



UTILIZATION OF MOBILE LEARNING IN THE TEACHING OF SCIENCE FOR SUSTAINABLE DEVELOPMENT

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Abstract:

The process by which one generation's wisdom, information, and skills are handed on to the next is known as education and training. Mobile learning (M-Learning) uses mobile devices such as handheld and tablet computers, mp3 players, smart phones, and mobile phones to support the learning process. These cutting-edge technological devices have revolutionised education by allowing students to learn while moving, making the learning experience more engaging, entertaining, and motivating. This has provided people all around the world with a complete means of transmitting and sharing information. Science is both a process and a body of knowledge, and students learn science by participating in both the content and the methodology. This study investigates the use of mobile learning in the teaching of science sustainable development. Also, it examines the concept of mobile learning, its relevance in the teaching of science, challenges of M-Learning. It concludes by recommending provision of M-learning gadgets such as mobile phones, smartphones, laptops, iPods etc., for collaborative and personal learning at their convenient time which will bring about improvement in learning and teaching of science.

Keywords: mobile learning, teaching science, mobile technologies

1. Introduction

The broad adoption of mobile technologies, both hardware and software, is quickly becoming a requirement for development support. According to Jabbar & Felicia (2015),

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mobile learning is a sort of learning that takes place on mobile devices such as tablets, laptops, and digital readers.

It is the form of learning that occurs when a learner is not in a fixed, predetermined location, or when a learner utilises the learning opportunities provided by mobile technologies. Mobile learning (M-Learning) is a new way to skill acquisition, information distribution, and dissemination that is gaining traction throughout the world. Mobile learning is a modern learning environment that allows for collaboration, personalization, informal learning, and a student-centered learning environment. Mobile learning is defined as "*learning across different contents/ settings through social and content interactions, as a result of the convergence of online capabilities onto mobile platforms, as well as the accessibility and affordability of mobile technology.*" In both formal and informal settings, m-learning has the potential to become the next ubiquitous channel of education.

The mobile technology consolidates sustainable development in the sense that its accessibility and flexibility ease the stress of carrying heavy computerized equipment in order to access materials online or offline. The major fact that mobile learning brings in flexibility on location and time of access is in itself a boost for development.

2. Concept of Mobile Learning

Any sort of learning or education that is not restricted to a specific venue, geographical area, or time frame is referred to as mobile learning. It is the schooling or learning experience that is flexible with venue and timing. Mobile learning exists in various forms ranging between text messages, audio messages and video messages. This presents the platform and forum for learning with ease or convenience. Learning is constant while the methods of learning change every day with technological development. M-Learning has added to the focus of education from what is learnt (content) to how we learn (method).

Over the last two decades, mobile computers have steadily been brought into educational settings (Sung, Chang & Liu, 2016; Olugbuyi, Oginni, Ayeni & Fatoba, 2018). They are more convenient than laptops and computers, and their functions are similar to those of laptops. Mobile devices are substantially less expensive than PCs and laptops, therefore these are relatively inexpensive options.

This presents the learners the room to be active in the process. The new age of learning has motivated learners to be active in the classroom. One-to-one computing has a lot of computing power and portability, which, when paired with wireless communication and context sensitivity features, makes it a wonderful learning tool for both regular classrooms and outdoor casual learning (Sung, Chang & Liu, 2016).

2.1 Mobile Learning and Science Teaching

Mobile learning, as a type of digital education, provides scientific students with a diverse range of learning opportunities. M-Learning, or the process of making education mobile, satisfies the demands of learners all over the world, boosting their confidence. Mobile learning is an eye-catching and stress-free way to maintain mastering skills and have

constant access to information. It is widely available, inexpensive, and quickly disseminated, so it has a lot of potential for reaching out to underserved communities and giving them with opportunities for further education and advancement (Mehdipour & Zerehkafi, 2013).

Science teaching has evolved over the years, from the age of physical classrooms to virtual classrooms. Technological advancement has welcomed new ideas in the teaching of science. Science concepts are no longer obsolete as it is ever present in this new age. Students can access science library anytime and anywhere and of course anyhow! Technology, which is a type of science and is the application of knowledge, is constantly breaking new ground, offering scientific education a fresh perspective. Distance learning is aided by mobile learning in instances where access to learning is restricted or disrupted owing to physical location or post-conflict or post-disaster scenarios (Mehdipour & Zerehkafi, 2013).

Several experiments were conducted to see if mobile learning may improve students' motivation to learn (Jabbar & Felicia, 2015; Wouters, van Nimwegen, van Oostendorp, & van der Spek, 2013). It was observed that mobile learning can help students achieve emotional learning objectives, which adds to the body of data supporting the use of mobile technology in science learning and teaching. Therefore, as mobile learning has a great and positive influence on the teaching and learning of the sciences, its utilization into science teaching will enhance both the teachers and learners.

2.3 Relevance of Mobile Learning in the Teaching of Science

Science concepts is dynamic as the method of teaching. Mobile learning takes away rigidity from the method of teaching and learning, gives room to interactive, collaborative and efficient classrooms. Mobile learning has evolved from a tiny academic interest to a set of substantial programmes in schools, companies, museums, cities, and rural areas all over the world in the last ten years. Challenges such as covid-19 have been unable to impede teaching and learning with the introduction of mobile learning in science education. It is therefore imperative that mobile learnings' relevance to teaching and learning of science cannot be over emphasised.

The educational system has shifted from the pre-COVID era to the post-COVID era, where learning has to be on the go. Any education that wants to thrive will embrace mobile learning as it eases so many educational barriers, and makes teaching and learning flexible. Science education has progressed beyond learning within the four walls of a school or institution; it is now virtual, requiring students to learn without having to travel to a specific area. Every organisation and industry are on the web, as this is a way of reaching out to the world at large. M-learning is a means of reaching out to the world at large, hence science education will be projected to the world via M-learning.

Science education can take place anywhere, anytime, anyhow and in any form, all thanks to M-Learning. The idea that you can never be late to the classroom alone takes away the fear most students have tried to overcome for years. The emotional stability that

comes with never missing anything whenever one decides to learn alone is power and gives learner the right attitude to learning.

Mobile learning also brings many forms and strategies of teaching and learning to science education. Virtual and collaborative classrooms will be utilized when engaging the classroom using mobile learning. M-learning gives the learner confidence to gather information. The teacher also will be flexible in teaching as most of the concepts and information to pass across is always available.

Mobile learning also makes science teaching available around the clock. It is always available 24/7! This idea brings the right attitude from the learner and he/she will be rightly motivated to learn. Mobile learning eliminates the need to carry laptops or other heavy devices around to access information online; instead, mobile phones, tablets, and iPads can access information online in a short amount of time. Mobile learning's importance in science learning and teaching cannot be overstated.

2.4 Utilization of Mobile Learning in Science

Mobile learning can be used in many ways in the learning of the sciences. Electronic books, OutStart, Inc., handheld audio and multimedia guides, in museums and galleries, are examples of mobile devices and personal technology that can enable mobile learning. Handheld gaming consoles, such as the Sony PSP or Nintendo DS, are examples of current gaming consoles. Personal audio player, for example, for listening to lecture recordings (podcasting), Personal Digital Assistant, both in and out of the classroom Tablet computers, UMPCs, cellphones, camera phones, and smart phones are all examples of mobile devices (Mehdipour et al., 2013).

According to analysis, the use of portable devices resulted in better learning results than the use of laptop computers. It's possible that this is related to the fact that handheld studies tend to incorporate novel teaching methods (Sung et al., 2016). Therefore, it is admirable for mobile learning to be utilized into the teaching and learning of the sciences.

2.5 Challenges of Mobile Learning for Effective Teaching of Science

Technologies have eased a lot when it comes to education. However, there are challenges that come with the integration of mobile learning in the teaching and learning of sciences. Technical challenges such as; network connectivity (where one may experience difficulties in connecting to the internet/intranet), battery life (the mobile devices can operate as long as the battery can take it), the size of the screen for reading matters as one may find it difficult seeing the letters clearly, key size is also an issue as typing or messages may not be types expressly as the larger devises, limited memory space also is an issue as memory becomes full after saving files for a period of time which eventually will affect the response of the device. A device may become inefficient if not updated regularly which takes up memory space. There are some files or assets which may not be supported by a specific device, also there is the challenge of not being able to open multiple pages at once. The possibility of files being hacked by hackers, phishing agents,

and other third parties. These are some of the technical difficulties that mobile learning presents.

Also substantial are the societal challenges. There are numerous internet distractions that may cause one's focus to move away from reading or learning vital books or messages and toward chatting, pornography, movies, gaming, and other activities. There is no time limit on the schedule, which could lead to time waste. On the internet, demographic restrictions are impossible to enforce. On the internet and through the usage of mobile learning, personal and academic life are disrupted. In the teaching and learning of science via mobile learning, these and a slew of other issues arise.

The abuse of the mobile learning leads to internet thefts, cyber bullying, hackings, tracking of someone's location and so many more are side effects of M-Learning.

3. Conclusion and Recommendations

It can be established that mobile learning is an improvement in the study of the sciences. It has its pros and cons; however, it brings a new dimension to science teaching and learning.

It is recommended that for sustainable development, learners should be encouraged to engage the mobile handset for learning purposes more than the destructive and selfish reasons.

It is also recommended that learning applications should be easily accessible for learners so as to ease learning.

Also, it also recommended that mobile learning applications be updated frequently to ward off hackers and fishers thereby easing its accessibility to users.

Contributions Statement

The abstract, introduction and concept of M-Learning was written and edited by Dr. Ayeni, Margaret Foluso, while Olugbuyi Peter Olubunmi wrote Mobile Learning, Science Teaching, Utilization of M-Learning and Challenges of M-Learning for effective teaching of science. The final editing and proof reading was done by Dr. Margaret Foluso Ayeni.

Conflict of Interest Statement

The authors hereby declare no conflicts of interests. The article is not submitted to any other journal outfit.

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