E-Learning: Implications for Mathematics Educators

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Abstract:- The search for knowledge is an everyday thing amongst humans. This has resulted in the enrolment of people into different institutions of learning. The development of technology and the discovery of the internet resulted in their usage for learning. Several institutions have implemented this in their programmes over the years.

This paper examined the concept of e-learning; how it works, it benefits to learners, educators and the society and some challenges it faces. Consequently, its workability for mathematics educators was deduced.

Keywords: Learning, Educator, Mathematics and Online Learning.

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I. Introduction

E-learning involves the use of electronic devices in learning especially on the internet. The advent of the internet and the World Wide Web provided a solution to the problem of distant education. Educators could easily reach out to learners through online learning. Recently, online learning offers rich educational resources in different formats which support varieties of learning pattern, enabling proper communication between tutors and learners. The flexibility which e-learning provides for learners to access information from any place and at any time has made it popular. This has made it become one of the fastest growing trends in the educational use of technology.

The internet provides open sources for information. Learning materials have been made accessible to learners with educators having the opportunities to share their knowledge through the internet. This also provides the educators, the opportunity to prepare their lessons according to the varying abilities of the learners (Gamalel-Din, 2010).

Gamalel-Din (2010), in his review, developed Artificial Intelligent (AI) techniques aimed at promoting e-learning from fourth to fifth generation. In his work, smart tools and environments based on student model and a one-to-one adaptive e-learning were developed. These tools adopted theories from learning, education and cognition. Other developments form their work include methodology of incremental building of domain ontology, learning objects repositories (LORs) obtained from submitted learning materials of instructors and enrichment of learning objects metadata structure and the ontology relationships to accommodate learning style theories.

Hui-Chuan et al (2009) in their study, developed an e-learning model which incorporates problem-based learning as its core and social constructivism and situated learning as its auxiliary theories with the goal of enabling teachers develop knowledge on effective way to teach students with disabilities. The approach recommended adaptive learning cases based on the behaviour of the tutor and the students and has semantic searching capability to avoid information mistake and loss caused by semantic variation.

The U.S. Department of Education (2010) in their review on online learning made the following findings;

- On the average, students in the online learning condition, performed better than the traditional face-to-face learning condition. Though some varying conditions of the two settings were not considered, some treatment conditions were considered.
- When comparison where done on the advantages of combined instruction (online and face-to-face), purely face-to-face and purely online, it was discovered that the advantages of the combined state was far greater than that of purely face-to-face whereas, there were not much over the purely online instruction.
- The effect sizes were larger for conditions in which the e-learning were collaborative or instructive than in the independent working conditions.
- There were not significant effects on the learning outcome of student from the varying methods of implementation of studies online.
- The effectiveness of e-learning varies across material content and types of learners.

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- When there were variations in terms of curriculum contents and approach with medium of instruction, there were larger effect sizes.
- Conditions implemented in same study for both combined and purely online learning generally result in similar learning outcome.
- Freelance learning for learners (having control of interactions with media and other things) improves e-learning.
- Successes are achieved with single learner than with group of learners when providing guidelines for learning.

E-learning provides for educators (mathematics educators inclusive) the opportunities of reaching out to learners and also to learn and improve on knowledge from other educators.

II. How does e-learning work?

According to the US Department of Education (2010), e-learning can be;

- Expository: where digital devices transmit knowledge to learners.
- Active: where the learner builds the knowledge through inquiry-based manipulations of digital artefacts such as microworlds, games, simulations and online drills or
- Interactive: where the learner builds knowledge through inquiry-based collaborative interaction with other learners; in this teachers become co-learners and act as facilitators.

Yengin et al (2010) proposed three methods on how to put any course online with an effective way to engage students into the learning. These methods include active learning, motivation and feedback.

- Active Learning: This involves ways and strategies in making students to be actively involved in the learning process. To make e-learning interesting to students, self-regulating measures are put up for the learners. Some strategies were highlighted and they include placement of emphasis on development of students' skills more than mere transmitting of information and engagement of students in the learning.
- Motivation: E-learning involves distant learning therefore, the students need motivation to be actively involved. Ilker and his team adopted the ARCS motivational model. ARCS which is an acronym for Attention, Relevance, Confidence and Satisfaction.

Mathematics e-educators must ensure that their students who are in distant places pay attention to the lessons. This can be achieved through use of methods that intrigue the interest of the learners.
The educators must ensure that the content of lessons become relevant to set goals. Contents should be according to syllabi.
At the end of the class, it is very important to see the students become confident on what they have learnt. This confidence comes from their ability to handle task given to them after learning. Their ability to deliver on these tasks is dependent on the learning process.
Most importantly is the satisfaction of learners. The educators must ensure that the learners become satisfied with the lessons. Lessons should relate to real world issues. Learners should see need for the lessons. They should understand the applicability of those lessons.

- Feedbacks: Feedbacks in e-learning enhances evaluation and improvement of the learners' performances. Feedbacks make the educators to know if the goals of the lessons are achieved. It makes room for responsiveness in lessons – educators can make adjustment to meet up the demand of the learners. In all, feedbacks make e-learning effective.

III. Benefits of e-learning

This section presents the varying benefits of e-learning; its benefits to the learners, benefits to the educator and benefits to the society

Benefits of e-learning to the learners (students)

Some benefits of e-learning to the students include;

- Flexibility: Kim et al (2005) in their investigation into online learning discovered from the result they obtained that 60% of the students they interviewed admitted that flexibility is the most important benefit of e-learning. In most cases students involve in e-learning are juggling between family, full time job and school. E-learning provides them the opportunity of studying at desired time. E-learners are now having time for other responsibilities other than learning within desired time and places.
- Feedback: E-learners have opportunities of getting feedbacks on what they learn as most e-learning platforms are designed to enable questions and feedbacks. Ulrike-Marie et al (2011) noted that e-learning enhances feedback which can be provided by the educators or automatically by programmes.

They further revealed that the automatic feedback is more economical as it provides for immediate feedback to the students. It was also revealed that these feedbacks were responsive; they could be standardized (be the same for all students) or adaptive (adapting to individual student's answers).

- Interaction: e-learning allows the students to interact with their instructors more freely than in the traditional face-to-face learning. Some online learning platforms are designed to be interactive; allowing the learners and educators to chat on subject matters. Learners through these chats, ask questions on areas where they may be confused or having less understanding and the educators provide answers to questions raised.

- Fascination: E-learning presents more features than the traditional face-to-face learning. These different features make e-learning to be interesting. Kim et al (2005), in their study, observed that 70% of the students of e-learning were fascinated about the contents and features of online courses.

- Satisfaction: Since online learning is opened to different individuals, educators develop their content to meet up desired standards. Kim et al (2005) revealed in their study that 95% of online students interviewed were satisfied with their learning.

- Distant Learning: E-learning allows students to learn from anywhere they desire. This eliminates the need for students to move to where their instructors are based. Students can now learn from instructors in other countries, school in institutions far away from them and obtain knowledge from anyone living far away.

Benefits of e-learning to the educators

The benefits of e-learning are not just to the learners but to the educators as well. Some of the benefits of e-learning to educators include;

- Feedbacks: E-learning provides for the educators the opportunities to evaluate the performances of learners to know if desired goals are met.

- Relearning: Educators have access to relearn and advance on already gotten knowledge through e-learning platforms. Most educators have improved on their knowledge through e-learning; learning from others what they did not know.

- Transmission of Knowledge: Educators, through e-learning platforms, have been able to transmit their knowledge to different places without geographical limitations.

- Access to Instructional Materials: Educators, through online platforms, have access to various materials that they use to develop the content of their lessons.

- Flexibility: E-learning also provides different packages that enhance flexibility of educators on how they deliver their lessons to the learners. The development of technology has made this achievable.

Benefits of E-learning to the Society

Even as we know that the learners and educators are integral part of the society, notable benefits of e-learning to the society include;

- Cooperative Learning: Some e-learning environments are designed to allow collaboration between learners. This has enhanced the development of teaming skills that is necessary for global developments. E-learning therefore, encourages teamwork.

- Globalization of Knowledge: E-learning has provided free access to shared knowledge. Discoveries are shared online; making knowledge to be global. E-learning enhances intercontinental tutoring and learning. Learners learn from people from distant places while educators teach people in distant places as well.

IV.   Challenges of E-learning:

Despite the numerous advantages (benefits) of e-learning, there are inherent challenges that it presents. These challenges are discussed below under some themes.

- Communication: On most online learning platforms, the learners find it difficult to communicate with their peers. This most times are caused by the different times zones which affect their learning times. Consequent upon this, learners find it difficult to communicate on how to team up and do their assignments. This difficulty in team scheduling is a great challenge on most e-learning platforms.
Also, there is a lack of emotional connection in teams of online learning. As learners are not physically together, this often affect their connectivity.

- Absence of Real Time Feedback: In most cases on e-learning platforms, questions asked by students are not responded to immediately unlike the cases of the traditional face-to-face learning environments. Students sometimes wait over some

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period of time for feedback. In cases, where the students need feedbacks immediately, this may pose a threat.

- ICT Experience: Wan et al (2008) investigated into the effect of some psychological factors like learners' ICT (information and Communication Technology) experience affects the outcome of e-learning. In their study, they discovered that ICT experience affected e-learning outcome indirectly through virtual competence. Therefore, the ICT experience of learners affects the way they learn on e-learning platforms. Students with less experience, show low learning outcome while those with good experience, show high learning outcome and perform better.

- Finance: E-learning is done with the aid of electronic devices. These devices are bought. Also, there is the need for internet connectivity to be able to access e-learning materials. To get this internet services, one has to buy them. Economically, e-learning is more expensive than the traditional face-to-face learning. This is a major challenge to the spread of e-learning.

- Attitude: Reed et al (2010) in their study discovered that the attitude of students towards mathematics and computer tools affects the e-learning. Negative attitudes towards these things become a great challenge to the success of e-learning.

V. Conclusion

In this work, it has been shown, the concept of e-learning, how it works, its benefits and the challenges. We have seen that e-learning can be in three forms; expository, active or interactive.

The various benefits of e-learning highlighted in this work shows that it offers several opportunities for the students. The paper further shows its benefits to educators; feedback, relearning, transmission of knowledge, access to materials and flexibility. In addition to the highlighted challenges in the paper, a clear guideline has been made for mathematics educators and learners who intend to explore the online platform.

As a recommendation to the learners, the opportunities presented by e-learning platforms should be fully utilized. Its flexibility presents an avenue for the learners to go about other endeavours and still engage in learning from any place and at any time. Ways of overcoming its challenges should be developed by students to optimally benefit from all it offers.

Educators on the other hand, should utilize the opportunity to transmit knowledge to different parts of the globe. Different systems have been designed to aid the teaching processes in e-learning. Mathematics educators are advised to harness these systems to optimally achieve their goals on e-learning. Whereas many students lack the interest in learning mathematics, educators on the other hand can utilize systems designed for online teaching to captivate the interests of the students. These can come in the form of games or simulations. Course contents should be relevant to the things the students encounter to further get them involved in the learning processes. Every topic in mathematics delivered, should have practical or applicative examples treated in it. The learning environments should encourage interaction with the students for good feedback. Also, the system should allow for interactions between students to enhance team work between students. Regularly, the educator should evaluate the students to ensure the students meet up on set goals for the lessons.

Whereas e-learning has been seen to have enhanced free transmission of knowledge, encouraging globalization of knowledge, there is the need for the society to appreciate e-learning. Different institutions and groups should develop platforms where learning can be done online. Research centres should share their works online. Institutions of learning should also introduce e-learning programmes in courses that do not require much laboratory works. Courses in mathematics can be done easily on e-platforms, so it should be encouraged.

Therefore, e-learning with its vast benefits demands total acceptance and use by different group of people; from learners, to educators and to institutions. This enhances the rapid spread of knowledge across the globe.

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