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PROMOTING INTERACTIVITY IN ONLINE LEARNING – TOWARDS THE ACHIEVEMENT OF HIGH-QUALITY ONLINE LEARNING OUTCOMES

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Abstract:
Online learning is different from face-to-face contact learning. The former is technology-mediated and often accused of lacking the interaction the learners would have when learning together in contact sessions. However, the richness of online learning is flexibility, which allows learning to take place anytime from anywhere. Online learning through the utilisation of digital learning platforms may provide rich learning experiences. The Covid-19 pandemic prompted most institutions of higher learning to move to online learning due to restrictions on gathering. Some of the institutions were not prepared for this move and this resulted in challenges in implementing online learning effectively. When online learning is not implemented properly, students will be pedagogically distanced from the course instructor and the learning process. Moore's (1989) transactional distance theory notes the importance of pedagogical distance to ensure effective distance learning. In this discussion, we unpack the transactional distance theory and suggest ways of promoting interactivity in online learning in different ways. Conclusions are drawn from the discussion and recommendations are made.

Keywords: collaborative learning, pedagogical distance, interactivity, online learning, higher education

1. Introduction

The Covid-19 pandemic and the resultant restrictions on gatherings forced many institutions to embark on online learning. Effective online learning is only possible if it is underpinned by the online learning theories such as the Connectivism (Siemens, 2005)

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and the online collaborative learning theory (Harassim, 2012). Kirkwood and Price (2014, p. 6) argue that it is not necessarily true that technologies can 'enhance learning.' Of importance is how technology is utilised to drive a particular pedagogical perspective. In other words, technology should not influence pedagogy, and Bates (2017) talks of pedagogy before technology. Course instructors need to be thoroughly grounded in principles and practice of teaching and learning to enable them to select and utilise technologies appropriately and effectively.

Of importance in online learning is the need to reduce the learner's loneliness (Gillet-Swan, 2017). Students should be provided with opportunities to work collaboratively in knowledge-construction and knowledge sharing. Siemens (2004, p. …) observes the importance of learning communities and views a community as "*the clustering of similar areas of interest that allows for interaction, sharing, dialoguing, and thinking together*." This ties well with the Community of Inquiry framework, which is premised on social constructivist approaches to learning hence placing emphasis on high levels of different forms of interactivity. Interactivity in online learning is therefore important for enhanced learning.

2. Defining online learning and digital learning platforms

As technology continues to evolve, different authors have come up with various definitions of online learning. Verawardina, Asnur, Lubis, Hendriyani, Ramadhani, Dewi, and Sriwahyuni (2020, p. 386) define online learning as "*learning that uses internet technology that allows teachers and students to carry out learning wherever and whenever outside the classroom*". Past research (Benson, 2002; Moore, Dickson-Deane, & Galyen, 2011) identify online learning as a version of distance learning which enhances access to educational opportunities for learners. Since online learning has become a prevalent model for higher education, institutions and instructors continue to investigate the advantages of including both synchronous and asynchronous elements in online learning. Educause (2020) coined the term bichronous online learning, which refers to blending asynchronous and synchronous online learning.

Another facet of online learning is emergency remote teaching (ERT). Bozkurt and Sharma (2020) describe ERT as a temporary shift of instructional delivery to an alternate delivery model due to crises. It involves the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or as blended or hybrid courses and that will return to that format once the crisis or emergency has subsided (Hodges, Moore, Lockee, Trust & Bond, 2020).

In the educational technology domain, a digital learning platform can be defined as a system that allows learning resource sharing in the context of higher education (Matsunaga, 2018). Digital learning platforms are foundational technologies on which other systems are constructed (Dron, 2018). Platforms are supposed to work together with other software applications. A learning platform is a blend of internet-based services that offer instructors and learners learning material to support instruction. They provide

a learning experience by putting together technology and learning material. Since they have been in existence for some time, the future provides opportunities for the advancement of learning management systems.

A digital learning platform can be described as a flexible open center, which allows for personalized learning, and around which all learning radiates. The flexibility is made possible by plugins and data flow to support learning activities (Thorleif, 2016). Digital learning platforms offer flexibility and personalization with standards like Learning Tools Interoperability. The learning platform should be an integral part of the digital learning environment, together with a changing landscape of third-party applications that you plug in and out.

The platform approach is crucial since it provides opportunities for efficiencies and device scalability. Institutions of higher learning face challenges, due to massification, spanning from infrastructure to security issues (Battle, 2018). The digital learning platform provides media that encompasses learning content in the form of audio, video, text, web resources, and events generated by students interacting with content (Dede & Richards, 2012; Goodyear & Retalis, 2010). Digital learning platforms give students control over time, place, and device they choose to access learning material. The platform enables students to access course content.

3. Online learning during and after the Covid-19 pandemic

The Covid-19 pandemic has resulted in far-reaching consequences for the education sector, the world over. Pravat (2020a, p.12582) notes that in an attempt to contain the transmission of the virus many countries adopted lockdown measures, which resulted in remote learning. In view of the situation in India, which is true of many other contexts, Pravat (2020a, p.12584) says that:

> "*COVID-19 has accelerated the adoption of digital technologies to deliver education. ... It encouraged all teachers and students to become more technology savvy. New ways of delivery and assessments of learning opened immense opportunities for a major transformation in the area of curriculum development and pedagogy*."

It is clear from the above observation that even education systems that were not prepared were forced to embark on online or remote learning. Pravat (2020b) notes that online learning is the best solution for learning in situations of lockdowns and other social gathering restrictions. Pravat (2020b, p.83) further observes that in online "*learners use Internet technology to communicate virtually with their teachers and fellow learners through Email, WhatsApp, Videoconferencing, Instant messaging or using other tools*."

Upoalkpajor and Upoalkpajor (2020, p.25) states that there are a number of opportunities that have been discovered in the Covid-19 pandemic as a challenge. One of the opportunities is the realisation of the importance and usefulness of digital learning in contexts where digital learning was never fully implemented. Realising this opportunity,

governments have begun to strengthen internet infrastructure and mobilise different technologies in order to optimise online learning.

Learning technologies developed to enhance teaching and learning in the Covid-19 pandemic environment will be useful in the post-Covid period (Nkansah, Ayiku, Mensah, Nkrumah, & Evans, 2020). In a way, the Covid-19 pandemic should be a catalyst for the e-learning revolution. The post-Covid-19 period should have strengthened and emboldened the e-learning agenda in most countries in Africa.

4. Defining interactivity in online learning

Interactivity is a derivative term from the interaction that has long been recognized as a critical component of both conventional and distance education (Anderson, 2003). The interactivity of e-learners has been identified as a critical success factor in virtual learning environments (Rodriguez-Ardura & Meseguer-Artola, 2016; Van den Berg, 2020) and a key contributor to engagement and learning gain (Nolan-Grant, 2019). Similarly, Alhih, Ossiannilsson, and Berigel (2017) view interactivity as one of the crucial success indicators and quality standards in online distance models. They add that interaction promotes one's motivation and self-responsibility for the learning processes. It is vital therefore, that online learning environments provide opportunities for interaction.

Before considering the effects of interactivity and how it can be maximized in virtual learning environments, it is important to define the term. Interaction has been defined in different ways (Van den Berg, 2020). According to Steuer (1992, p. 84) (cited in Rodriguez-Ardura and Meseguer-Artola, 2016) interactivity is 'the extent to which users can participate in modifying the form and content of a mediated environment in real-time'. However, others conceive interactivity as a structural capacity of the virtual environment, which reflects its functionalities and design which can be measured by considering the number and type of interactive elements in the virtual environment. Such features may include real-time feedback, network interaction, or sensitive images. However, Rodriguez-Ardura and Meseguer-Artola (2016) challenge this view of interactivity and argue that the 'actual' interactivity level of a virtual environment does not necessarily correspond with final users' subjective evaluations. They conceive interactivity as "*the extent to which the e-learners perceive that their communication or interaction in the virtual education environment is bi-directional, responsive to their actions and controllable*" (Rodriguez-Ardura & Meseguer-Artola, 2016, p. 505).

There are different types of interactivity. Originally, three types of interaction were identified and defined by Moore (1989) in distance education mediums. Other authors (Anderson, 2003; Dailey-Hebert, 2018; Nolan-Grant, 2019) have embraced these three types, modes, or levels of interactions, which are learner-learner (peers), learner-instructor, and learner-content (online resources). Dailey-Hebert (2018) argues that blending the types of interactivity yields improved motivation, satisfaction and achievement in online courses.

Nonetheless, with the increasing use of technology in educational learning environments, a fourth type of interaction has been identified. Allah et al. (2017) contend that there is also student-medium (interface) interaction emanating from the rapid developments in technology and its reflections on distance education. This type of interaction is also referred to as interaction with technology (Van den Berg, 2020). Van den Berg (2020, p.225) argues that the three types of interaction identified by Moore (1989) and "*prevalent in the online learning environments, are mediated by an underlying technology. Interaction with technology is therefore a further vital type of interaction that needs to be added to Moore's initial three types of interaction*".

Student-student interaction in online learning environments include a student working with their peers within teams/groups through discussion, debate, role-play, scenario-building, team projects, or other collaborative activities, for example (Dailey-Hebert, 2018). During such interaction, students co-construct knowledge and meaning together without relying on the 'expert' instructor to convey their knowledge. This type of interaction can be formal or informal (Alhih et al., 2017). According to these authors, formal student-student interactions are built into the course and learning design and are often assessed while informal interactions between students may occur through social media.

The Student-Instructor interaction is about the relationship between the student and the instructor, which serves as the foundation for learning in online courses (Dailey-Hebert, 2018). The interaction can be one-to-one interaction between the student and the course instructor or to a group. It has been shown that one on one student-instructor interaction in online learning promotes student learning, course satisfaction, student satisfaction and persistence. There should be teaching and social presence as important factors that drive learning quality (Kauffman, 2015). Interactions such as students receiving timely feedback from the instructor, knowing the instructor, and having a variety of ways for being assessed all contributed to student satisfaction (Kauffman, 2015). This type of interaction is also enhanced by the tools available in the online learning environment, which support the development of the feedback, relationship building, and timely communication (Dailey-Hebert, 2018).

Student-Content interaction involves students interacting with the content in online learning (Dailey-Hebert, 2018). This type of interaction is viewed by Moore (1989) as primary and a defining characteristic of education because it is the process where the learner interacts with content intellectually resulting in changes in their understanding, perspective, or the cognitive structures of their mind. Student-content interaction occurs when students create new knowledge by combining new information with their existing knowledge, with the assistance of the course instructor (Van den Berg, 2020). Both Moore and Van den Berg assert that without student-content interaction no education or learning takes place.

According to Allah et al. (2017), student-medium (Interface) interaction emanates from mediums provided by technological tools that offer chances for students to share their ideas, talk and discuss or communicate. Examples of objects in student-medium

interaction include course management platforms, accessible library resources, webcam, search engines, and web sites. The students interact with machines and digital artefacts (Van den Berg, 2020).

In the online learning environment, the wide range of digital technology-supported services individuals use to fulfil their educational needs offer interaction opportunities (Rodriguez-Ardura & Meseguer-Artola, 2016). According to Rodriguez-Ardura and Meseguer-Artola (2016), examples of interactive features in E-learning environments include multi-blog learning applications, Wikispaces for collaborative project learning, software programs, hypermedia didactic materials, simulators, real-time communication and project video presentations. Interactivity can be maximized for effectiveness and efficiency in different ways as later discussed in this paper.

5. Unpacking Moore's (1993) transactional distance theory

Moore (1997) states that distance education should be viewed as more than just the physical separation of the student from the course instructor but should be looked at as a pedagogical issue. The separation between the student and the course instructor should be understood as more than a physical separation but an epistemological one too. Garrison (2000) notes that theories such as the transactional distance theory are important in guiding and understanding the complexity of distance learning. Moore (1973) defines the transactional distance theory "*as a psychological and communications gap that was a function of the interplay of structure, and dialogue*" (Moore, 1973 cited in Delgaty, 2018 p.2). In understanding the theory, one has to interrogate the relationship between structure, dialogue, and learner autonomy.

In Moore's (1993) transactional distance theory, structure refers to all issues around the curriculum such as the content as well as pedagogical methods and approaches. There is a need to understand how rigid and flexible the content and instructional issues are. Khan (2007) observes that flexible learning is more learner-centered and highly interactive. The transactional distance is reduced in instances where curriculum and pedagogical approaches are flexible, involving the learner. On the other hand, dialogue refers to issues of interactivity between the learner and the course instructor. If the online learning experiences involve high interactivity then, invariably, the transactional distance is reduced and students are more engaged in the learning process. Transactional distance, therefore, is understood as the relationship between structure and dialogue. There is also the issue of learner autonomy, which entails the extent to which the learner exercises self-directedness in the learning process. Brookfield (2013, p. 90) explains self-directedness in learning as "*learning in which decision around what to learn, how to learn it, and how to decide if one has learned something well enough are all in the hands of learners*." The transactional distance is reduced when learners take control of their learning.

When the online learning environment is more flexible in terms of the curriculum and pedagogical approaches and has high interactivity, the transactional distance is

reduced. It is therefore important to have online learning with more of the learner-centred and collaborative approaches. The learner-course instructor and learner-learner interaction should be maximised through synchronous and asynchronous means (Delgaty, 2018). If there are, online learning experiences involving less learner autonomy and less dialogue the transactional distance increases, suggesting a lack of meaningful learning. Online learning with less dialogue and more structure, results in increased transactional distance, suggesting a lack of meaningful learning (Moore, 1997).

Moore's (1993) transactional distance theory provides useful insights into the planning and implementation of online learning. The programs should be appropriately structured, involving the learners in terms of pedagogical issues. Where possible, the student voice should be included in the designing and development of curricula for the programs. Martens et al. (2019 p 1203) note that there are several ways of including learners in curriculum design and development such as "*design-based research (DBR), participatory design (PD), co-creation, co-design, student voice, student-staff partnership, students as change agents, student engagement, and student empowerment*." The importance of involving learning as an aspect of 'structure' in the transactional distance theory cannot be overemphasised. Pedagogical approaches should also be flexible and learner-centered. Online learning should also facilitate dialogue hence the need to be highly interactive with the digital learning platforms. Moreillon (2015, p.43) states that there are a number of online tools that could be used to promote the interaction of students. Some of the tools include discussion forums on digital learning platforms, social media tools such as Facebook, Twitter, blogs, wikis, chat forums, FaceTime, Google Hangout, and Skype. Jong et al. (2013) note that while group online discussions are useful in promoting collaborative learning there is a need to manage interpersonal relations, which may negatively affect peer interaction.

Online learning should also thrive to promote learner autonomy by encouraging self-directed learning. According to Kiliç and Sökmen (2012) self-directed learning provides learners with opportunities to work on their own, plan and pace their learning and in the process develop self-confidence, autonomy, motivation, and important skills for lifelong learning. Self-directed learning promotes deep learning in learners. The issue of promoting high levels of learner autonomy skills as advanced in the transactional distance theory is a crucial one in online learning.

6. Enhancing students' interaction with content

The student–content interaction embraces the principle underlying human-computer interaction in a learning environment (Anderson, 2011). When students interact with the learning content, it gives them the space to reflect on the content and develop their own understanding of what they read (Zimmerman, 2012). Students interact with the course content through engaging in such learning activities as reading, watching videos, using software programs, participating in simulations, exploring resources, and working on course assignments (Koskey & Benson, 2017).

Tools such as Prezi, Dipity, Thinglink, Animoto, Cacoo, and Flashcard Exchange enable students to engage with online content (Owusu-Agyeman & Larbi-Siaw, 2018). In addition, learning management systems assist as an important domain for promoting student–content interaction. When learners use powerful learning devices and find the learning management system user friendly, they are able to interact with the content easily within the learning community. Course design elements such as course structure, interface, or page design and usability define the structure of the technology tool that strengthens teaching and learning processes.

7. Enhancing students' interaction with course instructors

Technology is changing at a fast pace and methods to establish worldwide relations with one another are being used with increasing frequency for instructors to interact with students (Joosten, 2012). However, instructors must try not to keep up with all technological advances as they appear. Past research by Martin, Diaz, Sancristobal, Gil, Castro and Peire (2011) reveals that new technology emerges almost daily. Instructors may select one or two new technology-enhanced ideas that sound beneficial, then seek support on how to integrate the ideas in teaching and learning.

Course instructors may use technology to create opportunities for interaction. E-mail, asynchronous chats, and online office hours can provide important ways of connection and information between students and instructors outside of class. The use of synchronous or asynchronous audio and video tools when communicating with students can help build rapport. However, care should be taken not to create expectations and workloads that are unmanageable, particularly in large classes. A variety of strategies can help address these challenges. For example, instructors may set electronic office hour times when they are available for synchronous communication. The students will then know not to expect an immediate answer to an email.

8. Enhancing students' interaction with other students

Bickle and Rucker (2018) suggest that Interactive technology for example discussion forums, wikis VoiceThread are successful learning tools since they encourage collaboration, dialogue, and creativity. We live in a society where university students are connected to their mobile phones (Alosaimi , Alyahya, Alshahwan, Al Mahyijari & Shaik, 2016). VoiceThread is one example of technology that can be combined with group assignments to enhance student-to-student interactions (Delmas, 2017). The students are able to communicate across the Internet and share documents via the VoiceThread tool. Students are able to record their assignments using a smartphone or tablet. The recording can be shared with classmates via a link.

Madland and Richards (2016) explored a learning strategy to promote informal peer reviewing of assignments before submission. The authors claim that the strategy promotes student-student interaction and helps break the social isolation of distance

learning. Nevertheless, instructors ought to be careful that student-to-student interactions do not become a distraction but contribute to achieving learning outcomes.

Designing for the desired interactions is another way used to enhance student to student interactions as suggested by Ssentamu, Ng'ambi, Bagarukayo, Baguma, Nabushawo, and Nalubowa (2020). Building reflective questions, for example, YouTube videos allow students to pause and reflect. Research has demonstrated that asking students to respond to reflection prompts can increase interaction between instructors and students, which in turn can improve both teaching and learning, especially in large classrooms. However, collecting the students' responses, and summarizing these responses for both instructors and students is challenging and expensive (Luo, Fan, Menekse, Wang & Litman, 2015). To address these challenges, automation tools such as natural language processing systems may be developed to automatically summarise the reflections.

9. Enhancing students' interaction with technology

It is also important to allude to the fourth type of interaction, which is students' interaction with knowledge. Van den Berg (2020, p. 225) notes that the interaction with technology should be added to Moore's three types of interaction. It is important to note that the three interactions as advanced by Moore "are mediated by an underlying technology". (Van den Berg, 2020, p.225). Technology, therefore, becomes a vital medium of the interaction and students should be taught and supported in order to enhance their interaction with technology. Course instructors should be able to utilise technology well in teaching and learning. Students should also have the knowledge and skills to make effective use of technology for enhanced learning. Erişti and Kurt (2012, p.38) note that teachers should attend to all issues that may become a hindrance in the learners' use of technology for learning. Learners should be trained on how best they could utilise the technology. There should also be constant support for students in instances where they may face technical glitches as they use technology. Students should, therefore, be able to use technology if they are to derive benefits from the three interactions advanced by Moore hence the importance of this fourth type of interaction, which should equally be addressed.

10. Recommendations

In the light of the foregoing discussion, we make the following recommendations;

a) Online learning programme planning and delivery should be based on sound online learning theories and principles.
b) Course instructors should undergo constant professional development training in online pedagogies.
c) Online learning should be highly interactive by providing students with opportunities to be part of online learning communities.

d) Course instructors should be equipped with slides and expertise to plan for and regulate interaction in virtual spaces.
e) Course instructors should understand the concept of pedagogical distance in online learning and seek to find ways to reduce the distance.
f) Online learning programme planning and delivery should be evaluated constantly as a quality assurance measure.

11. Conclusions

We conclude that effective implementation is dependent upon the course instructors' understanding of the theoretical underpinnings of online learning. Online learning which is not based on theoretical considerations may not provide rich learning experiences for online learners. Of great importance in online learning is to provide learners with opportunities for collaborative learning experiences, interactivity is significant. Students should be able to interact with course instructors, with the course content, and with other students. Course instructors should be able to understand what interaction entails by drawing from the relevant theories such as the community of inquiry framework and the transactional distance theory. The reduction of cognitive or pedagogical distance should be the ultimate goal of planning effective online learning programs.

Conflict of interest
The authors declare that there is no conflict of interest.

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