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ONLINE ASSESSMENT: HOW EFFECTIVELY DO THEY MEASURE STUDENT LEARNING AT THE TERTIARY LEVEL?



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Abstract

Higher education institutions (HEIs) are increasingly adopting online learning procedures to facilitate and hopefully, enhance learning outcomes. However, concerns are arising regarding the reliability of this platform in measuring students' learning outcomes. Unfortunately, these concerns are mainly linked with technological and administrative failures that are likely to occur before or during the assessment process, and not with the actual attainment of the learning objectives. Using literature review as the research method, this paper provides some perspectives on the effectiveness of online assessment in measuring student learning at the tertiary level. Examples from the authors' own teaching experience are also provided to support the premise of the discussion. The research findings indicate that while both formative and summative online assessments are useful in measuring student learning at the tertiary level, there is no consensus on whether online platforms can be used effectively in both types of evaluation, with studies associating these platforms with various strengths and weaknesses. This study concludes that HEIs, having little choice at the current time, should take advantage of online platforms' strengths in measuring certain types of student learning while at the same time, ponder on the questions raised in this study on the need to institute remedial procedures to mitigate these platforms' limitations in measuring other types of learning that are difficult to capture using online assessment.

Keywords: Assessment, higher education institutions, online assessment techniques, formative and summative assessment

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1. Introduction

The primary aim of assessment is to educate and improve student performance not merely audit it.

Grant Wiggins (1998)

Student assessment is an integral part of the learning process in both physical learning and online learning. The advancement in information and communication technology (ICT) in the 21st century has facilitated the adoption of digital devices and technological processes in many sectors in the world, one of which is the education sector where digital devices have been adopted for both formal and non-formal education (Kumar Basak et al., 2018). The reasons for the widespread adoption of digital techniques include the time-saving nature of these techniques, the fact that they are relatively cheap and what is now the e-learning mantra, one can learn 'anywhere anytime'. According to Waller et al. (2019)

Universities are using technology as one of the primary means for initiating and maintaining contact with a diverse student population looking for anywhere, anytime learning" and "ubiquitous anytime, anywhere learning is attractive to adult learners who balance both home and career and to students who must work to afford higher education (p.186).

Hence, many HEIs have identified with and embraced e-learning's benefits incorporating them into their daily learning, teaching and assessment activities (Jalali et al., 2018). Waller et al. (2019) assert that:

technology has the potential to transform the preparation and learning for students, but only if it triggers a substantial and sustained change in the responses of educators to the innovations possible with technology. However, to date, the use of technology has primarily been evolutionary and not revolutionary (pp. 185-186).

In other words, despite all the hype of technology *enhanced* learning (TEL), educational processes have, according to the critics, simply shifted platforms, with all the traditional baggage intact. Lecturers still 'lecture' not realising that they are no long in a lecture hall with students as a captive audience. The shift to TEL would mean that students are freed up in the sense that they could be in Starbucks, on the subway or having their lunch while attending 'class'. What this means for attention to and retention of material being delivered is anyone's guess but as Waller et al. (2019) put it:

Higher education in the past has most often been a passive experience for the learner in which knowledge is presented, hopefully absorbed, and the degree of retention assessed. However, e-learning is more than mere retention; it requires building skills that can be usefully applied. (p. 186)

In the students' future professional area of engagement. It is therefore imperative that in developing their content for, transmitting it and assessing it through online platforms, HE instructors need to acknowledge that:

The world is changing rapidly and with it, the knowledge and skills—even the dispositions and attitudes—that educational systems need to deliver. While previously the focus of education could be predominantly on the inculcation of an existing canon of knowledge, now it must reflect new priorities...Creativity, problem-solving, adaptability, resilience, resourcefulness, even spiritual and moral 'literacies', are found in the curriculum aspirations of countries and organisations across the world where such competencies are seen to be essential for success in future society. (p.187)

How content knowledge and these particular skills related to “creativity, problem-solving, adaptability, resilience, resourcefulness, even spiritual and moral literacies” (Waller et al., 2019, p. 187) are factored into the delivery and assessed over the online platform is therefore of crucial importance in any discussion involving the effectiveness of using online assessments to measure student achievement. This is supported by Timmis et al. (2016) who posit that “although it can be argued that the central purpose of educational assessment should be to support learning, in practice, assessment is often more focused on qualifications and the reporting of achievement”. This is exacerbated by

The growing importance in many countries of so-called 'high-stakes' assessment in recent years as a policy tool to encourage greater competition and accountability between schools and across the education system as a whole, has greatly increased this focus on periodic, summative judgments of student performance in terms of overall grades and percentages. (p. 454).

What this boils down to is that “student assessment conducted solely for accountability reasons does not necessarily lead to learning” (Gaytan, 2007, p. 118). If this is the case, then assessment conducted in such circumstances does not close the teaching learning loop as it ought to be doing, and exists merely to satisfy externally imposed policy regulations. In such a case then, assessment becomes an exercise in futility as it fails in its basic role and responsibility to measure students' learning so students know where they stand and for instructors to know what their strengths and shortcomings are in terms of content and delivery.

The importance of assessment lies in the fact that it is the primary yardstick used to measure and categorise student academic attainment. For tertiary level students, it is also the yardstick that determines students' future professional placement opportunities. In other words, assessment can be considered the springboard for a student's professional trajectory and future success. Since assessment is integral to the teaching learning process as it is the only way to gauge student attainment of learning objectives, "educators must establish the purpose of assessment, the criteria being measured, and the intended outcomes before meaningful assessment methods can be achieved because "the purpose of assessment is to monitor student learning, improve academic programs, and enhance teaching and learning" (Gaytan, 2004, p. 25). This underscores the integral role of assessment in student learning because "assessment sits at the heart of the learning process, as it provides observable evidence of learning, determines student progress and demonstrates understanding of the curriculum" (Oldfield et al., 2012, p. 3).

2. Purpose of the Study

Having established the importance of assessment in student learning and achievement, this study was conducted to determine the downside, if any, of using online assessments to measure student learning at the tertiary level. The authors, who are both instructors in tertiary institutions with a combined experience of over 60 years in teaching at both undergraduate and postgraduate levels, are extremely concerned about the quality of learning and assessment using online platforms. While both recognise and appreciate the value of technological applications in facilitating the educational process, they wonder if shifting the entire process over to the arms of technology can assure the same levels of quality especially for assessment purposes.

3. Research Question

Only one question was deemed necessary to guide the direction of the study;

What are some areas of concern regarding online assessment in measuring student learning at the tertiary level?

4. Research Methodology

This study explores the effectiveness of online assessment techniques in measuring students' success at the tertiary level. The methodology used involved a literature review of related studies done in this area. According to Synder (2019):

literature reviews are useful when the aim is to provide an overview of a certain issue or research problem. Typically, this type of literature review is conducted to evaluate the state of knowledge on a particular topic. It can be used, for example, to create research agendas, identify gaps in research, or simply discuss a particular matter. (p. 334)

Since the aim of this study is to “discuss a particular matter”, this research method was considered ideal to obtain the necessary material to fulfil the needs of this study. Chalhoub-Deville and Deville (2008), too, argued that qualitative approaches are employed to achieve deeper insights into issues related to designing, administering, and interpreting ... assessment (cited in Rahman, 2017, p. 104)

Only credible sources for materials such sciencedirect.com, researchgate.com, jarp.org, Yale Poorvu Centre for Learning and Teaching and Chronicle of Higher Education were utilised to glean the relevant information to answer the research question. Apart from key phrases such as “online assessments at tertiary level”, “effectiveness of online assessments” and “pros and cons of online assessments at tertiary level”, the inclusion criteria also included works that extended beyond the usual five-year currency stipulation as online learning emerged as an educational force in its right almost 20 years ago and a considerable amount of significant research on this area was done from that time. To exclude such valuable material due to issues of currency would have constituted a significant loss in terms of evidence that could support this study.

5. Findings and Discussion

5.1. Techniques used in online assessment

Similar to traditional assessments, formative and summative assessments are the main two assessment techniques used in online evaluation (Patronis, 2017). The Yale Poorvu Centre for Learning and Teaching provides a succinct elaboration of both assessment technique.

Formative assessment refers to tools that identify misconceptions, struggles, and learning gaps along the way and assess how to close those gaps. It includes effective tools for helping to shape learning, and can even bolster students’ abilities to take ownership of their learning when they understand that the goal is to improve learning, not apply final marks” (Trumbull & Lash, 2013, as cited in Yale Poorvu Centre for Learning and Teaching, 2020, para. 1).

Such assessments may comprise informal formative assessment such as asking questions to check students’ understanding during a class, short written answers to questions or short quizzes after covering a topic or subtopics as self or peer assessment which may not

be graded. Formal formative assessments may be conducted through graded quizzes, tests, and presentations and so on. “In short, formative assessment occurs throughout a class or course, and seeks to improve student achievement of learning objectives through approaches that can support specific student needs” (Theal & Franklin, 2010, p. 151, as cited in Yale Poorvu Centre for Learning and Teaching, para. 1).

At the tertiary level, formative assessment provides instructors and students with frequent and timely feedback on the level of mastery of the learning objectives and the course material. The results obtained can then be used to measure the achievement levels of the learners as the course progresses (Spector, 2016). These also allow the instructors to identify students’ attainment of content, formulate remedial strategies to assist students who are unable to master the material and, in certain cases, permit students who are falling behind more time to catch up before conducting the next assessment. In certain cases, where possible, alternative assessments retaining the same level of difficulty of the original assessment may also be offered as a way of satisfying different learning styles. These formative assessments are, by default, low stake assessments since they are spread out over the duration of the course. Some courses may have several 3% - 5% quizzes while others may have three short presentations varying from 5% – 15% each of the total percentage, a mid-term of 10-15% and so on. In tertiary education, formative assessment is the primary form of assessment as the assessment for most courses are configured to give more emphasis to formative assessment. Many courses are configured at a 60-40% or even 70-30% weightage with the greater percentage apportioned to formative assessments.

On the other hand, “summative assessments evaluate student learning, knowledge, proficiency, or success at the conclusion of an instructional period, like a unit, course, or program. Summative assessments are almost always formally graded and often heavily weighted (though they do not need to be). Summative assessment can be used to great effect in conjunction and alignment with formative assessment, and instructors can consider a variety of ways to combine these approaches” (Yale Poorvu Centre for Learning and Teaching, 2020, para. 2)

Summative assessment, thus provides instructors with evidence of students’ mastery of the learning objectives at the end of a course of study, as with a comprehensive final examination, final project or portfolio to be submitted at the end of course. Obviously, due to its comprehensive nature, summative assessments are high stake compared to formative assessments and because of this, formative assessment is a preferred mode of assessment as it is broken up into smaller more manageable ‘bite-sized pieces’ that are easier for both students and instructors to cope with, in terms of studying for and doing the tasks for the students as

well as evaluating the tasks for the instructors. Additionally, formative assessments can be considered more learner friendly as these are deemed assessment for learning (AFL) focusing on appraising students of their mastery of content and areas for improvement. Summative assessments are not conducted with learners' improvement in mind as summative assessments are assessments of learning which are conducted for purposes of categorisation according to institutional, national, regional or even international standards like the SATS, TOEFL and IELTS. While these are important for a number of reasons, they have no feedback responsibility factored into them and such assessments may be created by people who have no relationship with the test takers like national high school or matriculation exams which are set by ministry-appointed examination panels. As such, formative assessments can be said to be learner-centric while summative assessments because of the "heavy emphasis and priority afforded to high stakes summative assessment, are often described as outdated, ineffective and at worst damaging" (Oldfield et al., 2012, p. 1).

The following part of the discussion is based on the premise of assessment as tool for learning (AFL) rather than assessment of learning.

5.2. Ethical Dimensions of Using AI in Healthcare

The overwhelming implementation of ICT in tertiary educational processes has raised several concerns about the effectiveness of these assessment techniques being administered online to measure student learning at the tertiary level. The authors' concerns were triggered regarding the efficacy of assessments being administered in measuring student learning especially for certain learning outcomes that cannot be replicated in and thereby assessed effectively on an online platform. A stark example of learning outcomes that are very difficult, nigh impossible to measure using online assessment are those associated with public speaking and drama / theatre courses. The very nature of such courses requires that the principal learning outcomes for this course are designed for and evaluated with the 'public' in mind. As such, assessing these learning outcomes devoid of the 'public' negates the learning outcomes and thence, the mastery of these particular skills by the students. In public speaking, for instance, components of eye contact and body language are vital aspects of the speeches being evaluated. One of the authors who teaches public speaking has found that it is impossible to assess these aspects online as there is no audience for the speaker to make eye contact with as the speech is recorded by speaker delivering the speech to a camera at home or in their room and posting on the online platform for evaluation. Mastery of this skill requires the speaker to be able to establish eye contact with the everyone in the audience seated in front, the back, the right and the left of the venue while delivering the speech. On top of that, unlike in the traditional setting

where the speaker can move about freely while speaking, body language is stilted and severely limited as the speaker is unable to move away from the camera. Hence, body language is limited to gestures which can be captured by the limitations of the camera angles. In addition, there is no way to evaluate speaker's response to audience feedback, which is another peripheral learning outcome for this course. This raises the question of whether online assessment is an effective tool in measuring particular learning outcomes. Another example also related to Public Speaking as well as Drama/Theatre courses is when the interaction and dynamics of a group presentation, another assessable component for this course, is lost in an online platform. The intangible chemistry and buzz among the group members in the traditional assessment format just cannot be captured in an online format. Certain creative attention grabbers for a group presentation like a sketch performed by the group in the traditional format cannot be done in the online platform as everyone has recorded their part separately, due the lockdown or distance. For group discussions, many instructors will agree that students' behaviour interacting online is very different from that when interacting face-to-face; there is 'something' missing; the buzz of camaraderie, of joking and laughter, gentle teasing of group mates for certain suggestions given all done in good fun, putting their heads together to come up with a visual - how can these be replicated on the online format? Some stakeholders who are only concerned about what can be measured may dismiss these intangibles as technically unnecessary as measurable learning outcomes but aren't these vital social skills for these students who will one day go on to interact with work mates in projects and for human interaction in general. As succinctly put by Warner (2016):

One thing I've learned both as a student and a teacher of writing, is that when it comes to learning, much of it is invisible and reveals itself only with hindsight. It seems possible to me that we don't know how to "measure" learning because the most meaningful parts of learning aren't measurable. (para. 17)

This is supported by a drama instructor who misses the 'thrills and spills' of a live final production for her course, Drama for the Teaching of English for a Teaching English as a Second Language programme., the lockdown has necessitated the conversion of the live final production before an actual audience into a radio drama, which obviously is well-suited for an online format as per the advice of Gaytan (2007) and others. But in the traditional live production, important peripheral learning outcomes related to preparation of props and costumes on a shoestring budget, staging and stage management, arranging for and completing the paperwork to obtain the venue to stage the production, publicising the production, handling ticket sales and so on are factored into the assessment for the final live production. Hence, vital soft skills like financial and time management, problem-solving, and entrepreneurship skills

are invariably lost as part of the learning outcomes for this course. Indeed, if and often when things go wrong in a live production such as when the music cue or lighting is off, how the cast responds reflects their skills of improvisation, the ability to think on their feet and come up with an instantaneous solution to ‘cover up’ the missed cues will serve them well in their professional life. Can all these be evaluated in an online assessment?

Pellegrino (2014) asserts that “assessments must reflect the needs of the society in which students as graduates will be operating in”. He elaborates that:

contemporary students must be able to evaluate the validity and relevance of disparate pieces of information and draw conclusions from them. They need to use what they know to make conjectures and seek evidence to test them, come up with new ideas, and contribute productively to their networks, whether on the job or in their communities. As the world grows increasingly complex and interconnected, people need to be able to recognize patterns, make comparisons, resolve contradictions, and understand causes and effects. *They need to learn to be comfortable with ambiguity and recognize that perspective shapes information and the meanings we draw from it.* At the most general level, *the emphasis in our educational systems needs to be on helping individuals make sense out of the world and how to operate effectively within it.* [italics writer’s own] (p. 3).

The co-author of this paper is a professor of mathematics and he too, has his concerns regarding online assessment of mathematics learning. If an expected outcome for math learning assessment is based on a dichotomous outcome of correct or incorrect response, then online assessment is acceptable which is usually elucidated at school mathematics at the elementary level. However, math courses at tertiary level, which are usually at an abstract level, require a mastery and display of conceptual content, how solutions are drawn and the interaction of learner-instructor that impact the learning outcomes (Karal et al., 2015). How do we assess these learning outcomes through online assessment? Proponents of online learning have suggested that instructors need to tweak or change their traditional paper and pencil test assessment to suit the online environment as it facilitates cheating (Gaytan, 2007; Sutherland & Dullaghan, 2020). However, one question connected to online assessment has not been fully and satisfactorily addressed by proponents – can we ascertain who is actually sitting behind the screen and how they are taking this online assessment? Open book maths exams have been proposed as an option and, at the current time, many instructors are using this as an assessment tool. However, a few areas of concerns arise in using open book assessment for mathematics learning. Firstly, assessment of mathematics as a subject comprises two levels of mastery namely, mastery of skills and conceptual abstraction

development. Thus, with online assessment, mastery computation type questions will be an exercise in futility as students can simply refer to Mr Google, unlawful websites, or even hire third parties to complete these assessment tasks which is obviously an act of academic dishonesty (Jervis & Brown, 2020; Sutherland & Dullaghan, 2019). Secondly, to set open book assessments for mathematics requires a certain expertise and competence from the instructor's perspective. In order to reduce academic dishonesty during exams, maths instructors need to set higher order thinking (HOTS) questions requiring in-depth understanding comprising analysis, evaluation and synthesis. If this is possible, it might mitigate opportunities for cheating. However, the downside of this is that with high expectations of learning outcomes reflected in more difficult exam questions, students who lack mastery of the content may resort to cheating as in the case of 125 Harvard undergraduates who were charged with academic dishonesty after collaborating on a final exam (Carmichael, 2012). To top it all, mathematics is the least favourite subject amongst students (Biswas, 2015; Intan Zulaika, 2016; Singh et al., 2016) both in schools and college, as proven by the sky rocketing failure rates, reduced number of students opting for it, increase in the dropout rate, as well as in students' unhappiness and the fact that students are not graduating on time because of their resentment towards the subject. With the current dismal attitude of students towards mathematics learning which has not changed over the decades, will online assessment really enhance students' learning of mathematics, beyond reasons of convenience?

An even more important consideration is that setting HOTS questions requires a similar HOTS in the instructors. Sadly, not all instructors are created equal in this aspect. This is obviously not their fault per se, as HOTS is the direct result of the education and training received by the instructors themselves. Have they been educated to operate along HOTS and received adequate training to set these types of questions which stimulate HOTS in their students? If the educational emphasis for mathematics learning is largely still based on rote learning and exam orientated teaching (Singh et al., 2016), such aspirations to assess HOTS in students will fall far short of espoused aspirations (Li & Schoenfeld, 2019). The tendency of learners to produce lower order cognitive answers in exams negates the expectations of open book exams; thus, the assessment will not depict a valid inference of students' learning. If the content that has been taught allows for only superficial understanding meaning that a breadth rather than depth approach was taken, then question types in the exam cannot be changed because by using open book as students simply would not have been sufficiently prepared, rendering the exam invalid.

Although, Gaytan (2007) asserts that "online assessment requires educators to modify their methods of instruction and it may require the most significant effort for innovation and

departure from traditional instruction because it changes human interaction, communication, learning, and assessment methods” (p. 119), it cannot be denied that unless some marvellous technological innovation is created to allow for effective assessment for learning outcomes like eye contact and responding to audience feedback during a speech without an actual audience, there are some learning objectives that just cannot be evaluated effectively online. Tweaking assessments, like changing a live production to a radio drama, to ensure that they fit into the online platform at the cost of particular learning outcomes may be unavoidable in current circumstances but whether it is fair to the students is open to debate. Similarly, changing to an open book format for a maths exam is highly questionable when the content taught is not reflective of the content to be assessed.

Another concern that emerges about transferring *all* assessment online is that, surely not all professional procedures are going to remain online forever. Right now, it is understood that there is no choice because of the lockdowns caused by the pandemic. However, there will come a time when face-to-face interactions, especially the top-priority ones, will resume. Will our students who have been evaluated through online assessments possess all the necessary competencies in terms of soft skills and intangible knowledge needed to operate effectively in real life situations? Tertiary level students will graduate and go on become doctors, surgeons, scientists and engineers. Can online assessment of all requisite skills ensure the stakeholders that these graduates are ‘fit’ to deal with real life situations? Can clinical practice done solely on dummies or virtually qualify a surgeon to operate on a real human being? What about a civil engineer’s field practice? Would they be able to differentiate virtual cement mix from the real stuff? It is frightening to contemplate students evaluated in virtual assessments going on to build bridges and flyovers. This would be similar to passing an online driving test and then awarded a licence to drive on an actual road.

6. Conclusion

The concerns raised above are valid because they have profound implications for tertiary level students’ competencies and their future professional success. As such, there is a need to address such concerns for the satisfaction of all the stakeholders. These concerns include such issues as whether assessments are capturing particular learning outcomes in online environments and understanding how the evaluation techniques for such learning outcomes can work effectively within the online environment. For instance, how does one evaluate eye contact in a public speaking assessment online, when there is literally no ‘public’ for the speaker to make eye contact with? How would one evaluate group dynamics during a group presentation when the presenters are in separate locations? Gaytan (2007) advises that

“online assessment requires educators to modify their methods of instruction” (p. 119) but how does one modify instruction and assessment for eye contact or group dynamics or any of the other learning outcomes that cannot be modified to suit the call for “departure from traditional instruction” in such cases?

Online assessment is not without its advantages. Learning outcomes that can be evaluated through written assignments and multiple-choice questions do very well on online platforms. But as the saying goes, man does not live on bread alone. Acing written assignments and multiple-choice questions do not ensure employability which are a conglomerate of both the tangible and intangible. Hence, despite its numerous advantages that make online assessment useful, it remains a topic of discussion due to the concerns about its effectiveness and efficiency in measuring particular learning outcomes. The speed at which universities have embraced this assessment platform ostensibly to cater for the massification and democratisation, and the insidious commodification of higher education, is both worrying and depressing to some stakeholders who care for the wholesomeness of the graduates emerging from the fully online educational experience.

Waller et al. (2019) got it right when they claimed that “technology should not be an end for global higher education; it should be the means to achieve the end” (pp. 185-186).

This means that:

Some fundamental questions about how schools and universities capture and evaluate their students' learning and progress, with or without the use of digital technologies should be asked” because “changes to assessment are risky, because reassessing its fundamental properties and principles also calls into question deeper aspects of education. (Olfield et al., 2012, p. 35)

In order to “question deeper aspects of education” Gee and Shaffer (2010) recommend taking a good long look at “three fundamental properties of assessment” which are “what is assessed, how the assessment takes place and the purpose of the assessment in the first place” (cited in Olfield et al., 2012, p. 35). The purpose of assessment should outweigh all other considerations because it “is more than mere retention; it requires building skills that can be usefully applied” (Waller et al., 2019, p. 186).

The last word on this issue is from Pellegrino (2014) who rightly asserts that it time for institutions and instructors to realise that “it is also important that assessments do more than document what students are capable of and what they know’ because their success depends not just on technical expertise but also the fact that “they need to learn to be comfortable with ambiguity and recognize that perspective shapes information and the meanings we draw from it” (p. 3).

The philosophy and policy guiding our assessments owe it to the students that their learning needs are adequately and comprehensively taken care of, and that *all* learning outcomes are effectively measured, be it on a traditional or online format. “At the most general level, the emphasis in our educational systems needs to be on helping individuals make sense out of the world and how to operate effectively within it” (Pellegrino, 2014, p. 3).

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