Research on a Learner Assessment Model in Online Learning for Higher Education

Suriati Jamalludin
University or Pahang, Malaysia, https://orcid.org/0009-0005-9894-1371

Awanis Romli
University of Pahang, Malaysia, https://orcid.org/0000-0003-4623-1149

Abstract: The COVID-19 pandemic has tackled global sustainability without prejudice or geographical constraint. It has also prompted people to advance to the post-pandemic era. However, it is possible that in the future, extreme negative effects in response to crisis, especially during a pandemic, would recur. In fact, it might worsen. This situation has forced the education sector to adjust its teaching and learning approach in order to implement a new solution based on a selected component, namely assessment. In such case, the implementation of assessment has been activated for online learning platform. Hence, it is crucial to refer and study the current environment mode of the E-Assessment model in view the of the model development perspective and the features of the assessment concept for model development. The seven features that make up the degree of assessment conceptual dominance in online learning are authenticity, responsiveness, practicability, adaptation, transparency, alignment, and affordance. In accordance with the overall analysis of the conceptual features, the possibility of frequent and synchronized usage may be extended in detail for further investigation.

Keywords: E-Assessment, online learning, model

Citation: Jamalludin, S., & Romli, A.., (2023). Research on a Learner Assessment Model in Online Learning for Higher Education. In M. Koc, O. T. Ozturk & M. L. Ciddi (Eds.), *Proceedings of ICRES 2023--International Conference on Research in Education and Science* (pp. 573-587), Cappadocia, Turkiye. ISTES Organization.

Introduction

Assessment is an essential component of learning as it is a useful method to visualize the engagement between learners and educators (Taras, 2005). Respectively, assessment can improve teaching and learning, as well as can be used to hold learners and institutions accountable (Talib et al., 2020). Assessment in the twenty-first century should encourage students' use of critical thinking, analysis, synthesis, and inference (Segers et al., 2003). Hence, it is key to prove if an education system is producing the desired outcomes for learners, the economy, and society at large (Clarke, 2012). In response to the online learning environment, it is relevant to consider the E-Assessment component. Learners' E-Assessment is the process of testing students' knowledge

and abilities using information and communication technology (ICT) for all assessment processes, including design, implementation, reaction recording, and feedback provision as perceived by learners, teachers, lecturers, and tutors (Wuisan & Wibawa, 2019). Meanwhile, Gaytan contends that technology, delivery, pedagogy, learning styles, and learning outcomes all play a role in the positive E-Assessment outcomes (Gaytan, 2005). Pursuant to this, assessment has brought various positive perspectives that are not just confined to the platform approach. Due to the emergency shift, the most recent assessment case study in the digital world showed negative views when assessment activities have the potential to cause discontent, irritation, and anxiety in the summative assessment approach (Losad et al., 2020).

The Highlighted E-Assessment Changes in Response to the Crisis

The changes brought about by emergency remote teaching and learning (ERTL) are indeed compulsory and from different perspectives. These perspectives may vary depending on the context and individual experiences of learners and educators.

Firstly, the emergency remote teaching and learning (ERTL) strategy has been activated generally without assessment. Although there must be drastic changes, the factor of relevancy has presented challenges for both educators and learners. With the current issue, it is clear that perspectives toward assessment need to be tolerated. The COVID-19 pandemic has activated the emergency transition mode when it dreadfully disrupts the education sector. An online learning activation mode by minimum plan, zero plan, or unexpected condition within a limited timeframe is referred to as an as emergency transition, specifically to the education domain as remote teaching (ERT) (Bozkurt & Sharma, 2020; Nassr et al., 2020). Respectively, ERT's uniqueness is the new response phase discovery for the COVID-19 pandemic due to its global impact on the education sector, without prejudice at any level. As opposed to the prior crisis, the local effects were due to events like earthquakes, protests, severe floods, conflict, Ebola, and SARS.

The second problem lies in the status and level of assessment necessity in relation to the teacher and the student. The COVID-19 pandemic sample crisis initiates learning assessment adjustment activities. Applying online evaluations to courses meant for face-to-face instruction is challenging. The major challenge is the struggle to evaluate learners using the continued existing assessments that are assigned in a normal situation (Mumtaz et al., 2021). The worst adjustment occurs when the assessment is cancelled and the institution has to claim it as less important (Burgess & Sievertsen, 2020). Furthermore, during ERT, an assessment was identified from two (2) different perspectives (Jankowski, 2020a). First, since assessment is optional, it was set aside while professional development focused on online instruction and technology rather than on assessment or learning. Secondly, the administration should consider skipping the evaluation if it causes the faculty to be overburdened under normal circumstances and the grading evaluation letters to pass and fail are diverted (Jankowski, 2020b; Means & Neisler, 2020; Watermark, 2020). The learners were given the option of grading their assessments using pass-fail or grading conventions in detail (Means & Neisler, 2020). 60% might have opted for grading pass-fail to

grade, 6% chose mandatory pass-fail, and 34% had no choice but to continue receiving a letter grade(Means & Neisler, 2020) For example, in reaction to the Canterbury earthquake, the final test and take-home assignment had been cancelled and their weighting were redistributed among other evaluations (Agnew & Hickson, 2012).

Thirdly is the assessment methodology and pedagogical. During COVID-19, various adjustments had been made according to several different case studies. Most case studies were based on surveys. Henceforth, the assessment was done in light of the learner demand (Jankowski, 2020b; Rice, 2020), frequent technology use (Rice, 2020), the extension of the report deadline (Jankowski, 2020b; Rice, 2020), and the modification of assessment planning activities for the future (Rice, 2020). Furthermore, educators must also be flexible when determining the number of outcomes they assess(Watermark, 2020). On top of that, the necessity of a management assessment system is made much more pressing during a crisis (Watermark, 2020). The increased workload and pressure during a crisis can lead to a breakdown in communication, decision-making, and collaboration. Uniquely, there is also an assessment approach to capture a wide range of learner learning evidence, including field experience and other clinical practice measures (Watermark, 2020). Moreover, formative assessments are used, and surprisingly, the students performed well on tests and quizzes (Chen et al., 2021). Another viewpoint claims that assessments can be roughly divided into timed, remotely proctored exams, and open-ended tests(Guangul et al., 2020). A variety of learning management systems, such as series of quizzes, open-book, take-home assessments, professional presentations or demonstrations, annotated bibliographies, fact sheets, and e-portfolios can be used to administer remotely proctored exams. Meanwhile, open-ended assessment is another applicable concept of E-Assessment. The valid concept of open-ended assessment is suggested based on 11 guidelines: ask more conceptual questions; eliminate multiple-choice and fill-in questions; change the numbers, names, or scenarios if using problems from textbooks; randomize discrete parts of the problem when applying for an exam; avoid questions that consist of only simple computations; clear about the rules for take-home exams; remind students of the academic integrity policies; ask learners to sign the college academic integrity intent prior to the take-home exams; set time limits for the take-home exams to prevent contract cheating and help seeking; and offer learners to ask for clarification when necessary (Guangul et al., 2020).

On top of that, as more and more educational institutions and organizations move towards online learning and remote assessments--crucially because of emergency transition--cheating is a growing concern (Daniels et al., 2021; Durcheva & Rozeva, 2019; Gamage et al., 2020; Hamdan et al., 2021; Hickson & Agnew, 2013; Hosseini et al., 2020; Meccawy et al., 2021; Ng, 2020; Peytcheva-Forsyth & Aleksieva, 2021). However, the study's findings showed that the three contexts under study—face-to-face exams, submission of paper assignments prepared without a teacher, and submission of online assignments without the presence of a teacher—have different effects on the opportunities for dishonest behavior in assessment. Nevertheless, technology primarily modifies cheating methods rather than promoting academic lying or dishonesty (Peytcheva-Forsyth & Aleksieva, 2021).

It is crucial to note that there are indeed two main approaches--learner academic integrity and software-based

measures—for preventing and verifying cheating in online assessments. According to Hosseini, the important contributing factors to academic integrity include learner behaviors, attitudes, perceptions, understandings of deserving greater attention, and the effectiveness of institutional practices in helping students avoid academic misconduct (Hosseini et al., 2020) As a result, students who commit academic misconduct for the first time will, at the very least, be given a "0" for their task, or the lecturer may award an "F" to them for the course. Additionally, the specific institution enforced their code of conduct and severely penalize individuals who violated it (Meccawy et al., 2021). Not limited to the learner, Meccawy stresses that the educator has been trained to detect the cheating method. In addition, a case study by a researcher showed that learners prefer face-to-face assessments because educators transfer their experiences and methods for evaluating students from face-to-face to online settings without adapting and changing for the latter's particulars (Peytcheva-Forsyth & Aleksieva, 2021). Furthermore, the educator can create and ask a different set of questions as another manual for use in online assessments to prevent cheating (Verhoef & Coetser, 2021a).

Ideally, software-based measures should emphasize two timelines; pre-cheating and post-cheating. As an example, Turnitin (or text similarity) is used as a post-cheat software. On the contrary, pre-cheating or online monitoring software based on automated monitoring that runs on the computer of the test-taker can automatically analyze the data from their screen, video, and audio stream to notice any undesired activities (ProctorEdu, 2023). These, nevertheless, may end up being ineffective and reduce lecturers' statuses from educators and instructors to policing officers (Verhoef & Coetser, 2021a).

The Recognition of New Normal Phase

New normal phase is getting significant now that COVID-19 has brought about the prolonged suspension, cancellation program, and uncertainty. Although the phrase “new normal” is not new, it requires exclusive re-attention as a consequence of the pandemic. On the other hand, moving forward for crisis preparation and adaptation without suspension or cancellation is a solution for sustainability and reliability. Previous research claims that the new normal, which has been defined and applied to the diversity of climates or the occurrence of weather events, is not what it used to be (Lewis et al., 2017; Trenberth et al., 2015). In contrast, when this differs from the scenario that existed prior to the commencement of the crisis, a new normal is a state to which an economy, society, and others settle after a crisis (International Labour Organization, 2020). It is used to compare to the normal situation or an old normal. Additionally, the research of COVID-19 in education has identified a particular new normal term as a way in which education is anticipated to occur in the post-COVID-19 era that will be distinct from the manner education was typically exercised during the pre-COVID-19 days (Xiao, 2021). The new normal phase has brought about several changes to the way education is delivered, including the increased use of technology and online platforms, the adoption of new pedagogical approaches that emphasize student-centered learning, and the recognition of the importance of mental health and well-being in the learning process. Therefore, it is important to adjust every single aspect, including E-Assessments in teaching and learning.

Methodological of Analysis

The purpose of this article is to demonstrate the method applied for article analysis, which helps with the construction of the E-Assessment model development. It is useful to ensure that the associated track is followed in a way that allows for the systematic and target-oriented development of the E-Assessment model. It is important to preview the model that has previously been thoroughly explored based on four main factors: objectives, conceptual criteria, approaches, and procedures. In actuality, the respective factors have been extracted from ten (10) different E-Assessment models throughout the course of eleven (11) years of updates. Subsequently, it is anticipated that the criteria will assist in establishing a reference methodology flow scheme that is legal to practice. Therefore, the flow scheme that can be referred to is in Figure 1 below.

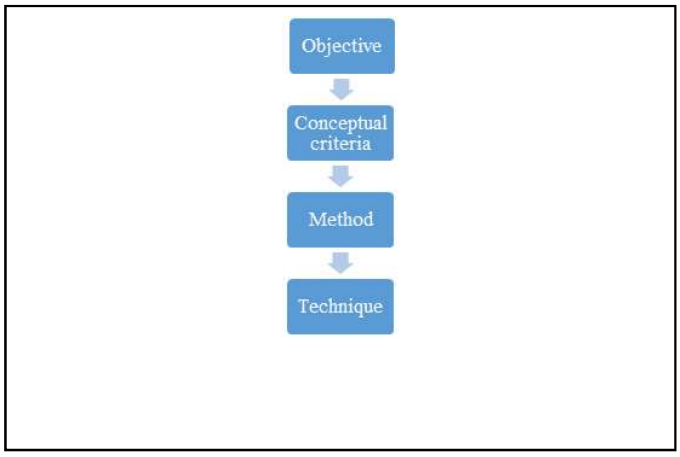

Figure 24. Methodology of Flow Scheme

On the other hand, Table 1 shows the range of eleven (11) years update from 2009 to 2020. Therefore, the significant trend of environment discovery for the E-Assessment model is in the pre-crisis or normal case. The development is well-planned in mode. To date, there is no preparation to deal with environmental uncertainties within the associated time frame. Therefore, the exploration is attempting to delve in-depth into another associated factor.

Table 1. E-Assessment Models

Reference	Title	Environment Discovery
(Schiller, 2009)	Practicing Learner-Centered Teaching: Pedagogical Design and Assessment of a Second Life Project	Pre-crisis
(Sewell et al., 2010)	Online assessment strategies: A primer	Pre-crisis
(McCracken et	Principled Assessment Strategy Design for Online Courses and	Pre-crisis

al., 2012)	Programs	
(Tinoca et al., 2013)	A conceptual model for E-Assessment in Higher Education – authenticity, consistency, transparency, and practicability	Pre-crisis
(de Villiers et al., 2016)	Principles of Effective E-Assessment: A proposed model	Pre-crisis
(Barana & Marchisio, 2016)	Ten good reasons to adopt an automated formative assessment model for learning and teaching Mathematics and scientific disciplines	Pre-crisis
(Padayachee et al., 2018)	Online Assessment In Moodle: A Model For Supporting Our Learners	Pre-crisis
(Amante et al., 2019)	E-Assessment in Portuguese Higher Education: Model and Perceptions of Teachers and Learners.	Pre-crisis
(Pauli & Gill, 2020)	The Future of Assessment: Five principles, five targets for 2025	Pre-crisis
(Philips et al., 2020)	New Digital Assessment Model and resource gateway	Pre-crisis

When the needs and abilities of two direct stakeholders, the learner and the educator, are synchronized on concepts, activities, and learning outcomes by technology, device, and application support, this offers another intriguing perspective that is able to advance smart education. The chaos in teaching and learning in response to the crisis trigger on survival with a minimum of or without achieving the targeted learning outcome and concept, as well as the level of technological familiarity and devices, come first.

Analysis Component

The analysis component is capable to explore the E-Assessment model from multiple scholars in depth and with interest. On top of that, the justification of the model development should be clear so that other scholars may use it to enhance on a different perspective in order to collaborate, upgrade, or improve prior limitations. The specification must therefore include the criteria for the objective, concept, method, and approach.

Objective

Initially, the necessary objectives of the previous studies need to be described. Based on the main purpose of development, the trends of model construction can be categorized into two: first, the intention to meet the needs and requirements of the direct stakeholders; and second, the advancement of technology movement. Hence, nine (9) models that fulfilled the needs and requirements of the direct stakeholders, such as learners, instructors, educators, or course designers, were reviewed (Amante et al., 2019; Barana & Marchisio, 2016; de Villiers et

al., 2016; McCracken et al., 2012; Padayachee et al., 2018; Philips et al., 2020; Schiller, 2009; Sewell et al., 2010; Tinoca et al., 2013). As a result, the model's priority is designed from the perception of the medium and the lowest hierarchy of stakeholders. Moreover, there are direct implementers who react to the viability of the adopted model. Most of the selected models believe that the adaptability of both educator and learner is the main preference when the indicated elements of concept are to optimize performance of the implementer. In contrast, there was a single E-Assessment model that aimed to facilitate technological innovation with human factor ignorance (Pauli & Gill, 2020).

Therefore, for the objective justification of the model, the limitations of the learner and the educator as a result of crisis should be taken into account.

Concept

The next component or concept involves the highlighted factors of the associated E-Assessment conceptual model. The factors are represented as an element, a dimension, a principle, or a strategy. They are compulsory components because they serve as the main reference for activity design and learning outcomes. The justification of the activities must be in line with the factors that have been assigned so that changes in activities are controlled consistently to achieve the desired result. With respect to the crisis situation, the reference of E-Assessment conceptual model to be used for drastic transition activities during emergencies is still unclear. In addition, it can be challenging to ascertain the rationale for the emergency transition criteria, which executes the suspension of physical teaching and learning. E-Assessment is therefore a viable option for surviving in an online platform.

The factors that are regularly implemented in the preceding models must therefore be addressed first. However, it is crucial to note that the implementation is limited for pre-crisis environments. For each model, various factors have been incorporated. However, the factors that are most consistent may be adopted in the future model. If the same element appears frequently in at least two (2) separate models, it is to be introduced into the future model. The Schiller model in Table 1 is thus excluded from Table 2 because the dedicated factors are inconsistent with other models. According to Table 2's authors (Amante et al., 2019; Barana & Marchisio, 2016; de Villiers et al., 2016; McCracken et al., 2012; Pauli & Gill, 2020; Sewell et al., 2010; Tinoca et al., 2013), the consistent factors are authenticity, responsiveness, practicability, adaptation, transparency, alignment, and affordance. Six (6) models established authenticity, four (4) models established responsiveness, two (2) models established practicability, adaption, and affordance, and three (3) models employed transparency and alignment. Despite the consistency of the appropriate factors utilized at least twice, there is no assurance of robustness in the context of the pre-crisis, crisis, and post-crisis phases. Therefore, it is relevant to propose an additional new factor that will influence each of the selected factors to be sufficiently functional and effective throughout all phases. Table 2 lists seven (7) factors of nine (9) E-Assessment models. The keyword of terms is elaborated in Table 3. Moreover, definitions of represented factors are concluded based on the selected models. (1) authenticity refers to the use or application of actual contexts and real tasks in learning and E-Assessments while

taking situational constraints and the online environment into consideration, (2) responsiveness refers to the speed and quality of feedback in E-Assessments that is timely, informative, and encourages positive attitudes towards future learning amongst students in the online environment, (3) practicability refers to the feasibility of the E-Assessment strategies in terms of effective management and assessment complexity from stakeholders' perspectives. This dimension is particularly important to design E-Assessments competently and efficiently given the complexity of its design in the online learning context, (4) adaptation to the application of multiple E-Assessment approaches including platforms by allowing a diverse range of opportunities for students to adequately exhibit learnt competencies and skills, and to enhance their learning to address the limitations of online assessments, (5) transparency refers to the explicit description and mutual comprehension of E-Assessment criteria, goals, procedures, and expectations by both educators and learners, (6) alignment refers to the learners' ability to demonstrate that they have achieved the learning outcomes in E-Assessments, and (7) affordance refers to the E-Assessment management system's capacity to deliver formative, diagnostic, or summative assessments and feedback, similar or equal to alternative technologies or assessment tools.

Table 2. The E-Assessment Model Factors

Num	Factor / Author	Auth	Res	Pra	Ada	Tra	Ali	Aff
1	(Sewell et al., 2010)	√	√					
2	(McCracken et al., 2012)	√	√			√	√	√
3	(Tinoca et al., 2013)	√		√		√		
4	(de Villiers et al., 2016)	√			√		√	√
5	(Barana & Marchisio, 2016)		√		√			
6	(Padayachee et al., 2018)							
7	(Amante et al., 2019)	√		√		√		
8	(Pauli & Gill, 2020)	√						
9	(Philips et al., 2020)		√				√	

Table 3. Terms and Keywords for Factors

Num	Term	Keyword
1	Aut	Authenticity
2	Res	Responsiveness
3	Pra	Practicability
4	Ada	Adaptation
5	Tra	Transparency
6	Ali	Alignment
7	Aff	Affordance

Method

In these particular models, the incorporation of various methods was applied, including mixed quantitative and qualitative methods. In addition, experience is the most crucial factor to be assessed when justifying the validation method with reference to the nine (9) selected models. The role and the experience are two more aspects on the criteria that will be considered as the approach is developed.

Due to an experience factor, 70% of the models were validated wholly (pure-method) or partially (mixed-method) by qualitative techniques (Barana & Marchisio, 2016; de Villiers et al., 2016; Philips et al., 2020; Schiller, 2009; Sewell et al., 2010; Tinoca et al., 2013). In contrast, 20% of the models (Amante et al., 2019; Padayachee et al., 2018) used quantitative approaches. Although Padayachee E-Assessment model adopted a quantitative approach, it is important to note that the categorization of questions has been divided into two (2) distinct categories, namely open-ended and close-ended, to accommodate the stakeholders' varied and broad experiences (Padayachee et al., 2018). In contrast, Barana and Marchisio's only study employed close-ended questions to measure experience (Barana & Marchisio, 2016). Furthermore, a unique case occurred when Pauli and Gill conducted their study using the rationale of professional experience to produce the outcome of an E-Assessment model (Pauli & Gill, 2020).

On the contrary, the main respondents involved were from five (5) different stakeholders, including educators, instructors, learners, and course or content designers. Despite the fact that there were many different stakeholders, the problem solving strategy was started from the bottom up by taking into consideration the experiences of each stakeholder.

Technique

These techniques indicate the meaningful assessment activities that are pertinent to the concept mapping (Gaytan & McEwen, 2007). Furthermore, numerous studies concur that one of the assessment techniques' capabilities is to be exemplary and guide learners towards achieving the desired learning outcomes in a virtual environment (Kucina et al., 2014; Sewell et al., 2010). As a conceptual evaluation guideline, the eight (8) traits

of authenticity, difficulty, coherence, engagement, respect, responsiveness, rigor, and validity are evaluated with exceptional precision (Huba & Freed, 1999). Meanwhile, the learning experiences that learners have while using the learning strategies contribute to the ultimate learning outcome, including what they have learned and how effectively they have learned it (Weimer, 2002).

E-Assessment and innovation are being used in a variety of effective ways, which strengthens their capacity to drive learning processes and outcomes (Romeu Fontanillas et al., 2016). If an E-Assessment activity adheres to the assessment standards, learning objectives, and applicable E-Assessment guidelines, it is deemed to be fully compatible (Tinoca, 2012; Wuisan & Wibawa, 2019). Various E-Assessment strategies, assignments, and evaluators should also be included. E-Assessment could be viewed as reliable if it is assumed to be constant. (SAQA, 2001). Therefore, there is validity in the correlation between three (3) different perspective criteria, namely assessment techniques, learning outcomes, and concepts, with consistency being the primary criterion.

Unfortunately, adopting the alternative assessment activities as a crisis response without violating pre-crisis principles has avoided the issue of alignment status from the perspective. Constructing the activities through the learning outcomes and the concept is the key step in the creation of assessment using the bottom-up methodology. The precise correlation between assessment activities, learning outcomes, and concept criteria is henceforth shown in Figure 2, which is shown below.

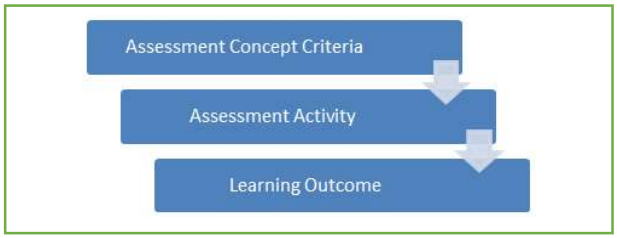

Figure 2. The Correlation Component of E-Assessment Model

Conclusion

With the advent of technology, it has been seen that the numerous E-Assessment conceptual model developments have produced the climactic result for quality learning. On top of that, it has the ability to generate an efficient assessment that benefits the learner, instructor, and educator, as well as a layer for implementation effect.

It is crucial to note that prior studies only discovered instances of the development of an E-Assessment conceptual model in usual circumstances. It is intriguing to note that according to mathematical perspectives, the pre-crisis and the crisis meet in the new normal phase. First, directly duplicating the offline assessment activities to the online environment will raise reliability and validity concerns as this approach is utilized to raise

performance and learning standards. Second, there is a possibility that misalignment occurs when amendments to assessment activities are not in line with learning concepts and outcomes in a way that allows for continual progress for survival. To reset the significant factors that complement both phases, a novel solution known as the normal phase has been devised. Figure 3 is a new normal Venn Diagram that might help to visualize the concept of phase complementary.

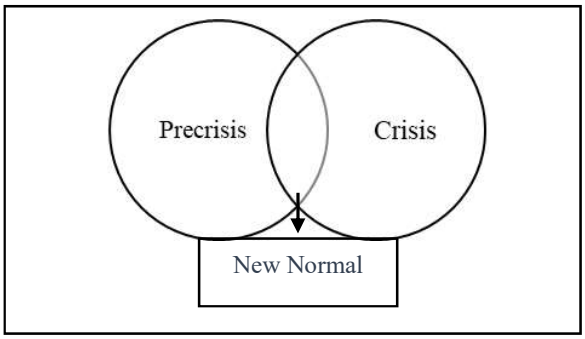

Figure 3. The New Normal Phase in Venn Diagram Imagination

An E-Assessment case study during an emergency determines that it is supposed to tolerate or be flexible with learning outcomes in order to survive (Reimers & Andreas, 2020). However, can the assessment method survive and still produce optimum quality with unparalleled concepts and activities? Accordingly, a study concluded that designing the assessment becomes an intriguing choice when offline assessment cannot be substituted by an online assessment with the same learning outcomes and concepts utilizing a technological approach (Joshi et al., 2020). Due to the critical phase of the multiple detrimental effects on teaching and learning, we also need to accept that now is the moment to utilize the complementary nature of offline and online platforms.

Additionally, a process and procedure for assessment should be designed that can be used with both platforms without the need for an emergency adjustment phase and is dependable to take into account any circumstances in the new normal phase. This kind of planning can quantify the degree to which online and offline platforms complement one another. It is vital to establish that flexibility is the main factor that able to influence the seven devoted factors that conceptual E-Assessment model relies on to endure the tolerability of emergency in the new normal phase. On top that, this is a novel solution to remain consistent and relevant with both phases and technological orientation.

Acknowledgement

This work was supported by the Postgraduate Research Grant Scheme (PGRS2003106), Universiti Malaysia Pahang.

References

Agnew, S., & Hickson, S. (2012). Using Online Assessment to Replace Invigilated Assessment in Times of Natural Disaster: Are Some Online Assessment Conditions Better than Others? *Journal of Open, Flexible and Distance Learning*, *16*(1), 1–13. http://ezproxy.lib.ucalgary.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1079992&site=ehost-live

Amante, L., Oliveira, I. R., & Gomes, M. J. (2019). E-Assessment in Portuguese Higher Education: Framework and Perceptions of Teachers and Students. In *E-assessment in Higher Education* (pp. 312–333). IGI Global. https://doi.org/10.4018/978-1-5225-5936-8.ch013

Barana, A., & Marchisio, M. (2016). Ten good reasons to adopt an automated formative assessment model for learning and teaching Mathematics and scientific disciplines. *Second International Conference on Higher Education Advances*, *228*(June), 608–613. https://doi.org/10.1016/j.sbspro.2016.07.093

Bozkurt, A., & Sharma, R. C. (2020). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian Journal of Distance Education*, *15*(1), 2020. https://doi.org/10.5281/zenodo.3778083

Burgess, S., & Sievertsen, H. hendriks. (2020). *Schools, skills, and learning: The impact of COVID-19 on education*. 2020. https://voxeu.org/article/impact-covid-19-education

Chen, Z., Jiao, J., & Hu, K. (2021). Formative assessment as an online instruction intervention: Student engagement, outcomes, and perceptions. *International Journal of Distance Education Technologies*, *19*(1), 50–65. https://doi.org/10.4018/IJDET.20210101.oa1

Clarke, M. (2012). What Matters Most for Student Assessment Systems: A Framework Paper. In *READ/SABER Working Paper Series. ...* (Vol. 1).

Daniels, L. M., Goegan, L. D., & Parker, P. C. (2021). The impact of COVID-19 triggered changes to instruction and assessment on university students' self-reported motivation, engagement and perceptions. *Social Psychology of Education*, *24*(1), 299–318. https://doi.org/10.1007/s11218-021-09612-3

de Villiers, R., Scott-Kennel, J., & Larke, R. (2016). Principles of Effective E-Assessment: A Proposed Framework. *Journal of International Business Education*, *11*, 65–92.

Durcheva, M., & Rozeva, A. (2019). Authentication with TeSLA system instruments supporting eAssessment models in engineering courses. *AIP Conference Proceedings*, *2172*(November). https://doi.org/10.1063/1.5133513

Gamage, K. A. A., de Silva, E. K., & Gunawardhana, N. (2020). Online delivery and assessment during COVID-19: Safeguarding academic integrity. *Education Sciences*, *10*(11), 1–24. https://doi.org/10.3390/educsci10110301

Gaytan, J. (2005). Effective Assessment Techniques for Online Instruction. *Information Technology, Learning, and Performance Journal*, *23*(1), 25–33. http://search.proquest.com/docview/219816513/abstract/77B81AD0A634A49PQ/1%5Cnhttp://media.proquest.com/media/pq/classic/doc/1058985151/fmt/pi/rep/NONE?cit%3Aauth=Gaytan%2C+Jorge&cit%3Atitle=EFFECTIVE+ASSESSMENT+TECHNIQUES+FOR+ONLINE+INSTRUCTION&cit%3Apub=

Guangul, F. M., Suhail, A. H., Khalit, M. I., & Khidhir, B. A. (2020). Challenges of remote assessment in higher education in the context of COVID-19: a case study of Middle East College. *Educational Assessment, Evaluation and Accountability*, *32*(4), 519–535. https://doi.org/10.1007/s11092-020-09340-w

Hamdan, R., Ashour, W., & Daher, W. (2021). The role of the E-learning departments in controlling the quality of electronic assessments in palestinian universities during the COVID-19 pandemic. *Sustainability (Switzerland)*, *13*(21), 1–12. https://doi.org/10.3390/su132112021

Hickson, S., & Agnew, S. (2013). Assigning grades during an earthquake - shaken or stirred? *New Zealand Economic Papers*, *47*(3), 288–303. https://doi.org/10.1080/00779954.2012.715825

Hosseini, M. M., Egodawatte, G., & Ruzgar, N. S. (2020). Online Assessment in a business department during COVID-19: Challenges and practices. *The International Jpurnal of Management Education*, *20*(1), 1–10.

Huba, M. E., & Freed, J. (1999). Learner-Centered Assessment on College Campuses: Shifting the Focus from Teaching to Learning. In *Pearson* (First Edit, Vol. 24, Issue 9). Pearson.

International Labour Organization. (2020). *ILO Monitor: COVID-19 and the world of work. Second edition*. https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/

Jankowski, N. A. (2020a). Assessment during a Crisis: Responding to a Global Pandemic. In *National Institute for Learning Outcomes Assessment* (Issue August).

Jankowski, N. A. (2020b). *Assessment During A Crisis : Responding to a Global Pandemic Assessment* (Issue August).

Joshi, A., Vinay, M., & Bhaskar, P. (2020). Impact of coronavirus pandemic on the Indian education sector: perspectives of teachers on online teaching and assessments. *Interactive Technology and Smart Education*. https://doi.org/10.1108/ITSE-06-2020-0087

Kucina, S., Saeiko, A., Lőssenko, J., & Gil-Jaurena, I. (2014). Time to assess learning outcomes in e-learning (TALOE) – e-assessment practices. *EDEN 2014 ANNUAL Conference - E-Learning at Work and the Workplace - From Education to Employment and Meaningful Work with ICTs*, 74.

Lewis, S. C., King, A. D., & Perkins-Kirkpkpatrick, S. E. (2017). Defining a new normal for extremes in a warming world. *Bulletin of the American Meteorological Society*, *98*(6), 1139–1152. https://doi.org/10.1175/BAMS-D-16-0183.1

Losad, A., Pauli, M., & Atewell, S. (2020). *Assessment rebooted: From 2020's quick fixes to future transformation*.

McCracken, J., Cho, S., Sharif, A., Wilson, B., & Miller, J. (2012). Principled assessment strategy design for online courses and programs. *Electronic Journal of E-Learning*, *10*(1), 107–119.

Means, B., & Neisler, J. (2020). *A National Survey of Undergarduates During the COVID 19 Pandemic*.

Meccawy, Z., Meccawy, M., & Alsobhi, A. (2021). Assessment in 'survival mode': student and faculty perceptions of online assessment practices in HE during Covid-19 pandemic. *International Journal for Educational Integrity*, *17*(1), 1–24. https://doi.org/10.1007/s40979-021-00083-9

Mumtaz, N., Saqulain, G., & Mumtaz, N. (2021). Online academics in Pakistan: COVID-19 and beyond. *Pakistan Journal of Medical Sciences*, *37*(1), 1–5. https://doi.org/10.12669/pjms.37.1.2894

Nassr, R. M., Aborujilah, A., Aldossary, D. A., & Aldossary, A. A. A. (2020). Understanding Education

Difficulty During COVID-19 Lockdown: Reports on Malaysian University Students' Experience. *IEEE Access*, *8*, 186939–186950. https://doi.org/10.1109/access.2020.3029967

Ng, C. K. C. (2020). Evaluation of academic integrity of online open book assessments implemented in an undergraduate medical radiation science course during COVID-19 pandemic. *Journal of Medical Imaging and Radiation Sciences*, *51*(4), 610–616. https://doi.org/10.1016/j.jmir.2020.09.009

Padayachee, P., Wagner-Welsh, S., & Johannes, H. (2018). Online assessment in Moodle: A framework for supporting our students. *South African Journal of Higher Education*, *32*(5), 211–235. https://doi.org/10.20853/32-5-2599

Pauli, M., & Gill, F. (2020). The Future of Assessment: Five principles, five targets for 2025. In *Spring* (Vol. 22, Issue 2). https://doi.org/10.31390/cwbr.22.2.01

Peytcheva-Forsyth, R., & Aleksieva, L. (2021). Forced introduction of e-assessment during COVID-19 pandemic : How did the students feel about that ? (Sofia University case) Forced Introduction of e-Assessment During COVID-19 Pandemic : How Did the Students Feel About That ? (Sofia University Case). *AIP Conference Proceedings 2333*, *050013*(March). https://doi.org/10.1063/5.0041862

Philips, B., Wong, C., & Yeung, A. (2020). *New Digital assessment Framework and Resource gateway*. University of New South Wales Sydney. https://www.education.unsw.edu.au/news-events/news/new-digital-assessment-framework

ProctorEdu. (2023). *What Is Proctoring Software?* https://proctoredu.com/blog/tpost/iljf6ig521-what-is-proctoring-software

Reimers, F. M., & Andreas, S. (2020). A framework to guide an education response to the COVID - 19 Pandemic of 2020. In *Oecd*.

Romeu Fontanillas, T., Romero Carbonell, M., & Guitert Catasús, M. (2016). E-assessment process: giving a voice to online learners. *International Journal of Educational Technology in Higher Education*, *13*(1). https://doi.org/10.1186/s41239-016-0019-9

SAQA. (2001). *Guidelines for integrated Assessment*.

Schiller, S. Z. (2009). Practicing Learner-Centered Teaching: Pedagogical Design and Assessment of a Second Life Project. *Journal of Information Systems Education*, *20*(3), 369–382.

Segers, M., Dochy, F., & Cascallar, E. (2003). *Optimising New Modes of Assessment: In Search of Qualities and Standards*.

Sewell, J., Frith, K., & Colvin, M. (2010). Online assessment strategies: A primer. *Journal of Online Learning and Teaching*, *6*(1), 297.

Talib, R., Bakar, Z. A., Rameli, M. R. M., Ashari, Z. M., Alias, R. A., Zain, R. D. M., & Iahad, N. A. (2020). Conceptions and alternative assessment practice in Malaysian higher education. *Journal of Advanced Research in Dynamical and Control Systems*, *12*(7 Special Issue), 2822–2832. https://doi.org/10.5373/JARDCS/V12SP7/20202423

Taras, M. (2005). Assessment - Summative and formative - Some theoretical reflections. *British Journal of Educational Studies*, *53*(4), 466–478. https://doi.org/10.1111/j.1467-8527.2005.00307.x

Tinoca, L. (2012). Promoting e-assessment quality in higher education: a case study in online professional development. *ICICTE 2012 Proceedings*, 213–223.

Tinoca, L., Oliveira, I., & Pereira, A. (2013). A conceptual framework for e-assessment in Higher Education – authenticity , consistency and practicability. In *Handbook of Research on Transnational Higher Education Management* (Issue January, pp. 652–673). IGI Global. https://doi.org/10.4018/978-1-4666-4458-8.ch033

Trenberth, K. E., Fasullo, J. T., & Shepherd, T. G. (2015). Attribution of climate extreme events. *Nature Climate Change*, *5*(8), 725–730. https://doi.org/10.1038/nclimate2657

Verhoef, A. H., & Coetser, Y. M. (2021a). Academic integrity of university students during emergency remote online assessment: An exploration of student voices. *Transformation in Higher Education*, *6*, 1–12. https://doi.org/10.4102/THE.V6I0.132

Verhoef, A. H., & Coetser, Y. M. (2021b). Academic integrity of university students during emergency remote online assessment: An exploration of student voices. *Transformation in Higher Education*, *6*(a132), 1–12. https://doi.org/10.4102/THE.V6I0.132

Watermark. (2020). *COVID 19 and Your Campus:Impacts on Teaching & Learning and Institutional Effectiveness*.

Weimer, M. (2002). *Student centered teaching: Five key changes to practice*. Jossey- Bass.

Wuisan, P. I., & Wibawa, B. (2019). Using electronic assessment system in higher education: Challenges and solutions for lectures, students and institutions. *International Journal of Recent Technology and Engineering*, *8*(2 Special Issue 9), 673–678. https://doi.org/10.35940/ijrte.B1141.0982S919

Xiao, J. (2021). From Equality to Equity to Justice: Should Online Education Be the New Normal in Education? In *Emerging Pedagogies for Future of Education*. IGI Global.