Online formative assessment in higher education: Its pros and cons

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Abstract: Online and blended learning have become common educational strategy in higher education. Lecturers have to re-theorise certain basic concerns of teaching, learning and assessment in non-traditional environments. These concerns include perceptions such as cogency and trustworthiness of assessment in online environments in relation to serving the intended purposes, as well as understanding how formative assessment operates within online learning environment. Of importance also is the issue of how formative assessment benefits both the student learning and teaching within pedagogical strategies in an online context. This paper's concern is how online formative assessment provides teaching and learning as well as how lecturers and students benefit from it. A mixed method questionnaire on formative assessment with a main focus on how formative assessment within online contexts operates was used to collect data from courses using Blackboard. Lecturers and students at a comprehensive university were the population. Various techniques for formative assessment linked with online tools such as discussion forums and objective tests were used. The benefits that were famous comprise improvement of student commitment, faster feedback, enhanced flexibility around time and place of taking the assessment task and importance in the procedure for students and lecturers also benefited with less marking time and saved on administrative costs. The crucial findings are that effective online formative assessment can nurture a student and assessment centred focus through formative feedback and enrich student commitment with valued learning experiences. Ongoing trustworthy assessment tasks and interactive formative feedback were identified as significant features that will deal with intimidations to rationality and trustworthiness within the milieu of online formative assessment.

Keywords: online formative assessment, formative feedback, student engagement, learning

1. Introduction

Assessment for learning (formative assessment) has been noticeable intonation in assessment circles rather than assessment of learning (summative assessment) but the main focus has shifted; the use of online and blended learning has developed drastically in the 21st century higher education learning and teaching environment. Larreamendy-Joerns and Leinhardt (2006, 572) literature review "observed two complementary movements in the educational landscape: the merging of online teaching and learning into the stream of everyday practices at universities, and the increasingly salient role of distance programmes in institutions of higher education". In an online setting, the non-existence of physical space and face-to-face interaction between lecturers and students leads to diverse techniques of assessing learning in a class.

Assessment is important because it has a strong impact on learning. Assessment is at the core of formal higher education (Angus & Watson 2009). Bransford, et al. (2000) concurs with that assertion as they also mention that assessment is a crucial element for effective learning. How the lecturer approaches assessment impacts on how students identify the class, the content to study, and their own work (Brookhart 1997). Teaching and learning methods must be assessment-centred to offer learners opportunities to prove their emerging abilities and receive backing to enrich their learning. What students understand as imperative is often influenced by assessment (Lemanski 2011; Russell & Barefoot 2011), and a lot of students are not eager to waste time on work that they feel will not contribute directly to their academic progress (Rust 2002) i.e. work which as far as they are concerned is irrelevant. The term 'backwash' refers to the influence assessment has on student learning (Biggs & Tang 2011); which means that assessment, and not the curriculum defines how and what students learn. It is clear now that the choice of assessment is critical, and properly aligning the assessment to the learning outcomes can produce a constructive learning practice (Biggs & Tang 2011), although the student is learning for the assessment. Furthermost notably, assessment practices affect students by leading their consideration to certain aspects of module material and by stipulating how to process information. Students focus their determinations towards any material or cognitive abilities they believe will be assessed (Bull & McKenna 2004). Therefore assessment influences what material students spend time learning, as well as the type of learning taking place. Various forms of assessment inspire different categories of learning. They might include formative and summative assessment. For this paper, we will concentrate only formative assessment.

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Bloom (1969, 48), states that the purpose of formative evaluation is "… to provide feedback and correctives at each stage in the teaching-learning process" The distinguishing characteristic is "when the (results are) actually used to adapt the teaching to meet student needs" (Black & Wiliam 1998a, 140). Formative assessment plays a critical role in learning environments, specifically embedded formative assessment. It is very important to recognise the value of embedded formative assessment and its role in increasing student learning is essential in not only meeting the intended outcomes of the course, but also in closing the feedback loop in quality online courses. Instruction and assessment are an integral part of each other; thus, assessment should be viewed as a process which lecturers must use throughout the course, not just as an afterthought or for summative purposes at the end. With accountability in mind and the explosion of online learning environments the need for best assessment practices in online learning environments surges.

Formative assessment is usually used in the classroom as a basis of continuing feedback aiming to advance teaching and learning (Hargreaves 2008). It can also be named assessment for learning that takes place during the development of teaching with the purpose to support learning (Vonderwell et al. 2007). Formative assessment activities are entrenched within guidelines to monitor learning and assess learners' comprehension so that teaching can be modified and further learning is informed through continuing and timely feedback until the anticipated level of understanding has been accomplished. Formative assessments are practical i.e. they improve expertise and concentrate in scheduling, minimise student nervousness, afford students an additional sense of possession as they develop, and, eventually, endorse the conception of the module contents (Smith 1997; Stiggins & Chappuis, 2005; Stiggins & DuFour 2009; Wlodkowski 2008). Unlike summative assessment, formative assessment (a) has a drive more closely tied to lecturers' teaching outcomes; and (b) presents a potential for refining student learning that is more instantaneously obvious, as well as instructionally appropriate (Knowles 1984). The benefits of formative assessment have been well recognised and research has shown that formative assessment practices are supplementary with enhanced academic achievement (Hargreaves 2005; Hodgen & Marshall 2005; Wiliam et al. 2004).

Formative assessment is defined "as the iterative processes of establishing what, how much and how well students are learning in relation to the learning goals and expected outcomes in order to inform tailored formative feedback and support further learning, a pedagogical strategy that is more productive when role is shared among the teacher, peers and the individual learner" (Gikandi et al. 2011, 2337). The merging of formative assessment with technological perceptions conveys the idea of online formative assessment in unfolding this merging. Pachler et al. (2010, 716) used the term formative e-assessment which they defined as "the use of ICT to support the iterative process of gathering and analysing information about student learning by teachers as well as learners and of evaluating it in relation to prior achievement and attainment of intended, as well as unintended learning outcomes". The Pachler et al' s definition incorporates how formative assessment is applied in all e-learning milieus inclusive of the complementary part of ICT in f2f settings as well as in blended and online learning surroundings. In the same tone, Gikandi et al. (2011), define online formative assessment as the presentation of formative assessment within learning online and blended situations where the lecturer and learners are detached by time and/or space and where a considerable amount of learning/teaching events are led through web-based ICT.

Several researchers (Chung, et al., 2006; Van der Pol, et al., 2008; Vonderwell, et al., 2007; Wolsey, 2008) have revealed the pedagogical prospective of online formative assessment. Nevertheless, it is also of utmost importance further make sure that the learning setting offers the learners enough chances to not only learn actively but prospects to take part in learning which replicates their real-world professional settings. As confirmed by a number of researchers within the environment of online professional learning (Correia & Davis, 2008; Mackey, 2010; Sorensen & Takle, 2005), the characteristics of learning in a community of learners and engagement in dialogue which reveals how knowledge will be applied in real-world practices are therefore crucial in facilitating these developments to support significant learning. The ultimate goal is to support learning that is transferable to changing environments that illustrate 21st century professional essentials. Effective amalgamation of formative assessment in online learning environments has the prospective to offer a suitable organisation for continuous significant collaborations among students and the lecturer, and nurture development of effective learning communities to enable evocative learning and its assessment (Sorensen & Takle 2005). Furthermore, this can deliver a systematic arrangement for effective student support through ongoing observation of learning and provision of suitable formative feedback. Continuing provision for scaffolding learning is crucial in online learning, and can basically be facilitated through continual collaborative cooperation between the lecturer and students (Ludwig-Hardman & Dunclap 2003). This is because it supports

students to engage productively, and assists them in the development of self-regulated learning dispositions. This in turn supports them to take primary responsibility for their learning which is an important requirement for success in online learning. Effective presentation of formative assessment in online learning environments might provide a state-of-the-art pedagogical approach to simplify such prospects (Gikandi et al. 2011). "Formative assessment does not benefit all students if they do not fulfil their responsibility to learn" (Smith 2007, 32). What worked in the past in face-to-face settings does not necessarily work in online environments (Goldstein & Behuniak 2012). The pedagogical theory is the same, however the implementation varies. As Vonderwell, Liang, and Alderman (2007) pointed out, assessment (whether formative or summative) in online learning frameworks incorporates diverse features as related to f2f environments mostly due to the asynchronous environment of interactivity among the online contributors (the lecturer and students). Consequently, it lecturers need to reconsider online pedagogy so that they attain effective formative assessment strategies which provide evocative deep learning and its assessment. Assessment should not merely be vital part of scheming and planning of the modules, but assessment has to start also even before the teaching commences or at the very latest within the first few weeks of class. Students need to be able to exhibit their capability to attempt tasks in an online environment, before learning the content that will be assessed later. As such, formative assessment needs to be done early in an online or blended course to make sure that technological obstacles are not preventing students from succeeding in this environment.

Kigandi (2010) identified ten design principles grounded on a critical analysis of literature in online formative assessment and reliable learning viewpoints.

- The assessment activities need to be authentic by being relevant and meaningful to the learner real life situations and experiences, and seamlessly embedded in the teaching and learning processes. The tasks must be relevant to real life examples and be part of teaching and learning
- Assessment activities need to engage and support learners in individual construction of knowledge and meaning making them feel free and confident to use their previous knowledge and experience
- Assessment activities need to provide learners with opportunities to construct knowledge. Students should be allowed to share information with their peers online like in discussion forums
- The assessment activities need to be accompanied with opportunities to provide formatively useful, ongoing and timely feedback. Elaborated, timely feedback not based on marks should be provided to students by both the lecturers and peers.
- The assessment activities need to be accompanied by analytical and transparent rubrics that assist the learner to clearly understand the expected level of achievements. Such rubrics enhance student preparation for the submission of tasks and builds confidence in students to know that marking will be transparent
- The assessment activities need to create opportunities that engage learners in meaningful reflection. Students must be allowed to reflect on their own understanding, i.e. self-assessment to motivate them towards achieving set outcomes.
- There is need to provide opportunities for ongoing documentation and monitoring of learner achievements and progress over time. This will nurture students to be self -sufficient and the lecturer will also reflect on students' progress.
- Teachers need to be more explicit in stimulating shared purpose and meaning of learning and assessment activities. There should be evidence of alignment of teaching outcomes and assessment criteria.
- The assessment activities need to involve learners in multiple roles. Students should be part of planning assessment like choosing which rubric or what design of the rubric should be used to assess their tasks.
- The assessment activities need to be flexible and provide room for multiple approaches and solutions. Opportunities must be provided for students to reflect by looking at the rear mirror of their understanding of the topic as well as how they have developed to be independent thinkers.

These principles were very useful is the design of the assessment tasks used by lecturers in this paper.

Wilson et al. (2011) also found that use of computer-administered multiple-choice questions as formative assessment had an encouraging influence on student enactment. Marriott and Lau (2008) used e-assessments, and established that they are useful in the development of student engagement and motivation for learning.

Results revealed that e-assessments had a vital role in the teaching and learning practice (Marriott & Lau 2008). There is an ongoing argument as to whether e-assessment, particularly in the commonly used form of multiple-choice questions, can benefit deep learning (Jordan 2009), however research has established that well-designed assessments, including multiple choice questions, let assessment of higher cognitive functions, such as critical thinking and analysis skills (Brady 2005; Leung, et al. 2008; Draper 2009). It has been brought to light that students learning for a multiple-choice assessment concentrate on understanding and comprehension, whereas when preparing for a long-answer-type assessment they concentrate on recollection of facts to replicate in their answers (Leung, et al. 2008). Multiple-choice and continuous-assessment approaches were noted to be the favoured techniques of assessment by students (Furnham et al. 2011), therefore it is anticipated that they will inspire engagement, and escalate motivation and learning (Trotter 2006). Dermo (2011) found that student engagement with formative assessment, particularly the feedback, was a challenge and proposed that students can be engaged with low-stakes grades with formative tasks.

In addition, the delivery method in online learning environments allows for opportunities in student learning that are unique to this type of learning environment. Technology plays a positive roll on student learning (Bakerson & Rodriquez- Campos 2006), and provides an opportunity for closing the feedback loop. If done correctly, online learning environments can "provide student and lecturer with richer, more immediate feedback" (Bajzeket al. 2008, 1) which, in turn, will increase productivity and learning. Assessment in this type of environment benefits students and instructors (Dewald, et al. 2000). At all levels of education from pre all the way to higher education, accountability has a firm grip that is not going to loosen anytime soon.

Reliability and validity issues surmount in online assessments, however interactive, formative embedded feedback address these threats of reliability and validity. For All aspects of embedded formative assessment, technology can be used for implementing and fostering enhanced student engagement through learning experiences. The following discussion is the procedure followed in investigating how and if formative assessment in an online course improves learning.

2. Methodology

The lecturers and students using Blackboard, a VLE platform in a comprehensive university in Eastern Cape comprised the population. The sample included 2 modules, one form Faculty of Education and the other from the Faculty of Science, Engineering and Technology made up of two lecturers and 220 first year undergraduate students in 2013 term 2.

In both modules, online discussion forums and multiple choice tests were introduced in Blackboard as modes of formative assessment. Two processes were followed firstly; topics were posted in the discussion forum for interaction after class activity based on that particular learning outcome. Only participation in the discussion forum had grading not the content. An assignment then followed for individual/group submission and grading. Secondly, a pool of objective questions (multiple-choice, true/false) was uploaded online. Students were allowed two (2) attempts to answer after getting feedback online. They also had time to revisit their reading material before making next attempt based on the scaffolding their received from the automated online feedback. The test items were randomised to avoid memorising answers. Feedback was immediate after submission but only included submitted answer and feedback, no correct answers in the first attempt, and then the correct answer would be shown in the second and final attempt. These tasks were not graded. A summative test would follow a week later based on the same learning outcome. Then at the end of the semester, students and staff surveys were conducted on how both the lecturers and students felt about the process with questionnaires that were given to students and staff after the summative assessment. An interview was also held with a few students to confirm or expatiate on some responses from the questionnaire.

3. Results

Responses from students on the use of discussion forums were mainly positive although there were some challenges identified. Mostly students praise online discussion forums as informative and guiding in concepts dealt with in class. By the time they have to write the summative assignment, such discussion forums have moulded their thinking to be more focused and intended outcome oriented.

Examples of such positive comments are:

"I have certainly learned a lot through this discussion not just from my own work but also from the other students"

"It requires us to think out of the box"

"It contributed to the communication between fellow – students"

"It encouraged me to read more"

"It kept me focussed and curious"

"It made me understand concepts much easier"

"A relaxed atmosphere to ask my peers"

"Could respond anytime, anywhere"

"Guidance from the lecturers kept me on track"

"Comments from peers helped a lot towards preparing my assignment"

Negative comments included:-

"Challenge to access internet"

"I had to filter good facts from bad ones when compiling my assignment"

"Some peers said negative things in their responses"

On the use of formative objective tests, the table below shows the students' responses in % using Likert scale ranging from strongly agree (SA), Agree (A), Not Sure (NS), and Disagree (DA) to Strongly Disagree (SDA).

Table 1: Students' responses on formative tests

Items	SA	A	NS	DA	SDA
Online tests are more accessible than paper-based exams.	70	30			
Marking is more accurate, because computers don't suffer from human error.	80	20			
The technology used in online assessments is reliable.	55	25	20		
Online assessments favour some students more than others					100
Randomised questions from a bank means that sometimes you get easier questions			55	20	25
Feedback given was fast	100				
Feedback was easy to understand	60	40			
Feedback scaffold my learning	22	70	8		
Multi attempts were helpful	68	32			
Improved my engagement with learning	70	20	5	5	
Took serious preparation for test 1st attempt than 2nd one	20	60		20	
Online assessment can do things paper-based exams can't	50	10	40		
Online assessment can add value to my learning	20	70		10	
Online assessment is just a gimmick that does not really benefit learning			10	40	50
Online assessment goes hand-in-hand with e-learning (e.g., using Blackboard	20	60	10	10	

There was larger inclination for online (83%) assessments, with only a few students declaring a preference for traditional assessments. Students, who favoured traditional methods of assessment, also indicated that "*the online assessments are valuable to strengthen knowledge. Nonetheless if the computer crushes or if your*

internet disconnects, that can be very painful. For this reason I favour traditional assignments". The most frequent reasons students gave for the preference of each type of assessment are given in Table2

Table 2: Reasons given as to student assessment preference.

Traditional Assessment	**Online Assessment**
Used to these types of assessments	Less stressed/less stressful
Might forget to do the online assessment	Less pressure/more relaxed
Easier	Convenience
Prefer preparing for larger assignments	Can do it at home
Less affected by computer problems	Can get feedback quickly time
	Can organise the time to complete it/do it in own
	Easy to access and submit
	Easier to focus

Responses from the lecturers were:-

All the lecturers were positive about the advantages in terms of less marking time (65%) the reduced marking load (88.3%). Their perception was that online assessment is better than pencil and paper assessment. These must be the innovators, early adopters which are the first group of people who accept an innovation and are able to work within the technological arena.

The academic staff perceived other advantages they observed in e-assessment, for example what e-assessment has changed or improved in students' learning, responding to the question whether e-assessment helps students to learn better. Group work in assessment tasks seems to have been made easier and they also retain more knowledge, which shows that e-assessment is more learner-centred and there is more practice, especially if it used formatively.

Table 1: How has e-assessment affected your marking load?

Item	**Yes**	**No**
It has reduced it dramatically	68.3	31.7
Marking essays is quite challenging because you have to download	75	25
Easy to mark objective tests	93	07
Time is reduced	65	35

As for compatibility the results suggest that e-assessment accommodates the needs of academic staff and they feel comfortable in using the innovation.

4. Discussion

Formative assessment was used as a central part of teaching as the students were given two attempts on their objective tests. Implementing this system of formative assessment during the semester provides students the prospect to: study before each of the first attempts on the tasks; complete the task, view the results and feedback, and make use the feedback to study further before attempting again; retake each question; and use the results as final preparations for the summative test. In addition, because all items on the summative final test are drawn from the formative quizzes, the prospect for students to master the content is considerably high. It has been proven that utilising the same content from the quizzes as 'feeder items' for the summative test, is exceptionally valuable.

From the comments and results above, like *"Comments from peers helped a lot towards preparing my assignment",* it shows that students appreciated and enjoyed online formative assessment. The majority of them are very positive about the process as it has nurtured them to better understanding and more learning. Students' success rate can be affected by a lot of factors even when using formative assessment. These might include opportunity to (a) realisation of gaps in content; and (b) revisiting certain topics that had been covered

but unclear. This then serves as a important factor influencing students' definitive achievement. As stressed by Smith (2007, 32), "formative assessment does not benefit all students if they do not fulfil their responsibility to learn". For instance, if students are given a specific number of attempts, and the lecturer uses the average scores rather than substituting taking the highest mark, students are encouraged to study before each attempt.

As much as some academics have a feeling that giving students second attempts is compromising the reliability of the assessment's results, as well being inappropriate and, at worst, as tolerating students' dishonesty, actually, affording students a chance to learn from their mistakes encourages the fundamentals of the educational system and in so doing developing honest competency (Chappuis & Chappuis 2008; Phelps 2010; Renfro & Grieshaber 2009; Smith 1997). Strategically, students also end up believing that the institution and lecturer support their learning. It promotes emphasis on student development, rather than on just examinations. This strategy inspires students to study numerous times, as well as it fights anxiety that might restrict the student's exact demonstration of his or her understanding. Such efforts guarantee that the summative final test is an assessment which measures the students' achievement of the intended outcomes of the module. Such a tactic also ensures that the final assessment is representative of the module' s efficiency; it works out as an exact summary of the content learned. The lecturers also felt closer to their students during the discussion forums as a result even shy student asked questions for clarity and there was better engagement with them than in a normal class.

5. Conclusion

Although formative assessment can help all students, it produces predominantly good results with low achievers by focusing on specific glitches with their work and providing them with a clear comprehension of the mistakes and how to correct them. Good formative assessment is not easy to achieve, taking into account the pressure from the public/parents, students themselves to produce results, and requires a jump of confidence by the teaching fraternity. The Blackboard selection is just one of the good effects of our technology focused eras. Some of the benefits of implementing e-learning for formative assessment can be specified as follows: It provides immediate feedback to the students so that the learning route ensues without deferment compared to traditional classroom based method, the possibilities to generate comprehensive feedback supports the student to find a solution for his/her slip-up, with appropriate clarification, it creates an attractive learning feature for the students as they do the assessment online and it shows the scores to the students so that proper assessment on one's situation in terms of topic knowledge is clarified.

Learner and assessment-centered approaches can offer a framework for moving away from the traditional viewpoint of attaining knowledge towards a new viewpoint that is compatible with active learning relevant to the 21st century learning. While acknowledging that there may be other ways of creating such a learning environment, application of formative assessment within the context of online learning is a viable option to achieve this. Online formative assessments are, somehow, more privatised efforts to learn; and, especially if students are afforded several attempts and average scores are used, they offer a much greater prospect to great achievement (Rovai 2000). I have observed that, with undergraduate students, the use of formative assessment is an irreplaceable and extremely valuable technique to enhance student understanding and supporting achievement. In essence, formative assessment leads to students being able to measure their own progress. It is also a tremendous value to lecturers as it can provide very important feedback about what exactly students are learning; the exact nature and extent of their difficulties.

Lastly, in recent years, as e-assessment tools become progressively used, lecturers benefit in both marking time and administrative costs of mark compilation, while for students, online quizzes give prompt and comprehensive feedback and prominently enhanced flexibility around the time and place of taking the assessment task. To enhance the feedback or online correspondence expected from the part of the lecturer, other Blackboard tools like discussion forum and virtual class room can be used.

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