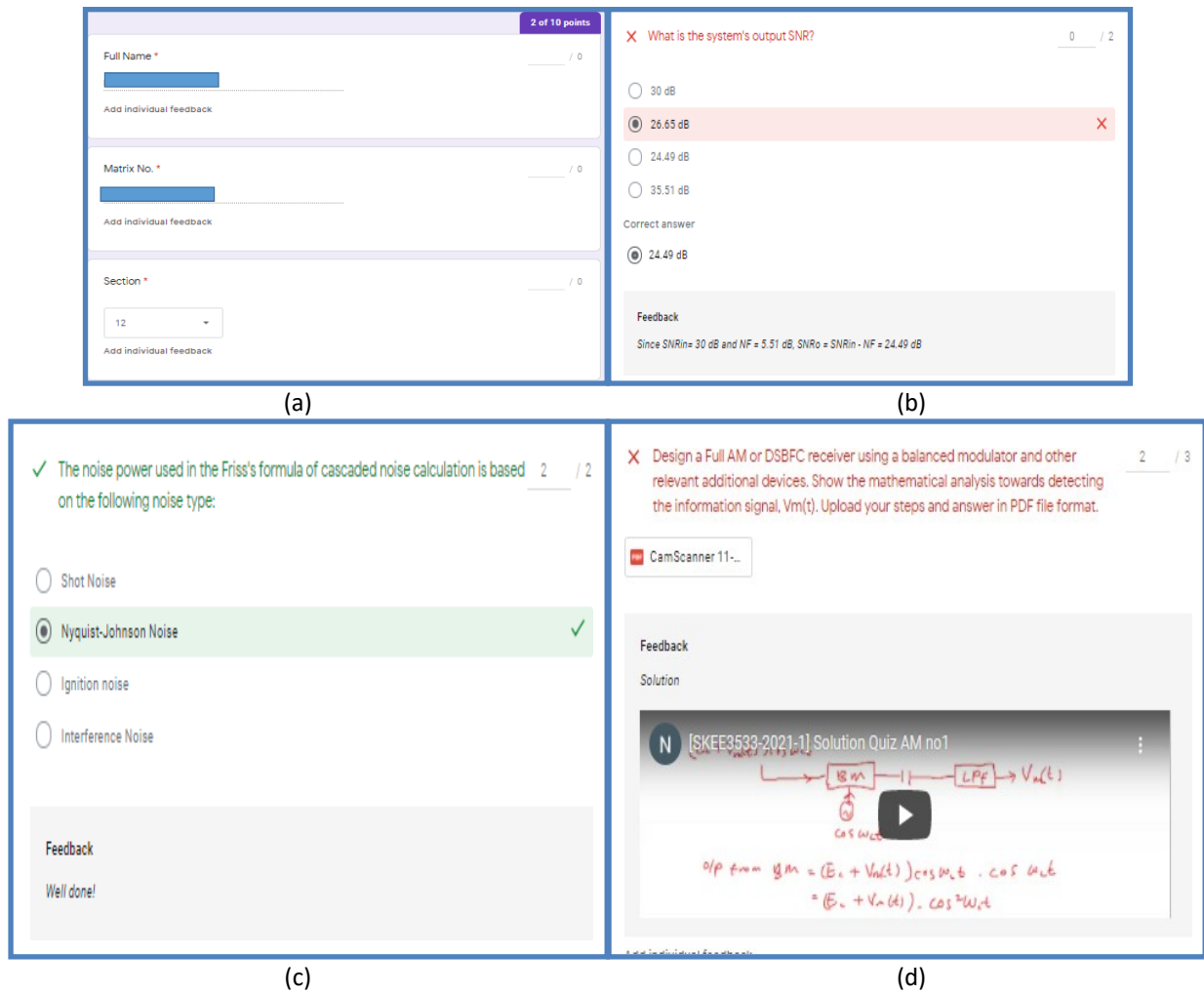
conventional and time-consuming as student solutions need to be prudently studied, it is an important approach that helps greatly with student learning. However, this approach takes much longer time, and any effort toward timely feedback is often compromised with other responsibilities such as research and administrative tasks.

The face-to-face restriction had led to the adoption of an alternative assessment approach using Google online quiz tool. It was implemented in Semester 1, Session 2020/2021, involving two sections of 54 students. Figures 1 (a) to (d) reveal some excerpts from the online quizzes. Feedback to student answers need to be provided beforehand in the 'Answer key' section as shown in Figure 1 (b). Figure 1 (c) shows the lecturer's automatic responses to both correct and incorrect answers while Figure 1 (d) shows the YouTube video solution as the feedback for a more challenging calculation question.



**Fig. 1.** Google Quiz Automatic Feedback Setting

Meanwhile, Figures 2 (a) to (d) reveal some excerpts from a student's view after the quizzes were marked, and results with feedbacks were revealed. The top right of Figure 2 (a) shows the total score of an individual student's quiz, Figure 2 (b) shows display of a wrongly answered question where the right solution is shown in the feedback area below and Figure 2 (c) shows the response for a rightly answered question. Meanwhile, for a design question as depicted in Figure 2 (d), the student may watch the provided video solution from the feedback area. Individual feedback can also be included for each question here if further comment or guidance is to be given per student basis.



**Fig. 2.** Responses to Student Answers

Even though Google quiz tool greatly assists in organizing quizzes, some challenges still remain. The most significant challenge was dealing with student’s attempt to cheat by using unknown identity and email in order to get the lecturer solution prior to submitting another version using the right student’s identity and email. This trick was solved by strictly limiting the access i.e., using student’s registered UTM email address and only one submission allowed per email. The other challenge was the assessment of non-automatically marked student answers which was time-consuming. Here, careful reading of student answers was needed, and fast response was made possible by aiming to return the quizzes before a set dateline e.g., before the subsequent topic begins.

#### 4. Finding and Discussion

##### 4.1 Analysis from e-PPP Survey

Results from a routine university survey on lecturer’s teaching (e-PPP) at the end of every semester are extracted to acquire student satisfactions on the overall course assessment, inclusive of quizzes. The session 20202021-1’s survey outcome is compared with the previous three sessions (20172018- 1, 20182019-1 and 20192020-1) that used only conventional quiz assessment method. As shown in Table 2, the average scores of e-PPP assessment component out of five are 4.590, 4.645,

4.630 and 4.880 for the four sessions starting from the 2017/2018-1 session up to the 2020/2021-1 session, respectively.

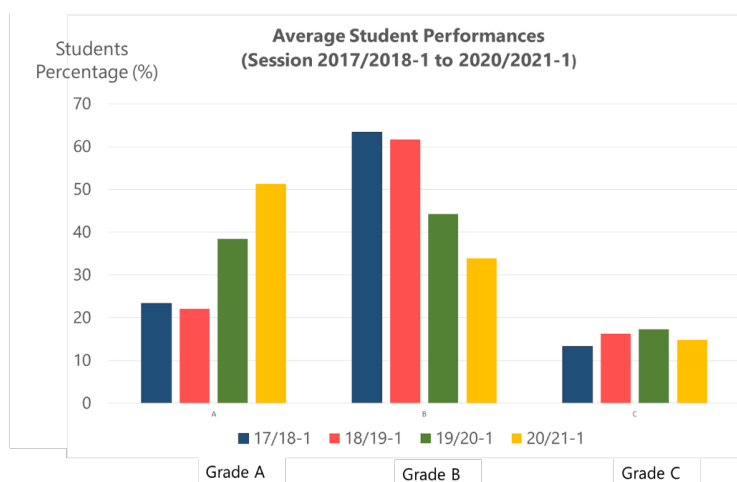
In all the previous three sessions, the average scores were nearly equivalent to the average faculty score with differences of only in between 0.01 to 0.03. On the other hand, score in the latest 2020/2021-1 session is well above the average faculty score with a significant difference of 0.270 point. A more detail insight into scores of all items within the assessment component for the 2020/2021-1 session is shown in Table 3. The results show that students are very satisfied with all the assessment aspects in overall, where Item 3 on timely assessment return particularly obtains the highest score.

**Table 3**  
 Average Scores of Items in the e-PPP’s Assessment Component  
 (2020/2021-1)

Assessment Items	Score
1. Fair assessment (Scope, duration, rationality & prior notice)	4.885
2. The ability to use assessment methods to challenge students to develop their individual capacity	4.850
3. Assessment results is returned in a reasonable period of time	4.905
4. Discussion of answers for every assessment	4.870
5. Use of assessment results to improve teaching	4.885

#### 4.2 Analysis on Student Performances

Figure 3 depicts the average student performances between three academic sessions from session 2017/2018-1 to 2020/2021-1. Overall, most students obtained grade B followed by grade A and C with exception to the session 2020/2021-1 where the implementation of timely, guided feedbacks had taken place in quiz assessments. In the semester, the number of grade A students surpassed the other grades, showing the indirect impact of the proposed technique on student performances. Interestingly, the number of grade C students remained to be quite consistent around 10% to 18% within the three semesters. This shows despite lecturer’s initiative to help students in their study, improvements cannot be realized without unfeigned commitment from them. Thus, attracting this undermotivated group of students continues to be a challenging task to most of the educators.



**Fig. 3.** Average Student Performances between Session 2017/18-1 to 2020/2021-1

## 5. Conclusions

This paper reports on the implementation of timely, guided feedback through an online assessment tool that is equipped with different approaches to explanation, in order to suit dissimilar questions' difficulty levels. Though the implementation of such online tool was realized as a direct result of COVID-19 pandemic due to the restriction in face-to-face class setting, it led to a blessed opportunity in improving the lecturer's assessment technique. Comparison made with the previous sessions that used the conventional face-to-face approach and non-systematic feedback mechanism revealed greater student satisfactions with the new method. The findings highlight the usefulness of such an online assessment tool for the benefit of enhancing the overall student learning experiences. At the same time, it also has an important role in assisting lecturers to provide timely feedback to students in as systematic and organized manner.

## Acknowledgement

We thank the Ministry of High Education Malaysia (MOHE) and Research Management Center of Universiti Teknologi Malaysia, for financial support under Transdisciplinary Research Grant scheme (Vote No 05G59 and 05G60). Special acknowledgements to the Faculty of Engineering, Universiti Teknologi Malaysia (UTM) for the financial support under Vote No 143.

## References

- [1] Yadegaridehkordi, Elaheh, Liyana Shuib, Mehrbakhsh Nilashi, and Shahla Asadi. "Decision to adopt online collaborative learning tools in higher education: A case of top Malaysian universities." *Education and Information Technologies* 24 (2019): 79-102. <https://doi.org/10.1007/s10639-018-9761-z>
- [2] Jiang, Lianjiang, and Shulin Yu. "Understanding changes in EFL teachers' feedback practice during COVID-19: Implications for teacher feedback literacy at a time of crisis." *The Asia-Pacific Education Researcher* 30, no. 6 (2021): 509-518. <https://doi.org/10.1007/s40299-021-00583-9>
- [3] Jie, C. Y., and N. Mat Ali. "COVID-19: What are the challenges of online learning? A literature review." *International Journal of Advanced Research in Future Ready Learning and Education* 23, no. 1 (2021): 23-29.
- [4] Irons, Alastair, and Sam Elkington. *Enhancing learning through formative assessment and feedback*. Routledge, 2021. <https://doi.org/10.4324/9781138610514>
- [5] Kechik, Tuan Siti Mastazameatun Long Tuan. "Factors of Technologies-Reliant for 'Pengajian Malaysia' Subject in Online Learning (OLL): A Conceptual Review." *International Journal of Advanced Research in Future Ready Learning and Education* 29, no. 1 (2022): 32-40.
- [6] Haughney, Kathryn, Shawnee Wakeman, and Laura Hart. "Quality of feedback in higher education: A review of literature." *Education Sciences* 10, no. 3 (2020): 60. <https://doi.org/10.3390/educsci10030060>
- [7] Nicol, David, Avril Thomson, and Caroline Breslin. "Rethinking feedback practices in higher education: a peer review perspective." *Assessment & evaluation in higher education* 39, no. 1 (2014): 102-122. <https://doi.org/10.1080/02602938.2013.795518>
- [8] Tan, Fiona DH, Peter R. Whipp, Marylene Gagne, and Niels Van Quaquebeke. "Expert teacher perceptions of two-way feedback interaction." *Teaching and Teacher Education* 87 (2020): 102930. <https://doi.org/10.1016/j.tate.2019.102930>
- [9] Barboza, Esdras Jorge Santos, and Márcia Terra da Silva. "The importance of timely feedback to interactivity in online education." In *Advances in Production Management Systems. Initiatives for a Sustainable World: IFIP WG 5.7 International Conference, APMS 2016, Iguassu Falls, Brazil, September 3-7, 2016, Revised Selected Papers*, pp. 307-314. Springer International Publishing, 2016. [https://doi.org/10.1007/978-3-319-51133-7\\_37](https://doi.org/10.1007/978-3-319-51133-7_37)
- [10] Nor, Siti Rohani Mohd, Adina Najwa Kamarudin, and Nurul Aini Jaafar. "Comparison on the Student's Performances during Physical and Online Learning in Financial Mathematics Course." *International Journal of Advanced Research in Future Ready Learning and Education* 28, no. 1 (2022): 1-8.
- [11] Bajaj, JAGMINDER KAUR, K. U. L. B. I. R. Kaur, R. A. J. I. V. Arora, and Satinder Jit Singh. "Introduction of feedback for better learning." *Journal of Clinical and Diagnostic Research* 12 (2018): 12. <https://doi.org/10.7860/JCDR/2018/36744.12402>
- [12] Fish, Wade, Rick Lumadue, and Lee Rusty Waller. "A Technology Based Approach to Providing Quality Feedback to Students: A Paradigm Shift for the 21st Century."



- [13] Pitt, Edd, and Lin Norton. "Now that's the feedback I want! Students' reactions to feedback on graded work and what they do with it." *Assessment & Evaluation in Higher Education* 42, no. 4 (2017): 499-516. <https://doi.org/10.1080/02602938.2016.1142500>
- [14] Pezzino, Mario. "Online assessment, adaptive feedback and the importance of visual learning for students. The advantages, with a few caveats, of using MapleTA." *International Review of Economics Education* 28 (2018): 11-28. <https://doi.org/10.1016/j.iree.2018.03.002>
- [15] Mutch, Allyson, Charlotte Young, Tamzyn Davey, and Lisa Fitzgerald. "A journey towards sustainable feedback." *Assessment & Evaluation in Higher Education* 43, no. 2 (2018): 248-259. <https://doi.org/10.1080/02602938.2017.1332154>
- [16] Mathisen, Petter. "Video feedback in higher education—A contribution to improving the quality of written feedback." *Nordic Journal of Digital Literacy* 7, no. 2 (2012): 97-113. <https://doi.org/10.18261/ISSN1891-943X-2012-02-02>
- [17] Hattie, John, and Helen Timperley. "The power of feedback." *Review of educational research* 77, no. 1 (2007): 81-112. <https://doi.org/10.3102/003465430298487>
- [18] Van der Kleij, Fabienne, Lenore Adie, and Joy Cumming. "Using video technology to enable student voice in assessment feedback." *British Journal of Educational Technology* 48, no. 5 (2017): 1092-1105. <https://doi.org/10.1111/bjet.12536>
- [19] O'Malley, Emer, Anne-Maria Scanlon, Lucy Alpine, and Sinéad McMahon. "Enabling the feedback process in work-based learning: an evaluation of the 5 minute feedback form." *Assessment & Evaluation in Higher Education* 46, no. 7 (2021): 1020-1034. <https://doi.org/10.1080/02602938.2020.1842852>
- [20] Pokorny, Helen, and Pamela Pickford. "Complexity, cues and relationships: Student perceptions of feedback." *Active learning in higher education* 11, no. 1 (2010): 21-30. <https://doi.org/10.1177/1469787409355872>
- [21] Auld, Ruth G., Phillip J. Belfiore, and Mary Catherine Scheeler. "Increasing pre-service teachers' use of differential reinforcement: Effects of performance feedback on consequences for student behavior." *Journal of Behavioral Education* 19 (2010): 169-183. <https://doi.org/10.1007/s10864-010-9107-4>
- [22] Mory, Edna Holland. "Feedback research revisited." *Handbook of research on educational communications and technology* 2 (2004): 745-783.
- [23] Van der Kleij, Fabienne M., Theo JHM Eggen, Caroline F. Timmers, and Bernard P. Veldkamp. "Effects of feedback in a computer-based assessment for learning." *Computers & Education* 58, no. 1 (2012): 263-272. <https://doi.org/10.1016/j.compedu.2011.07.020>
- [24] Shute, Valerie J. "Focus on formative feedback." *Review of educational research* 78, no. 1 (2008): 153-189. <https://doi.org/10.3102/0034654307313795>
- [25] Thurlings, Marieke, and Migchiel van Diggelen. "Perceptions of practical knowledge of learning and feedback among academic teachers." *European Journal of Engineering Education* 46, no. 1 (2021): 139-160. <https://doi.org/10.1080/03043797.2019.1677559>
- [26] Andrade, Heidi L., Randy E. Bennett, and Gregory J. Cizek, eds. *Handbook of formative assessment in the disciplines*. Routledge, 2019. <https://doi.org/10.4324/9781315166933>
- [27] Boud, David, and Elizabeth Molloy, eds. *Feedback in higher and professional education: understanding it and doing it well*. Routledge, 2013. <https://doi.org/10.4324/9780203074336>