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Enhancing the reading culture among language education graduate students through emerging technologies

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Abstract

The extent to which traditional forms of information is giving way to digital materials is high. Learners are bombarded with information that necessitates quick access, internalization and synthesis; which makes reading significant among graduate students. The reading culture among language education graduate students at Makerere University is low, as they do not seem to engage in intensive and extensive reading which is part and parcel of their scholarly and intellectual development. Using Bowers' Affordance Analysis Framework, the researcher identified and utilized a voki as an e-learning tool to foster the reading culture among graduate students. The findings revealed that the introduction of a voki in the teaching learning process led to improved student engagement with content, motivated interaction among students, and subsequently stimulated their interest in reading. The acquired skills, reading inclusive were not only viewed as pertinent to pedagogical considerations but significantly relevant to students' working life after school.

Keywords: Reading culture, Luganda language education, Emerging technologies, Voki, Graduate training

Background

Historically, functional literacy defined civilization and societies with writing and reading systems advanced steadily and colonized illiterate societies. The Egyptian hieroglyphs and the Mesopotamia's Sumerian script reinvented the wheel in world history where social strata emerged basing on one's ability to read and write. But, writing and reading is no longer a preserve for a few societies, but a global human right, and attention has shifted to one's ability to transform ideas from the text into knowledge. With the emergence of a knowledge society, the assumption that knowledge would become the most expensive commodity in the world did not hold, but instead knowledge is becoming the cheapest commodity in as far as accessibility is concerned.

The open education resources and emergence of massive online open courses (MOOCs); where information is relatively cheap and free (in economic terms as pointed out in the NMC Horizon Report 2014), are making consumption of electronic materials easily accessible (Bali 2014), and are greatly impacting teaching and learning than before (Hodgkinson-Williams and Shihaam 2010). Universities are increasingly subscribing to

open resources and encouraging students to utilize them. As one of the emerging technologies, open educational resources (OERs) are increasingly adopted and adapted by educators and learners as pointed out in the NMC Horizon Report (2014). To access this knowledge, one needs to read either print or electronic materials. Print materials are gradually losing their position as the widely sought-out materials for either educational purposes or social purposes, and instead digital materials are taking root. This is because publishers no longer produce print materials only as the case was before the digital age, but are increasingly providing audio and sometimes, audio-visual versions of the printed material; hence providing the reader with wider options than ever before. But, as we settle in the digital age, emerging technologies are increasingly impacting lives of students in higher education more than ever before (Bozalek et al. 2013).

The extent to which traditional forms of information (such as the printed materials) is giving way to digital materials (which are easy to access and user friendly) is high. Learners are bombarded with information that necessitates quick access, internalization and synthesis. Nonetheless, the rate at which digital materials are becoming obsolete is high; given the frequency with which knowledge is produced and accessed. Consequently, learners are accessing high-tech gadgets such as smart phones and laptops that seem to be less utilized in their educational engagements especially in as far as the concept of utilizing them for meaningful reading is concerned. Integrating technology to the concept of reading is a recent phenomenon but instead 'technology applications in literacy appear to have been far more commonly implemented in special education…' (Mckenna and Walpole 2007). The advent of digital literacy programmes is traced to the emergence of the Palm Pilot and its successors, language dictionaries, e-book grammars, and flashcard programmes (Godwin-Jones 2011). It is therefore highly doubted whether lecturers in higher education institutions, and especially language teacher trainers, are employing methodologies that integrate the use of emerging technologies (Ng'ambi et al. 2012, 2013) to stimulate the reading culture among learners.

Conceptually, emerging technologies have been defined differently by different authors though many agree that these technologies may or may not be new; are evolving in nature; experience hyper cycle; have not yet been fully understood or researched; disruptive in nature (in regard to the status quo); utilized by specific people; and provide personalized learning opportunities (Gachago et al. 2013; Veletsianos 2010). Emerging technologies are designed to facilitate individual learning through assisted discovery, and provide effective learning through hands-on experience. Research has shown that emerging technologies have the capacity to impact classroom practices, and reading inclusive (NMC Horizon Report 2014; Veletsianos 2010). Reading as a receptive skill is an essential skill in the development of scholarly and intellectual faculties of the learner. Reading is critical to any educational initiative, and is part of the functional literacy that defines the intellectual faculties of an individual. Reading is key to literacy development through empowering readers with new vocabularies as masterly of the spelling system (of a particular language) takes root (Krashen 2004). It is a core skill to other forms of literacy such as critical literacy and social literacy. In education, reading cultivates a sense of intellectualism and scholarly readiness among learners.

At the onset of the digital age, the concept of reading got redefined as a result of information overload that emerged to define the social and educational dimensions of the

learner. As the learner tries to make sense of the information around her, she can no longer afford to employ skimming (a sub skill of reading where an entire text is read to get an overall idea/s) for some of the literature she finds, but scans (another sub skill of reading) through looking for specific information pertinent to the challenge or opportunity being worked on. In this case, computer skills in knowledge search and management is important, and the learner's level of digital identity (DI) is essential. Digital identity entails digital learners' engagement with the available technologies at home and school, and is geared towards attaining educational and social objectives (Gurung and Rutledge 2014).

The personal digital engagement (PDE) or personal use of technology is becoming crucial in deciding learners' educational digital engagement (Gurung and Rutledge 2014; Oliver and Curtin 2007). Cell phones and internet have become part and parcel of learners' social lives and providing educational affordances that had not been thought of by the end-user before. Researchers are becoming interested in learners' engagement with their digital equipment to redefine the teaching–learning process. Educationists need to design educational materials that fit the context of the learner in developing countries. The question at hand would be 'What kind of digital reading activities and materials are needed to enhance learners' reading culture?' Different types of digital technologies are emerging every day but in this study, a voki was exploited to find out how it could be utilized to enhance graduate students' reading culture. A voki is an educational tool that provides learners with opportunities to create and customize talking characters through recording their own voices or typing a message. A voki enhances learners' creativity and originality as they read a text and encapsulate a voki message which could form an abridged version of the text.

Contextually, graduate training at Makerere University where the study took place emphasizes knowledge generation, innovation and utilization of the knowledge (Makerere University Strategic Plan 2008/9–2018/9; Makerere University Research and Innovations Policy 2008a). At Master degree level, students are expected to be creative, resourceful and adopt and adapt new knowledge through critical thinking, research and interrogation of pedagogical content and discussions. The reading culture among the graduate (Language and Literature) students at Makerere University is low, as they do not seem to engage in intensive and extensive reading which is part and parcel of their scholarly and intellectual growth and development. Several indicators attest to this and include; inability to critically contribute to classroom discussion; failure to analyse issues that crop up in classroom; failure to critique pre-tasks such as reading articles and critiquing them during the teaching–learning process. It was therefore assumed that employing emerging technologies especially a voki in the learning contexts of graduate students would enhance their reading culture. It was also premised on the assumption that the acquired skills, reading inclusive were not only viewed as pertinent to pedagogical considerations but significantly relevant to students' working life after school. This masters' programme is offered in two languages; English and Luganda.

Theoretical orientation on reading culture and emerging technologies

In order to understand the complexity of identifying tasks to enhance the reading culture among language education graduate students and the subsequent selection of the

appropriate technology to match with the tasks, the study had to be guided by Bowers affordance analysis framework. This framework describes the process of identifying technological affordance requirements of e-learning tools to match with the affordance requirements of e-learning tasks that are meant to solve an educational problem or goal (Bower 2008). Enhancing learners' reading culture necessitated selection of tasks (such as providing pre-lecture reading tasks critiquing peer-reviewed articles; discussing with peers, and presenting to class). Bower's framework was significant in the study because it instilled problem-solving skills among students whereby it was evident that identification of solutions to pending challenges was key to solving problems. For articles which were readily available, links would be provided and students either accessed them in the computer laboratory connected to the internet or used their own modem (personal subscribed internet service) to obtain them. The researcher provided students with articles which were not readily available on the net especially those that necessitated a subscription fee. But the former mode of obtaining texts articles was preferred because it encouraged learners to interact with the computer (technology) frequently, and provided access to other useful articles.

After reading, learners were required to create a voki that presents a summary of what the article was about or any other issue depending on the guiding question from the lecturer. During presentations, students were encouraged to use projectors (power point), record voices especially during a focus group discussion. In order to have a meaningful discussion, the researcher encouraged students to use a google doc as an interaction platform for discussion.

Literature review on emerging technologies and graduate training

The 21st century expectations of the workplace can no longer be effectively tackled by periodical reviews and reforms in curricula, but 'integration of technology into the curriculum has been seen as a way of responding to these challenges' (AACTE 2010; Bozalek et al. 2013). Integrating emerging technologies in the pedagogical process has been a huge challenge for many teachers and lecturers in high school and universities, respectively (Atkinson and Swaggerty 2011; Ng'ambi et al. 2012, 2013). Although earlier assessment of integrating emerging technologies in pedagogical considerations depended on institutional resources (Bozalek et al. 2013; Bates and Sangra 2011), current research has gradually shifted to students; since the latter possess and utilize emerging technologies in a wider social spectrum (Bozalek et al. 2013; Gurung and Rutledge 2014).

Research has indicated that application of emerging technologies in the teaching–learning process improves learner engagement and ultimately promotes learning (Carloni 2012). The emerging traits of emerging technologies such as, focus on collaboration, openness, 'connectivism' are transforming the pedagogical processes than ever before wherever they have been applied (Gachago et al. 2013; Atkinson and Swaggerty 2011). These skills are equally important to students' working life after school. Son (2011) underscores the role of a voki in the teaching–learning process when he explicitly states that the online tool helps to assign and track student performance, in addition to stimulating their creativity and collaboration. In reference to a study carried out among nurse trainees where a voki was utilized, it was revealed that the voki technology was fun and engaging, allowing creativity which is sometimes stifled in a traditional classroom

(Anderson et al. 2013). This study therefore was geared towards introducing emerging technologies especially the voki, among language education graduate students to examine the extent to which it can enhance their reading culture.

Results

Below are the findings that emerged from a study geared towards enhancing the reading culture among the language education graduate students at Makerere University through the use of emerging technologies:

Student engagement in the teaching–learning process

Data from observation revealed greater student engagement and involvement in the teaching–learning process. Introduction of pre-reading tasks prior to meeting in class provided students with 'talking points' during the teaching–learning process; as they discussed and analysed the read article/s. Commenting on each other's voki was an interesting interactive activity that stimulated curiosity and interest. Prior to the introduction of the Sandpit methodology, late coming was a norm to some of the students, but after the intervention, they started arriving earlier or on time since they had gadgets, such as the projector, to instal. One student who was a habitual late comer and sometimes missed his lectures commented 'I can no longer afford to miss this fun. I hope all (our) lectures had (utilized) a voki'. As a result, student involvement was translated into regular attendance; and regular attendance meant learning through fun. Consequently, the increased student engagement in the teaching–learning process; where evidence of reading was provided through presentations and discussions, resulted in better understanding of language concepts.

Besides, data indicated that group activities (reading a text and discussing among peers) outside the lecture room improved students' pre-lecture engagement tremendously. The pre-lecture activities enhanced students' analytical skills and stimulated their scholarly capabilities. These are key virtues not only in students' educational enterprises. The skills are equally in learners' world of work as creativity and innovativeness are some of the much sought attributes in schools and institutions. The researcher attended four student focus group discussions. In one of the discussions, students disagreed on the interpretation of a particular concept. The 26 min spent discussing the two articles revealed significant observations. The unstructured (informal) environment where students engage in academic discussions improved their analytical skills tremendously. They were free to speak, interject, disagree with one another, or support other's ideas, in the midst of pursuing their thesis—line of argument. Interviews with students revealed significant improvement in student engagement with content, peers and technology.

In line with Bower's affordance theory, the pre-lecture and lecture tasks such as reading, discussion and presentation were matched with digital tools such as computers/smart phones, google doc and projector; which were essential in obtaining the article, and creating and discussing the voki. However, as pointed out by students during the focus group discussions, several challenges were met during the process of engaging with emerging technologies.

> *'The internet is sometimes too slow and you can't download the article' lamented one of the students.*

'Yah, sure, sometimes communication among us (students) with the google thing (google doc) could break due to poor internet connection' I remember one time I had to go an internet café to continue the conversation, but unfortunately my colleagues were off (line)' another student retorted.

The above observations indicate that employing emerging technologies is not a smooth sail especially in developing countries, and Uganda in particular. Students' inability to perform as expected is due to several challenges that hinder their accessibility to information such as slow internet connection in computer laboratories (and sometimes is unavailable). The College of Education and External Studies has two computer labs. Failure to have a one-to-one laptop policy for postgraduate students has exacerbated the situation hence some students had to rely on computer labs and internet cafes to do assignments, communicate with their lecturers and peers, and download information for reading.

Increased interest in the learning process

'Introduction of the voki (digital tool) stimulated students' interest in the teaching–learning process and presented opportunities for inquiry which resulted in deep learning. The hands-on experience involved in creating a voki stimulated curiosity and eagerness among students. The first time a voki was introduced, students were sceptical on whether they would be able to create one or not. After going through the process, creating own vokis became a measure of success on how well one could employ digital technology in a language education setting. One student commented during a focus group discussion.

'A voki will indeed create interest among my Literature (in Luganda) students.'

In a lighter mood but quite inquisitive another student retorted:

'Are you going to use a tadooba (a paraffin lamp) to create that voki?'

The student had prior knowledge on the work station of his peer which neither had electricity nor internet to enable him create a voki.

The student replied:

'Solar panels are currently being installed. I think by next term (school term) the school will have power.'

The above conversation is significant in the debate of whether Africa and other developing countries will make strides in the digital world despite shortages in basic infrastructures such as electricity. The conversation signifies the digital divide between urban and rural areas. The school which the students were referring to is located seventy kilometres from Kampala—the Capital City of Uganda. The setting is quite rural with no electricity but the mobile internet service providers such as MTN and Orange provide opportunities for internet although such a service is still expensive to an ordinary Ugandan, and necessitates one to possess a smart phone.

Creativity and innovativeness

Student engagement and interest that ensued resulted in manifestations of creativity and innovativeness. Below is a sample of vokis created by students after reading assigned texts and summarizing the text on a voki.

http://www.voki.com/php/viewmessage/?chsm=8d0a0e822ba0b7742285e6e1837f7202&mId=2548782

http://www.google.com/url?q=http%3A%2F%2Fwww.voki.com%2Fphp%2Fviewmessage%2F%3Fchsm%3D8b5032d90916731629597d23beb277c3%26mId%3D2550066&sa=D&sntz=1&usg=AFQjCNES-9kAchX90XhIS1TydJP0Igvuiw

http://www.google.com/url?q=http%3A%2F%2Fwww.voki.com%2Fphp%2Fviewmessage%2F%3Fchsm%3D8c469aad0edc116c5e10b0d77eb73e63%26mId%3D2549947&sa=D&sntz=1&usg=AFQjCNGsk9hVU56tmNJzGkqaPHy1eRbQpA

http://www.google.com/url?q=http%3A%2F%2Fwww.voki.com%2Fphp%2Fviewmessage%2F%3Fchsm%3Df5555f22adc06d3048197b628021a71b%26mId%3D2549867&sa=D&sntz=1&usg=AFQjCNHK2IfcJXZ2XT8Y_CE78WVBOM1WnQ

Several vokis were created and students faced several challenges while making them. Some students had created female vokis but with a male voice; other vokis did not have a voice (message) at all; while others were microphone recorded but one could hardly get the message because the environment under which they were created was noisy. These were encouraged to get a noise-free environment and create their vokis. Since a reflective approach to learning had earlier on been employed where peer consultations were strongly encouraged, some students categorically indicated that they had been guided by fellow students when creating a voki.

Besides, the post-lecture discussions indicated tremendous innovations in the pedagogical process. One of the lecturers (who attended the researcher's lectures) commented:

> *I have never seen this before. I had my sabbatical in (name of the university concealed for ethical reasons) University. You know, it's a first class university, but this kind of engagement and interaction was lacking. I totally enjoy these lectures; every time (I attend) I pick something out of it.*

The above observation was not only a word of encouragement but also a reflection of the changes that were gradually but steadily taking place to enhance the reading culture among graduate students. When students are motivated to read, there are several opportunities that could nurture their reading. The Makerere University Research Agenda 2013–2018 emphasize the need to transform Makerere University from a largely teaching University to a Research-led University. To ensure attainment of this objective, ICT infrastructures have been put in place. The ICT Policy and the Directorate of ICT Support (DICTS) was established to provide expert knowledge and skills on ICTs to academic and administrative staff (Makerere University Council 2004). It carries out routine maintenance of all ICT related infrastructures in the university. As a result, there is a relatively stable internet in the computer laboratories that enable students to access and download texts.

Different forms of interaction

Different forms of interaction were witnessed since the introduction of the voki and the ETILAB methodology. Observations from the focus group interactions and the lecture presentations indicated interaction levels similar to Anderson's levels of interaction. The student–student interaction improved tremendously as peer discussion, interruption, correction and intervention were witnessed not only during group discussions but also during the teaching–learning process in the lecture room. During lecture presentations, different forms of interruptions were witnessed. Despite the fact that presentation rules had been set initially by students, such as 'maximum' attention to the presentation, commenting after presentation and others, there were interruptions in form of fillers, uttering words or phrases; which did not interrupt the presentation as had earlier on envisaged, informed the presenter on key issues concerning the topic under presentation. The concept of interaction among students was at its highest during the focus group discussions. The anxiety and eagerness to learn more about peers' ideas sometimes resulted into unnecessary noise as witnessed by the researcher in two of the two focus group discussions he attended. Without any intervention from the researcher, the students were able to reorganize themselves and the discussions continued.

Similarly, student-content level of interaction progressively gained ground as students read more materials in a week than they used to read before the commencement of the study. Indicators manifesting students' further reading were witnessed during the teaching–learning process. On several occasions, reference was made to articles that were allocated for reading, and those which were never assigned but has information that collaborates or contradicts ideas being discussed. Suffice to note, is the fact that student–teacher interaction gradually declined as learning became self-directed, and to some extent peer-directed.

But the level of interaction which gained prominence among students concerned digital technology. Six students were able to buy smart phone in the period of a semester—when the study was conducted, evidence of increased utilization of the computer lab by Master of Education language education students as observed by the computer lab attendant:

> *When you (researcher) requested that your students be given an opportunity to utilize the lab whenever it's free, I accepted but didn't think that they (students) would turn up as the case has been. Many times we receive such requests, grant them but students don't turn up, or they turn up in the first few days and then stop coming.' … your students have been active. One of them has been very consistent and would always turn up at a particular time. … we were forced to reserve a computer for him especially as we approach university examinations (a busy period when many students frequent the lab).*

The above observation underscores the extent to which students interacted with technology. It also manifests the interest and enthusiasm that had developed among graduate students towards reading through the use of emerging technologies.

Levels of reading

The findings revealed that graduate students read at different paces. The majority of students were average readers; some were fast readers whereas others were slow readers. This was revealed during the three lecture sessions where students were tasked to read a piece of text at a given time. In the first session, students were given a one page text (two and a half paragraph) to read in 2 min. The outcome indicated that a few students (three) were able to complete the text and answer questions that followed. Majority were average students who managed to read at least two paragraphs (eight), and only one student was unable to complete the second paragraph. However, by the time a third lecture session was held students' reading speed had improved tremendously, and the slow reader (during the first session) was among the average readers.

In the digital world and knowledge age in particular where learners are overloaded with information, the pace at which one reads a particular text has implications on the amount of information/data absorbed, and the subsequent comprehension of the text. After the introduction of a voki, the reading speed of students improved steadily; one of the factors responsible for defining a reading culture of a particular group.

Discussion

Technology is increasingly becoming a determinant in renewal of teacher education (Adcock and Bolick 2011). The creation of a voki in a lecture room was not only a mere introduction of technology but a hands-on experience that provided learners with opportunities to discover and exploit their reading and creative abilities (Baron and Wright 2008). The interest stimulated by the voki became a foundation upon which the reading culture is gradually taking root. Kennedy et al. (2008) underscores the importance of introducing practical oriented tasks in technology for greater learner involvement in order to enhance their learning experiences. Use of authentic language, in context of high interest (for example, through creating a voki), and of familiar nature to the learner seem to be the best bet for success in any teaching–learning process (LeLoup et al. 2005).

Introducing a voki and the eventual creation of vokis by students, presented 'evidence of learner and technology interaction whose outcome resulted in knowledge construction' (Ng'ambi 2013). The researcher noticed that students especially those who successfully created a voki, were reading much more text than they used to do before the study, and were always picking out a message for voki creation, and sharing their success with peers. Therefore, emerging technologies carries with it a social aspect that makes learning an interactive and social process (Leu et al. 2004) where an informal environment is created in the lecture room; which ultimately enhances learners' interest and cultivates their reading culture.

Although the study did not concretely integrate the voki in the pedagogical process as Rogers (2003)'s diffusion of innovations theory stipulates (as expounded in Bozalek et al. 2013), with the creativity and interest manifested by students, it is hoped that over time, and with the introduction of several other emerging technologies, the pedagogical process will become digital and quite interactive. Integrating organically emerging technologies in the pedagogical process warrants exploitation of knowledge and skills from students' personal digital engagement and assimilating them in their educational

digital engagement (Gurung and Rutledge 2014). Integrating students' literacy practices, such as instant messaging, in the pedagogical process could be a useful mechanism of enhancing learning (Lewis and Fabos 2005) and widening students' educational digital engagement (EDE).

Conclusion

The study set out to investigate the enhancement of the reading culture among language education graduate students at Makerere University through the use of emerging technologies. The results indicated that the introduction of interventions such as the voki and the ETILAB methodology in the teaching–learning process made tremendous strides in enhancing students' reading culture. Guided by Bowers affordance analysis framework, the researcher was able to identify a voki as an appropriate technological affordance to match with the task at hand—of enhancing graduate students' reading culture. The outcome manifested students' increased engagement and interaction in the teaching–learning process with evidence of incremental improvement in reading. Hence, an enabling environment geared towards empowering students to search, read and express themselves freely in a scholarly manner was forged (Henschke 2010). The integration of the voki in graduate students' pedagogical considerations and the subsequent interaction and interest that ensued among them, postulated an acquisition of knowledge and skills that was not only significant to students' educational endeavours but a life time undertaking.

Methodology

To achieve the above results, a reflective practitioner approach to learning and the ETILAB sandpit methodology were adopted during the teaching–learning process. The ETILAB sandpit methodology in particular was employed in this study to cultivate interaction and nurture creativity among learners. The Educational Technology Inquiry Lab (ETILAB) was established by the University of Cape Town (UCT) School of Education, South Africa to 'facilitate inquiry into educational technology research and pedagogies' (http://www.humanities.uct.ac.za/news/etilab-hosts-teaching-and-learning-think-tank). It is one of the maker spaces that provide learners with an opportunity to 'explore best practices in e-learning techniques and to experiment and prototype innovative teaching methods for the classrooms of the future'. Relatedly, a reflective practitioner approach was used in order to anchor the teaching–learning process on the rich learner experience (Stuart et al. 2009), especially their ability to read, which has accumulated since their undergraduate studies and also as practicing teachers. The above framework, theories and approaches were deemed important because of their ability to cultivate Bloom's revised (digital) higher order thinking skills such as evaluating and creating (Anderson and Krathwohl 2001). The higher order thinking skills of critiquing (evaluating) the read materials and creating a voki that summarises the text were indeed new skills students attained after introducing the methodology. Being a new phenomenon, creating a voki necessitated students' interaction, collaboration and discussion.

Specifically the above methodology employed naturalistic methods of inquiry which included observations, interviews, focus group discussion, collaboration and discovery to obtain data. The methods encouraged inquiry-based learning; where students were

assigned tasks that led to critical thinking and reflection. Emphasis was not laid on the end product but more on the process of learning through utilizing open and formative assessment. The reflective-ETILAB model created greater student engagement and involvement in the pedagogical process. Resourcefulness, innovativeness and creativity became the basis for learning. Prior to the introduction of the methodology, a document on the '21st century Knowledge and Skills in Educator Preparation' and some selected extracts of the NMC Horizon Report 2014 K-12 were given to students to acquaint themselves with the role of technology in the teaching–learning process. After reading the materials, the technology or digital component was analysed and discussed in detail to single out its significance in education. In a discussion that ensued, the importance of digitalization in education basing on what students had read in the documents and their own experiences was shared. To ensure ethical considerations, students filled and signed a consent form that guaranteed confidentiality of the responses obtained, and use of their information for academic purposes.

In the subsequent interactions, the researcher would give students an article to read prior to the lecture, and summarize it basing on the provided guiding questions. Sometimes, he could encourage them to critique the article, coming up with their own ideas on how a certain situation could be improved or made better. To sum it up, students had to create a voki (an audio-visual digital tool). The researcher requested one of his colleagues (Lecturer) to attend these lectures and comment on what transpired during the teaching–learning process. Subsequently, it naturally turned into micro-teaching whereby he could comment, ask questions, implore students to think and could also respond to particular questions and comments from students. The findings were coded and organized into meaningful categories for easy interpretation. The categories were analysed further to establish relationships among categories, meanings and interpretation of the collected data (Creswell 2009). As a result, themes emerged from data, which were employed in the discussion of results.

Abbreviations

ICT: information and telecommunications technology; DICTS: Directorate of ICT Support (at Makerere University); ETILAB: Educational Technology Inquiry Lab; DI: digital identity; PDE: personal digital engagement; EDE: educational digital engagement; MTN: mobile telephone networks—a South African-based telecommunications company operating in many African countries, Uganda inclusive; MOOCs: massive online open courses; OERs: open educational resources; NMC: New Media Consortium. The NMC Horizon Report: 2014 K-12 Edition is a collaboration between the New Media Consortium and the Consortium for School Networking (CoSN).

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Competing interests

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