MSINGI JOURNAL
of the Department of Educational Foundations
Volume 6 Issue 1, 2022
ISSN 2663-1032
DOI 10.33886/mj.v6i1.276

Online Continuous Assessment Tests: Experiences and Lessons from Kenyatta University

By

*Mukirae Njihia, Lecturer, Department of Educational Management, Policy & Curriculum Studies, School of Education,
Kenyatta University
E-Mail: *njihia.mukirae@ku.ac.ke*

Elizabeth Mwaniki, Lecturer, Department of Educational Psychology, School of Education,
Kenyatta University
E-Mail: *mwaniki.elizabeth@ku.ac.ke*

Anthony Ireri, Lecturer, Department of Educational Psychology, School of Education,
Kenyatta University
E-Mail: *Ireri.anthony@ku.ac.ke*

Accepted April 2022 **Published August 2022**

How to Cite:
Njihia, M., Mwaniki, E., & Ireri, A. (2022). Online Continuous Assessment Tests: Experiences and Lessons from Kenyatta University. *Msingi Journal, 6*(1), 53-68. Retrieved from https://journals.ku.ac.ke/index.php/msingi/article/view/276

Abstract

Between October 2015 and April, 2017, the School of Education, Kenyatta University in collaboration with the Commonwealth of Learning (CoL) organized three capacity building workshops for its lecturers on Integration of ICT in teaching and learning. During the 3rd workshop held in March, 2017 and whose focus was on online Assessment, it was noted that despite the university's investment in a Learning Management System (LMS) for online teaching and learning, lecturers had not utilized it for formative learner assessment. Therefore, it was agreed that the departments of Educational Psychology and Educational Management would play the role of trailblazers in giving online Continuous Assessments Tests (CATs) in the School of Education. In the 2nd semester of 2016/2017 academic year and the 1st semester of the 2017/2018 academic year, the two departments gave a total of four online CATs in four different units to over 9,000 undergraduate students. This innovation in assessment informed this study whose purpose was to document the views and experiences of both students and lecturers on online CATs. The study embraced a mixed method design that enabled collection and triangulation of quantitative

data from students and qualitative data from lecturers. The results indicated that the students were initially apprehensive before the online CAT but after they were done, a majority stated that they enjoyed the experience. The students also praised the technical support given during the CAT, the immediate feedback and the sense of control of their marks. Lecturers were initially sceptical about mounting online CATs but their perception changed after they were rolled out as they appreciated the reduced workload in terms of marking and grading as well as reduced human error. Some key challenges that hindered effectiveness of the online CATs included a few students' registration numbers missing in the LMS, slow internet during online CATs, students using wrong passwords to get into the LMS, interruption from other students in computer lab and strict marking in the short answer items.

Key words: Continuous Assessments Tests (CATs), Online Assessment, formative assessment, technical support, Learning Management System

Introduction

Formative assessments play a central role in effective teaching and learning. Results from such assessments are regularly used at all levels of learning to determine whether students understood concepts so that educators can remediate any possible lack of understanding before the summative assessments. Such assessments provide feedback that is intended to modify the learner's thinking or behaviour for the purpose of improving learning. This feedback may also be used by teachers as a basis for altering instruction. The formative assessment feedback cycle should therefore occur early in the learning experience if both students and teachers have to benefit during the duration of the subject (Farrell & Leung, 2004).

Despite the stated need for instantaneous feedback from formative assessments if they are to be effective, this does not always happen in Kenyan Universities which use the traditional paper and pen method of assessment mainly due to large class sizes. Since 2006, Kenyatta University (KU), like all other public Universities in Kenya has witnessed an upsurge in student enrolment due to the increasing demand for higher education. Indeed, the Economic Survey by the Kenya National Bureau of Statistics (2010) puts the student enrolment at KU at 16,736 in 2006. This enrolment increased fourfold to 67,091 students in 2016 according to the Economic Survey (Kenya National Bureau of Statistics (2020). This represents a growth in student population of over 400% in one decade. Consequently, this has resulted in large class sizes and student diversity that has put a lot of strain on the teaching and learning resources. With the large classes and other responsibilities charged on the lecturers, feedback from formative assessments otherwise called Continuous Assessment Tests (CATs) given in the traditional pen and paper format has not always been timely. This means that it may not therefore serve the purpose that formative assessments are meant to serve. This is usually a disadvantage to the students who in most cases get the feedback too near the summative assessments to be of much use. In fact, some do not get this feedback at all before summative assessments due to lack of proper mechanisms for handing back the graded CAT papers. From the foregoing, it is clear that a shift in assessment strategies from traditional pen and paper CATs to online CATs is long overdue if such CATs are to serve the purpose they are meant to serve in Kenyan universities. This need is felt further due to the global tilt towards 21st century skills such as ICT literacy in teaching and learning. Efforts have been made globally and locally to incorporate ICT in learning. Since 2015, the School of Education (SOE), KU in partnership with

Commonwealth of Learning (CoL) has been working towards capacity building of its lecturers on integration of ICT in teaching and learning. These efforts have been motivated by three reasons. One, the school trains teachers for basic and tertiary education institutions. Therefore, these teachers need to have a first-hand experience of ICT integrated teaching and learning at the university which they can replicate when they start teaching upon graduation. Two, the university has invested heavily in both ICT infrastructure and a Learning Management System (LMS) and thus the need to maximally utilise them to enrich the teaching-learning process. The third reason is grounded on efficiency as a concern. It was noted that even students who were enrolled in the Distance Open and e-Learning platform would be required to travel long distances to campus to sit for their CATs. The collaboration between the SOE, KU and CoL bore three capacity building workshops for lecturers from the School's seven departments on Integration of ICT in teaching and learning between 2015 and 2017. The third workshop which was held in March, 2017 focused on *Online Assessment* and aimed at equipping the lecturers with the necessary skills and attitudes to conduct online assessments. After this training workshop, the departments in the school have embraced the concept of online assessment and two departments (Educational Psychology and Educational Management) have since given online CATs for a number of units with very large class sizes ranging from 400 to over 3000 students. For example, in Educational Psychology Department, online CATs have been given for EPS201 (Psychology of Learning) while in the department of Educational Management online CATs have been given for EMP201 (Curriculum Development), EMP401 (Educational Administration) and EMP403 (Educational Planning and Economics of education). These CATs cut across the 2nd to the 4th academic years of study. These online CATs are therefore interesting case studies which provide useful lessons and insights which this paper shares.

The objectives of this study were to:

i. Capture the views of students and lecturers about the online CATs
ii. Identify challenges hindering effectiveness of on-line CATs
iii. Document the lessons learnt from administering on-line CATs

Literature review

Chen (2010) notes that a learning environment is characterised by three activities, namely: the curriculum, instruction, and assessment. He refers to them as the three legs of a classroom stool and states that each of them must be strong for it to retain its balance. However, assessment plays a key role among the three as it gives feedback on the success of the implementation of the other two. Assessment has a strong influence on learning (Baleni, 2015). Indeed, Angus and Watson (2009) point out that assessment is at the core of formal higher education. Assessment is said to have a 'backwash' effect on learning as it to a large extent influences what the learner focuses on (Biggs & Tang, 2011). This means that students usually focus more on those aspects of the curricula which they feel are likely to be assessed (Bull & McKenna, 2004).

Orlando (2011) points out that assessment in education are classified into three categories based on the purpose: diagnostic, formative, and summative. Diagnostic assessment precedes instruction and is used to gather information about students' prior knowledge before a course of study. Formative assessment is used to gather information in an on-going manner throughout a course. It is used to guide teaching and to improve learning and performance as well as give feedback to students.

Summative evaluation gathers and analyzes information at the conclusion of a course in order to determine whether students have achieved identified goals.

Formative assessment is the focus of this paper. Black and Williams (1998) referred to formative assessment as assessment for learning, as opposed to assessment of learning (summative evaluation). This means that one of the key objectives of formative assessment is to improve the learning process. This is achieved by giving immediate feedback to both the teacher and the student which guides on areas that need remedial action. Black and Williams (1998) identified the following key elements of formative assessment:

i. The identification by faculty and learners of learning goals, intentions or outcomes and criteria for achieving these.
ii. Rich conversations between faculty and students that continually build and go deeper.
iii. The provision of effective, timely feedback to enable students to advance their learning.
iv. The active involvement of students in their own learning.
v. Faculty responding to identified learning needs and strengths by modifying their teaching approach (es).

From the above, it is clear that formative assessments seek to improve the learning process through the active involvement of the student. Formative assessment takes place in all types of learning environments, be it face-to-face, online or blended mode.

The increased use of ICT in teaching and learning has given rise to the embedding of assessment in technology. This has led to the emergence of online assessment, also referred to as e-assessment which is the use of technology to manage and deliver assessment. Pachler et al. (2010) 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". Gikandi, Morrow and Davis (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.

A lot of literature points to several advantages of online formative assessment systems over the traditional paper and pen methods. One key advantage is flexibility in learning as students can take the assessment anywhere at any time (Buchanan, 2000; Oraifige, Heesom & Felton, 2009; Zakrzewski & Bull, 1999). Another advantage is instant feedback which according to Buchanan (2000) helps both learners and teachers in taking necessary remedial action. This assertion is reiterated by Benjamin, Robbins and Kung (2006) who opine that online assessments allow not only instant feedback but also robust analysis of results, reporting, and flexibility. Thus, since timely feedback is one of the key elements of formative assessment, then online assessment has an upper hand compared to the traditional pen and paper form of assessment. They provide learners with a focus for study activity and feedback on progress at given points in time and are therefore able to cater for the diverse needs of learners. Gunn (2015) also states that online assessment has become a key strategy to motivate, engage and provide timely feedback to twenty-first century learners. Other

benefits include the ownership of the process by learners who then become key actors, including the development of a learning community with valuable learning experiences (Gikandi et al, 2011). Online formal assessments are also rated high on efficiency. Since they are self-grading, they have efficiency gains for staff with regard to the time saved which could be put into better use, for example, developing and implementing remedial measures. However, it is important to bear in mind that online formative assessment requires an investment of time up front to establish the materials and processes.

Online formative assessment also has a positive effect on the learners. Ozden, Erturk, and Sanli (2004) established that immediate feedback and scores motivated students and contributed positively to their achievement. Walker, Topping, and Rodriques (2008) found that the majority of students used formative assessment as a pro-active diagnostic tool to gauge their knowledge and for identifying areas for further revision. Studies on learners' perception of online formative assessments further show that they viewed them as fair, reliable, secure, enjoyable, less stressful, capable of identifying their learning needs and as adding value to learning (Costa, Mullan, Kothe & Butow, 2010; Dermo, 2009; Ozden et al, 2004; Walker et al, 2008).

Studies also reveal that students' support mechanisms are important for the success of online formative assessments. These mechanisms include rubrics, (Bouzidi & Jaillet, 2009) clear marking criteria, (Chen & Tsai, 2009; Walker et al, 2008) assessment tutorials etc. Training of students is also important so that they are familiar with online formative assessment systems before the process of testing begins (Ozden et al, 2004).

Key challenges with online assessments usually revolve around security, authentication and integrity of online exam process (Sharma & Singhal, 2014). Since students sit for online assessments without the presence of the lecturer, authenticating the identity of the learner to eliminate use of proxies could be the biggest challenge. Sharma and Singhal (2014) proposes further deployment of technology like biometric identification and special cameras of 360 degrees. However, implementing these security measures would mean limiting the flexibility of the online assessment, by for example directing students to specific computer laboratories. This could work for full time face-to-face students but not for distance learners spread throughout a given geographical area.

Methodology

The development of this paper embraced the phenomenological approach as it sought to understand students' and facilitators' perceptions, perspectives and understanding of the online CATs. The paper employed a mixed method design that enabled the collection of both quantitative and qualitative data. The design was sequential as it entailed collection of quantitative data from students through an online questionnaire followed by collection of qualitative data from facilitators through a Focus Group Discussion (FGD). The population of the study comprised of the 9,883 students who had participated in the online CATs and 18 lecturers who were involved in the development and administration of the online CATs. An online questionnaire was sent to 800 students of which 492 (61.5%) responded. Purposive sampling was used to select 8 lecturers for participation in the two Focus Group Discussions. Data from the students' questionnaires and the lecturers' FGD were analysed and the results are presented in the following sections.

1. Results and discussion

a) Online CATs Administration and Performance

In KU, formative assessment for undergraduate students in the SoE comprises of two CATs and an end of semester examination. Both the CATs account for 30% of the grade mark while the end of semester examination accounts for 70%. During the second semester of 2016/2017 academic year and the 1st semester of the 2017/2018 academic year, a total of four online CATs were given in the departments of Educational Psychology and Educational Management as outlined in Table 1.

Table 1: Online CATs Given in 2016/2017 and 2017/2018 Academic Year

UNIT	Academic Year	Level of Study	No of Students
EPS201-Psychology of Learning	2016/2017	2nd Year	437
EMP403-Educational Planning	2016/2017	4th Year	3,228
EMP201-Curriculum Development	2017/2018	2nd Year	3,288
EMP401-Educational Administration	2017/2018	4th Year	2,930

From Table 1, it is evident that these were very big classes with enrolment ranging from 437 (EPS 201) to 3,288 (EMP201). The EPS 201 unit had a lower number of participants because only one class out of the eight (8) groups taking the unit participated. Being the first time that an online quiz was being offered in their department, most of the lecturers handling the other EPS 201 classes did not feel confident enough to offer an online quiz to their students and so opted out. This was unlike the department that houses the EMP 201, EMP 401 and EMP 403 units that already had many of their lecturers exposed to online quizzes because of their earlier experiences with a leadership course for all fourth year students that is usually offered and tested online. Many lecturers were therefore agreeable to an online quiz for their EMP 201, 401 and 403 classes. The huge enrolment in the units mentioned is due to the fact that all of them are common undergraduate units for students in the SoE. For each of the four units, the online CAT was served as the second CAT since the first CAT in each unit had been given earlier using the traditional paper and pen method. Due to the large class sizes, the lecturers had to plan in conjunction with the ICT Directorate and the University Management to ensure steady internet supply and reservation of the computer laboratories.

The researchers were able to secure scores for three of the four CATs, namely EPS 201, EMP 403 and EMP 401. EPS 201 was done first followed by EMP 403 in the 2nd semester of the 2016/2017 academic year. They were followed by EMP 201 and EMP 401 which were done in that order in the 1st Semester of the 2017/2017 academic year.

The total number of students who sat for the EPS 201 CAT was 437. The CAT had 15 multiple-choice test items each taking 2 minutes hence the whole CAT was timed to take 30 minutes. There were other 15 multiple-choice test items of equal difficulty set aside as an emergency CAT in case

some students failed to access the first CAT within the stipulated time or in case there was a power outage. The emergency CAT was hidden from students' view and was to be unhidden only when necessary. All the test items were shuffled amongst themselves and within the choices to control for cheating. The students had to use the students' computer laboratories and the CAT was to be done within a specific hour in a given day. In each computer laboratory, there was an invigilator (teaching staff) and an ICT Support staff to ensure that the computers were working well and that all students could access the CAT. The overall performance was impressive as shown in Figure 1.

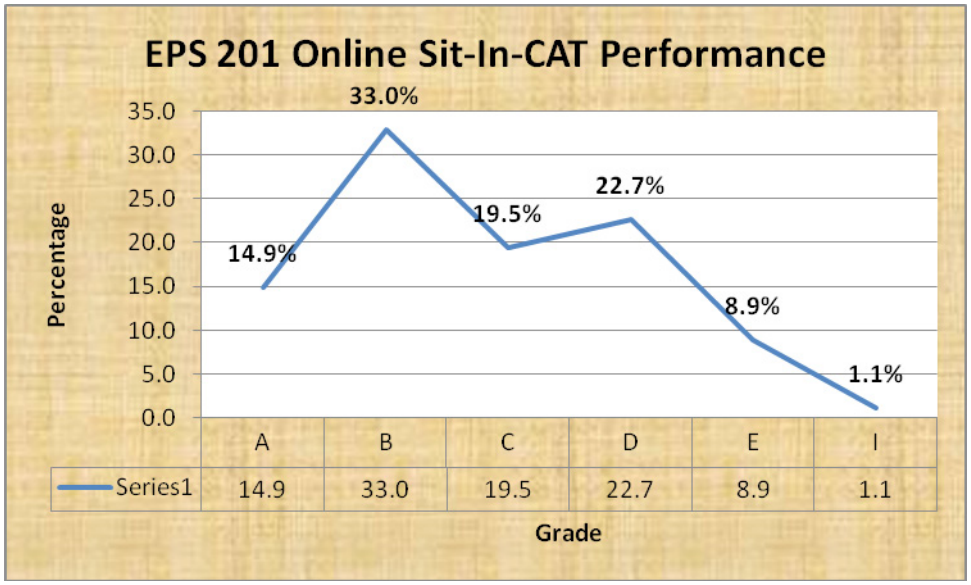

Figure 1: EPS 201 online CAT performance

Figure 1 shows a near-normal curve in terms of the online CAT performance for EPS 201. Although CATs are not usually scored out of 100%, the CAT grades have been converted to percentages for ease of analysis of performance. Based on this, the number of students who scored 70% (A) and above were 14.9%, those who scored 60 to 69% (B) were 33% while those who scored 50 to 59% (C) were 19.5%. Overall 67.4% of students scored over 50% while over 90% obtained the University pass mark of 40%. On the other hand, 39 students represented by the 8.9% failed while 1.1% accessed the CAT but did not attempt for varied reasons.

The EMP 403 CAT was done a few days later after EPS 201. This proved advantageous in that some lessons learnt during administration of EPS 201 were utilized while possible drawbacks were avoided. The total number of students who sat for the CAT was 3,228. There were 15 test items each taking 2 minutes meaning that the whole CAT was timed to take 30 minutes. The test items were also shuffled amongst themselves and within the choices to minimize cheating. As opposed to EPS 201 which was done at a go in a specific hour, the EMP 403 CAT was organized in a way that students could do the CAT from anywhere (not necessarily the computer labs) provided there was internet. The same CAT was designed to be available the whole day to cater for the big number of students as all could not fit in the computer labs in a single sitting. The overall CAT performance was as shown in Figure 2.

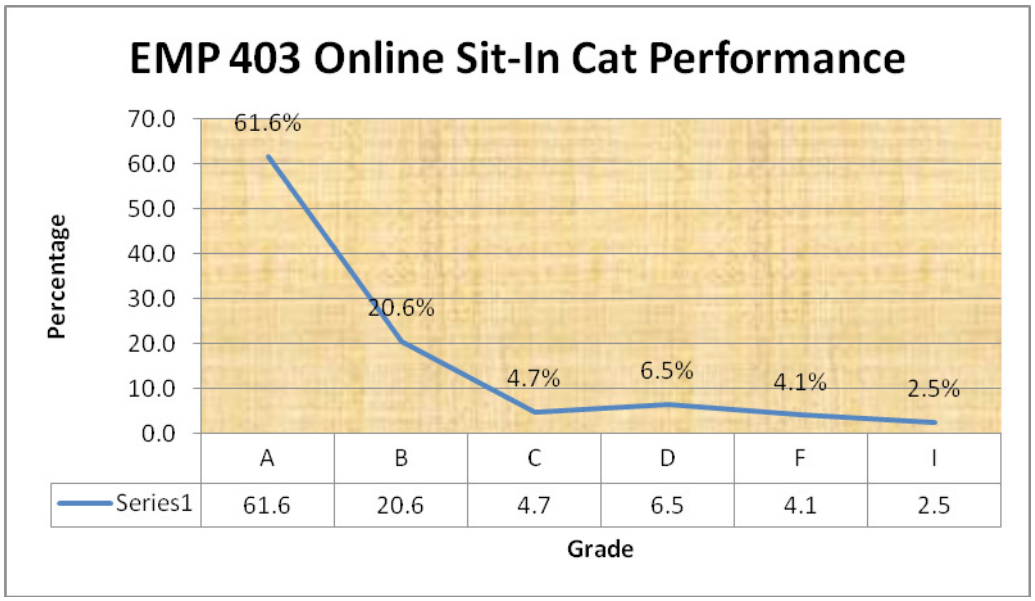

Figure 2: EMP 403 Online CAT performance

Figure 2 shows that unlike EPS 201 performance which assumed a normal curve, EMP 403 performance was negatively skewed meaning that majority of the students got high scores. For example, 61.6% of the students scored 70% (A) and above, 20.6% scored 60% to 69% (B), 4.7% scored 50% to 59% (C), 6.5% scored between 40% and 49% (D) while 4.1% failed. Overall, the number of students who scored over 50% was 86.9%.

The EMP 401 CAT was done by 2930 students who are mostly in their fourth year of study. It was also done in one day but its administration was improved having benchmarked from the other two CATs done earlier. Just like the others, it was done within one day but it was divided into different 4 sets of CATs of equal difficulty which were done after intervals of two hours. The overall CAT performance was as shown in Figure 3

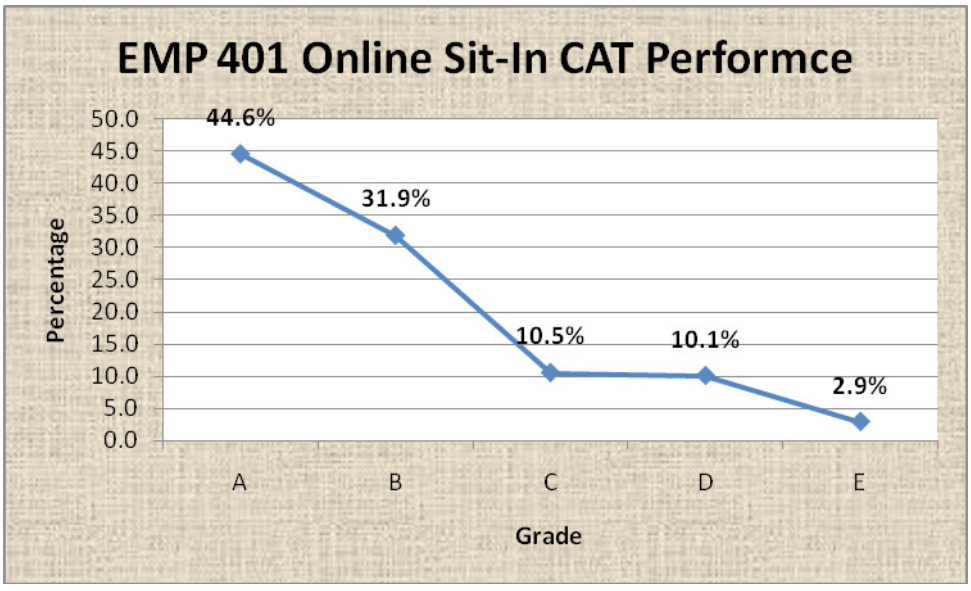

Figure 3: EMP 401 Online CAT performance

Unlike EPS 201 but like EMP 403, performance in EMP 401 was negatively skewed meaning that a majority of the students got high scores. As shown in Figure 3, those who scored 70% (A) and above were 44.6% while 31.9% scored between 60% and 69% (B). Those who scored between 50% and 59% (C) were 10.5% while 10.1% scored Grade D (40% to 49%). Those who failed (39% and below) were 2.9%. A comparison of the performance in the three CATs is given in Figure 4.

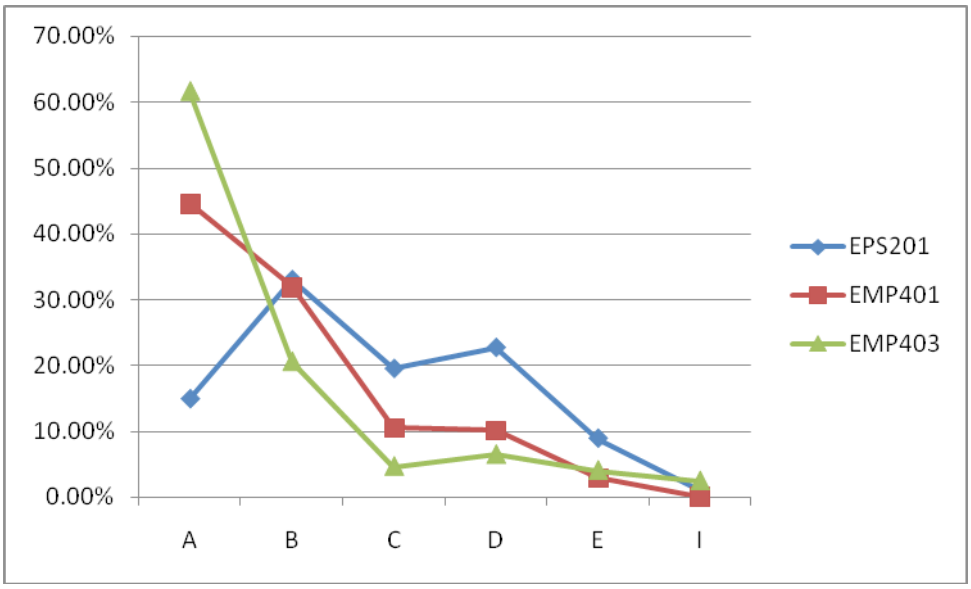

Figure 4: Comparison of performance in Online CATs for EPS 201, EMP 401 and EMP 403

Figure 4 indicates better performance in EMP 403 and EMP 401 than in EPS 201. There may be need to establish what could have influenced the extreme differences in performance of the three online CATs. Probable reasons could be the different cohort years with the fourth years (EMP 403 and EMP 401) probably having prior experience in online engagements, age differences, the different methodologies employed, class size effect, content difficulty or even different levels of test anxiety experienced by the three groups.

b) Experiences of students with the online CATs

The experiences of the students were captured through a 10-item online questionnaire that was given after the online CAT. The questionnaire had been sent to a sample of 800 students who sat for the four CATs but only 492 responded. Furthermore, not all answered all the items hence the varied *N* per item (475-492). Questions 1 to 8 were on a four-point Likert-type scale with responses ranging from SD (Strongly Disagree) to SA (Strongly Agree). The ninth item was different because respondents were supposed to state either 'Yes' or 'No' to the question. The tenth question which generated 336 responses was an open ended one which requested the respondents to give any challenges and observation about the online CAT that may not have been captured in the Likert-type questionnaire. The responses on the Likert questions are presented in Table 2.

Table 2: Students' Views on the Online CAT

S/NO	STATEMENTS	SD	D	A	SA	N	Weighted Average
1	I was able to access the CAT easily	7.4% (35)	8.4% (40)	35.8% (170)	48.4% (230)	475	3.25
2	The internet in the computer lab was reliable during the Online CAT	3.7% (18)	8.5% (42)	42.7% (210)	45.1% (222)	492	3.29
3	I experienced technical problems with computers during the Online CAT	30.9% (150)	42% (204)	19.8% (96)	7.4% (36)	486	2.04
4	There was adequate technical support in the computer labs during the Online CAT	4.9% (24)	6.1% (30)	62.2% (306)	26.8% (132)	492	3.11
5	I would prefer doing the Online CAT from the computer lab rather than from anywhere else	11.1% (54)	16.1% (78)	37% (180)	35.8% (174)	486	2.98
6	I think Online assessment controls cheating	18.5% (90)	19.8% (96)	48.1% (234)	13.6% (66)	486	2.57
7	I now feel confident enough to undertake Online CATS in future	3.7% (18)	8.5% (42)	48.8% (240)	39% (192)	492	3.23
8	I would recommend online CATs rather than Sit-in CATS in other units	14.8% (72)	17.3% (84)	35.8% (174)	32.1% (156)	486	2.85

Table 2 reveals that 84.2% of the respondents were able to access the online CATs without difficulties. This may have been due to the psychological preparation done by the respective lecturers. The ease of access could also be credited to the investment in ICT infrastructure and the LMS by the university. Indeed, 87.8% of the respondents found the internet reliable while 72.9% did not experience problems with computers. Additionally, 89% of the respondents stated that technical support was adequate. These are pointers to institutional readiness for online CATs in terms of technical support and ICT infrastructure. However, in the open-ended responses, students pointed out some challenges that were technical in nature. One such challenge was lack of adequate ICT infrastructure especially computers and internet. As noted by one student,

> "*Online CATs are good when all systems are set. However, with the big number of students, the computer Lab didn't meet the needs of many*."

Another student pointed out that,

> "*All computers in all computer labs must be well managed and serviced prior to online CATs."*

There were reports of some computers hanging in the course of the CATs while a concern was also raised about slow internet speed which may have been a handicap to the students as the CATs are timed. A few students were not able to access the online CATs due to use of wrong log-in credentials. Nevertheless, students were happy with the level of technical support that they were given. One of them noted that,

"the technicians assisted well. I had a problem with my password but that issue was solved very fast by the technicians."

These online CATs had a positive effect on the students as 87.8% felt more confident to do more online CATs in future while 67.9% said they would recommend online CATs in other units.
In the open-ended responses, one student opined that,

"online CATs are great initiative during the digital era"

while another responded that,

"Online CATs are flawless and easy to access. It's innovative."

This positive effect of online CATs as given by the students is in tandem with the findings of Ozden, Erturk, and Sanli (2004) who established that immediate feedback and scores given by online CATs motivated students and contributed positively to their achievement. It also concurs with earlier studies on learners' perception of online formative assessments which showed that they viewed them as being fair, reliable, secure, enjoyable, less stressful, capable of identifying their learning needs and as adding value to learning (Costa, Mullan, Kothe & Butow, 2010; Dermo, 2009; Ozden et al, 2004; Walker et al, 2008). However, many students in the EPS 201 group reported that the computer marking for short answer questions was very strict as it penalized them for wrong spellings of the answer words or because of putting an article before the answer words. They also reported that the shuffling of the answers was not well done. The example given by one EPS 201 respondent was a multiple-choice item having 'A' as the answer reading "All of the above" yet there are no options preceding it.

Though a majority of the students, 53.7%, felt that they did not need any more training on how to do online CATs the 46.3% that indicated they needed it is a sizeable number that cannot be ignored. The need for training of learners on online assessment concurs with the views of Ozden et al (2004). Thus, there is need for the lecturers and the ICT technical staff to further build the capacity of students in this area. With regard to the venue for the CATs, 72.8% of the students would prefer to do them in the computer labs while 27.2% would prefer doing it anytime anywhere. The flexibility associated with online CATs where students could do them from any location so long as there was internet may also be a matter for policy consideration by the university.

The open-ended responses were both positive and negative and to a large extent concurred with the responses from the Likert questions. The positive responses included praise for the lecturers for the new and exciting online CATs experience. Although the students reported being anxious at first, they were happy about the psychological preparation given by the facilitators. The students opined that online CATs were very desirable for a number of reasons. One was the flexibility. The CATs could be done anywhere within the given time as long as one had internet access. Flexibility, as pointed out in the literature review is one of the key benefits of online assessment (Buchanan, 2000; Oraifige, Heesom & Felton, 2009; Zakrzewski & Bull, 1999). Another reason why students were elated about the online CATs was due to the immediate feedback. One student observed that,

"Online CATs are the best as they give instant results. They should be given in all units." This means that students are able to assess themselves and gauge their performance before the final end of semester examination. The advantage of instant feedback as cited by the students is also supported by the literature review (Benjamin, Robbins & Kung, 2006; Buchanan, 2000). Instant feedback is of great importance to students as most of them use it as a pro-active diagnostic tool to gauge their knowledge and for identifying areas for further revision (Walker, Topping & Rodriques, 2008). Another advantage of the online CATs according to the students is that they gave them greater control of their marks because there would be no missing CAT papers and marks but rather an online trail of the same. This concurs with the views of Gikandi et al, (2011) who noted that one key benefit of online CATs is the ownership of the process by learners who then become key actors. On the other hand, the students raised several issues on the management and integrity of the online CAT. The flexibility offered by the online CATs could be a double-edged sword as some students raised misgivings about cheating. Many students, especially of EMP 403, expressed concern about possibility of cheating especially since it was the same CAT done throughout the day. Thus, some students felt that the process needed to be better managed so as to minimize possibility of cheating. One student pointed out that,

> *"Since we are many students and the halls are many and accessible, I would request that students are grouped in fewer numbers for easy CAT attendance and coordination."*

Other students suggested that the online CATs should be supervised by lecturers in the computer laboratories noting that students were communicating during the online CATs. Another student suggested that,

> *"the online CATs should be done at the same time in all campuses. Undertaking the CAT at different times can contribute to cheating noting that the first group managed to leak the questions to other groups."*

This concern on the integrity of online CATs that was raised by students concurs with the views of Sharma and Singhal (2014) who noted that one of the key challenges of online assessments usually revolve around security, authentication and integrity of online exam process. Thus, there is a need to develop measures for curbing cheating in online CATs so as to ensure the integrity of the assessment process. One suggestion given by students is having many different sets of questions for the different groups of students which may help minimize possibility of leakage.

c) Experiences of lecturers with the online CATs

The experiences of staff were obtained from two focus-group discussions held after the online CATs. A total of eight lecturers (2 from each of the four units) formed the respondents. Most of them revealed that they were initially sceptical about the online CATs and even expected it to fail. This however changed after the CATs went on well. One lecturer said,

> "*You see, I do not understand online assessment and so I went to see whether it would work. I got pleasantly surprised when the first student in the computer lab that I was in stood up and left. He had finished!"*

The lecturers were unanimous that online CATs had more advantages than the paper and pen CATs. Some said that although too much time and effort was required to set many test items, the work of administering and processing CATs was greatly reduced since the computer marked and recorded the CATs. Another lecturer said,

> *"This should be encouraged in large classes especially for CAT two that usually comes close to the final examination."*

They also said that they did not have to go photocopying in bulk or looking for many invigilators like in paper and pen sit-in CATs. They did not have to deal with CAT papers thereafter.
The instant feedback they said, allowed students to seek clarifications on answers marked by computer as well as difficult concepts immediately. Another lecturer pointed out that,

> *"It is good. Now I do not have to deal with the process of returning CAT papers with some never getting theirs. The time saved for the staff could be utilized in analyzing the results and coming up with remedial measures before the final examinations."*

These benefits of online CATs as articulated by the lecturers are in tandem with Buchanan (2000) who noted that instant feedback helps both learners and teachers in taking necessary remedial action as well as those of Benjamin, Robbins and Kung (2006) who noted that online assessments allow not only instant feedback but also robust analysis of results, reporting, and flexibility.

d) Challenges during online CATs

Despite the advantages of online CATs mentioned above and the fact that both staff and students received them well, a few challenges were experienced during the online CATs as reported by both the students and lecturers. For the students, the major problem was slow internet in some instances and this made some students to panic. Another challenge was the uniformity of the online CATs. In online CATs, the system should ideally generate questions randomly from a pool for every student upon logging in to prevent cheating but the KU Moodle platform did not have the capacity to do this. This meant that the EMP 403 CAT that was open throughout the day could have facilitated some element of cheating since it was the same CAT throughout. Some students had difficulties accessing the online CATs due to wrong log-in credentials pointing to disuse of the same. One student with special needs missed the EPS 201 online CAT and had to get a paper and pen CAT later. She explained that the computer light would affect her retina. Another one had to have his fonts enlarged but completed the CAT.

For the staff, the major challenge was the system not capturing registration details of about 250 students, a problem that e-learning department said originated right from the initial registration in first year where some students email addresses were captured as usernames instead of their registration numbers. This complicated the collating of marks because one had to match the names on the online CAT to those on paper and pen CAT 1. The meaning of this is that without the first CAT, it would have been impossible to collate the marks since names can be the same hence need of a registration number. Some lecturers had a negative and skeptical attitude before the online CATs as captured by one of them during the focus group discussion who said that,

"I came to see the CAT fail."

Lastly, lecturers were worried because they had no way of verifying if indeed it was the students doing the CAT or not. This was especially the case with the EMP 403 that was done anywhere anytime.

Lessons Learnt

From the above experiences and challenges, a few lessons can be learnt. One is that the use of online assessments saves a lot of time and resources when dealing with large classes. Such CATs enhance efficiency (in terms of minimal resources used and exam processing) and effectiveness (instant feedback) compared to the paper and pen CATs that take a minimum of two weeks to give feedback to learners. Learners also have control over their marks and this minimizes cases of missing CAT marks. Two, multiple-choice test items are the best in online CATs for objectivity and the fact that the computer is very strict with short answer questions and marks even spellings. However, in the multiple-choice items, one should avoid choices indicating position of answers e.g., "All the above" and "None of the above" because shuffling within choices may leave such answers as the first choices yet there may be no preceding answers. Three, technical support is very necessary at each and every stage for both students and lecturers. There is therefore need for continuous training of both staff and students to build their ICT capacity and also alter their attitude towards integrating ICT in teaching and learning. Four, Learners with special needs should get appropriate facilities and support during such online CATS, for example, use of audios, dark rooms and the dark computers for those with eye problems and other assistive technologies such as use of Nonvisual Desktop Access (NVDA) which is a free and open-source, portable screen reader for Microsoft Windows. Five, the CAT period should be limited to a specific hour for all students to avoid cheating and if this is not possible, then modalities of enabling the Moodle platform to generate a different but equivalent set of questions for each student from a pool should be sought and used. This can be done by upgrading the current Moodle platform and adding the necessary plug-ins. Lastly, the University also needs to revise its examinations policy to incorporate online CATs to enable it deal with issues that threaten the validity and reliability of assessment in online environments, cheating and other malpractices.

Conclusion

The study reveals that the university has the technical and human resources to mount online formative assessment. However, there is need for further improvement of the ICT infrastructure so as to cater for the big number of students as well as those with special needs. More capacity building of faculty in online formative assessment is necessary to not only equip them with the requisite skills needed in online testing but also change their attitudes towards online CATs and build their confidence in the process. Enthusiasm for online formative assessment by students is quite high due to the practical benefits it confers as it not only gives them immediate feedback but also control of their marks. Lecturers also enjoy efficiency benefits as they save on time that would have been spent manually grading the CATs. Nevertheless, there is need for the university to update its examination policy to embrace online formative assessment.

References

Angus, S. D., & Watson, J. (2009). Does regular online testing enhance student learning in the numerical sciences? Robust evidence from a large data set. *British Journal of Educational Technology, 40 (2)*: 255-272.

Baleni, Z. (2015). Online formative assessment in higher education: Its pros and cons. *The Electronic Journal of e-Learning Volume 13 Issue 4* 2015, (pp228-236) available online at www.ejel.org

Benjamin, S., Robbins, L.,& Kung, S. (2006) Online Resources for Assessment And *Evaluation.Academic Psychiatry, November 2006, Volume 30, 6*, pp 498–504

Biggs, J., & Tang, C. (2011). Teaching for Quality Learning at University. Maidenhead: Open University Press.

Black, P., & William, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy and Practice 5,* no. 1:7–73.

Bouzidi L., & Jaillet, A. (2009). Can online peer assessment be trusted? *Educational Technology & Society, 12 (4),* 257-268. Retrieved from http://www.ifets.info/journals/12_4/22.pdf

Buchanan,T. (2000) .The Efficacy of a World-Wide Web Mediated Formative Assessment. *Journal of Computer Assisted Learning,16* (3), 193-200.

Bull, J. & McKenna, C. (2004). Blueprint for Computer-Assisted Assessment, London: Routledge Flamer

Chen, M. (2010). Education Nation: Six Leading Edges of Innovation in our Schools, Jossey-Bass, San-Francisco, CA

Chen, Y., & Tsai, C. (2009). An educational research course facilitated by online peer assessment. *Innovations in Education and Teaching International, 46 (1),* 105-117. doi:10/1080/14703290802646297

Costa, D., Mullan, B., Kothe, E., & Butow, P. (2010). A web-based formative assessment tool for Masters students: A pilot study. *Computers & Education, 54 (1),* 1248-1253.

Dermo, J. (2009). E-Assessment and the student learning experience: A survey of student perceptions of e-assessment. *British Journal of Educational Technology, 40(2),* 203-214. doi:10.1111/j.1467-8535.2008.00915.x

Farrell, G. & Leung, Y. K. (2004). Innovative Online Assessment Using Confidence Measurement**.** *Education and Information Technologies 9:*1, 5–19, 2004.

Gikandi, J.W., Morrow, D. & Davis, N.E. (2011) Online formative assessment in higher education: A review of the literature. *Computers & Education, Volume 57, 4*, pp 2333-2351. https://doi.org/10.1016/j.compedu.2011.06.004

Gunn, C. (2015). Online Assessment and Learner Motivation in the Twenty-First Century. *Motivation, Leadership and Curriculum design* pp 53-62

DOI 0.1007/978-981-287-230-2_5

Kenya National Bureau of Statistics (2010) *Economic Survey*. KNBS, Nairobi.

Kenya National Bureau of Statistics (2020) *Economic Survey*. KNBS, Nairobi.

Oraifige, A. ,Heesom, D., &Felton, A. (2009) Technology supported Learning (TSL) for formative assessment, *Engineering Education, 4:1*, 61-67

Orlando, J. (2011). How to Effectively Assess Online Learning, Magna Publications Inc. Madison

Ozden, Y., Erturk, I., & Sanli, R. (2004). Student perceptions of online assessment: A case study. *Journal of Distance Education, 192,* 66-92.

Pachler, N., Daly, C., Mor, Y., & Mellar, H. (2010). *Formative e-assessment: Practitioner cases. Computers & Education, 54*: 715–721.

Sharma, I., & Singhal, A., (2014). Research on Online Examination System. *International Journal of Engineering Technology, Management and Applied Sciences,* August 2014, Volume 2 Issue 3, ISSN 2349-4476

Walker, D., Topping, K., & Rodrigues, S. (2008). Student reflections on formative e assessment: expectations and perceptions. *Learning, Media and Technology, 33(3),* 221-234. doi:10.1080/17439880802324178