An Optimized M-Learning Competitive Based System

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ABSTRACT
This project designed and developed a game based interactive mobile learning model. The model was custom made to match peculiar needs of students in developing countries like Nigeria, who are getting ready to transit into the University in respect to having access to quality study materials in all fields, learning in a self-paced manner within a team-structured contest environment wherein they either join an existing team or create their own teams and invite their peers to join their team and having a collaborative learning. The goal of this project is to enhance learning among students by offering an interactive mobile learning model to help students' cognitive ability and increase their interest in becoming better learners. This model provides a fun-filled interactive learning environment where students' cognitive abilities are evaluated alongside their interests built up, as they are meant to assess their memories with the sample questions in a team-structured contest environment and in return win amazing rewards at the end of their learning. Teachers of schools can also use the model to independently assess their students and evaluate them accordingly by creating quizzes and assignments for them on the system. Parents on the other hand can now comfortably become part of their kids learning progress by following up on their learning progress in real time using the model.
Keywords: Mobile learning, Competitive Model, Game based learning model.

I. INTRODUCTION

The rapid growth in technological development has given rise to a positive influence on the educational system, and its role in the learning process cannot be over-emphasized. Educational technologies today have become increasingly important in the education environment owing to the internet's rapid growth. The internet, since its development, has shown to be a powerful educational tool that offers productive utilization of time and direct right of entry to lots of educational materials for students and teachers. This rapid growth has brought about a massive change in the way learning takes place now. Academic learning in today's world has moved from the well-known traditional face-to-face classroom-oriented way of learning to a more flexible and digitalized form. Few months back, the world was faced with the challenges of the novel COVID-19 pandemic and almost everyone was out of school yet that did not stop the learning process. This was made possible because there were technological tools such as Zoom, Google Meet and Microsoft Teams that were put in place for students to continue their learning. People can now learn from anywhere across the globe without physically being present in the learning location.Competition-based pedagogy is a well-known student-centered learning method that combines the utilization of competitions and tasks [1]. This is geared towards helping the student produce a positive result. This implies that students can learn and compete cognitively with other students in the same environment. This teaching method in addition, employs team-based learning standards. Competition-based learning comprises of student teams in open-ended assignments or task that looks like some problems the students may likely face at school. In any case, performance is evaluated upon completing the task assigned in the subjects compared to other groups. This learning method is reward-oriented, and it aims to build up motivation in the students to give in their best in the overall assignment given. A great majority of educational experts, according to [2] opines that

competition-based learning has the possibilities of enhancing the students' motivation to work harder to come out with positive results at the end of the process, as they are more enthusiastic about the problem to be solved and the possible rewards that awaits them. Competitive learning is acceptable because it debilitates carelessness and raises the students' value consciousness of the positive results. Therefore, the more difficult the competition, the grater the work the competing students have to put in to achieve success in the given task. One can say that this method is an effective one as it will keep your high achievers achieving, meaning that the more wins they have, the more wins they want to keep having, nobody would want to go below the high score they have made already. Furthermore, competition-based learning can help improve these students' ability to think creatively, alongside their problem-solving and teamwork skills, which are set to prepare them for real-world problem-solving. The utilization of mobile devices has since discovery been on a vertical rise. Pretty much every secondary school student, particularly those in the senior secondary, has access to a mobile device, which in some cases may be loaded up with irrelevant materials that are not educational, thus posing as a massive distraction to these students. The role of mobile technologies in 21st century learning is becoming increasingly important; this has resulted in a need for mobile learning environments to provide an efficient and effective way of learning. In countries like Nigeria, where development is still at the early stages, mobile technologies can help provide an improved learning environment that is completely reliable compared to most developed nations where you can find stable electrical power, reliable computers, and good internet connectivity. Mobile tools are owned and used by everyone irrespective of their age, nationality or gender; they are embedded with computer functionalities and their ease of use, mobility and functionality enable the people to use and move around with the devices everywhere they go. The pricing models of the devices vary depending on the device capability, the supplier and the business logic behind the device; some devices are relatively expensive while others are inexpensive. Mobile devices are transforming the way in which we live, work and play. Mobile learning, according to [3], is a harbinger of future learning. Many learning institutions are now integrating mobile learning technologies in their institutions due to the high accessibility and affordability rates of these mobile devices and, most importantly, because mobile devices are not location-bound. Mobile learning

(M-learning) is said to have occurred when the learner is not limited to time or bounded to a particular location. This learning occurs from anywhere and across the globe without the learner physically being present in the exact location as the teacher. This is made possible with the services provided by mobile technology devices, presenting the learning contents and permitting remote communication among teachers and their respective students. This new learning model became possible with wireless networks that support accessibility and collaborative learning among schools, colleges, and universities at all levels. Mobile learning (M-learning) is considered a follow-up on the Electronic learning (E-learning) framework, thereby further improving learning from wherever and anytime. It is regarded as the fourth generation of the electronic learning environment [4].There is a need to engage these teenagers, who are faced with the many distractions that comes with mobile devices most especially the social media, where people are allowed to post whatever they feel like posting without considering who reads them and who is affected by the negative effects of some of their contents, with educational content that would make the learning process fun and flexible for them. The competition structured way of learning will motivate the students to learn and make the whole process lively and a fun-filled one for them. Every student having an equal opportunity to participate in the learning process, making their contributions, and being rewarded for their academic excellence.

II. LEARNING ENHANCEMENT

Enhancement as defined by the Oxford English Dictionary is an increase or improvement in quality or value. In relation to the educational sector, learning enhancement are procedures and strategies employed by institutions of learning and educational bodies which is geared to helping students study more effectively and improve their work, providing expert guidance on study skills, this approach can be said to be student-oriented as it puts students practices in place which reflect the school's commitment to ensuring that each student is given the opportunities necessary for her to make meaningful progress in learning, also to maintain and monitor standards related to learning and teaching. This is of utmost importance to institutions of learning, as it makes the learning process fun and meaningful for the student, and gives room for more significant and evocative activities that not only engage the emotions of these students but also helps them connect or

bound with what they know already, building long-term memory storage capacity.

2.1 Mobile Learning (M-Learning)

Mobile learning (simply known as M-learning) is considered as an extension of e-learning According to [5], Mobile Learning (M-Learning) involves the use of mobile devices such as PDAs, cell phones, smart phones, notebooks, and other devices over wireless networks to provide communication between students and instructors regardless of time and space. This implies that m-learning is a means to enhance learning experiences and has no restriction of time, space and place. It has no restriction of time, by providing a platform where the learner can gain knowledge anytime, unlike the conventional traditional teaching and learning environment where the teacher and learner has a fixed time for interaction. It is not space restricted since knowledge acquired in one context can be applied to another context. It is not bound by place as learning can take place anywhere and not just in a classroom.

2.2 MOBILE OPPORTUNITIES AND CHALLENGES

Mobile technologies, such as mobile phones, smart phones, PDAs, tablet PC and laptops have become integrated into many of the daily activities of learners and are widely used to support learning. According to [6], mobile technologies are commonly used by children. Mobile technologies enable learners who might otherwise have been excluded to engage in education and offer learners a distinct learning experience. According to [6] notes that "Today's students are no longer the people our educational system was designed to teach". He further state that the thinking and mental processing of these student's is profoundly different from their predecessors, they have developed new learning styles and intellectual capacities because of their exposure to technology. Also effective learning occurs only when the learners are active participators in the learning process thus it is necessary to empower learners in the mobile age wherever and whenever they are to be effective. Play is enjoyable, can occur anywhere and anytime, is often self-initiated and informal. As already mentioned, learners should ideally learn the very same way that they play; learning and play need to be relevant to their daily activities. If learners could learn at any location then the nature of learning would improve. According to [7] games in education may improve and motivate learners to engage in the learning process. The intention of learning anywhere you choose (that is, mobile learning) is not to replace formal classroom learning but to enhance the classroom form of learning.Unlike formal classroom learning, mobile learning can reach a broad audience that is any audience with a mobile device. Mobile learning technologies support the distribution of learning material using a wide range2 of multi-media content and they also support collaboration and personalized learning [3]. Each of these will be discussed in the section below.

1.   Mobility

According to [7] there is a myth that mobile learning is "Learning while Mobile", this misperception is derived from the hypothesis that the term 'mobile' refers to 'mobility'. This section will clarify what Mobility is all about. As mentioned earlier in this study, mobility in the mobile learning context refers to the ability to link classroom activities to the outside world, providing learners with the capability to learn in their **own environment**. Mobility offers the learner the opportunity to learn beyond the classroom as these devices can be taken from one location to another - they are personal and portable. The portability of the device is reliant on its physical characteristics; the size and weight of the mobile device matters as much as the input and output capabilities of that device. Compared to desktop computers, portable devices can be used in any location suitable to the learner, instead of learning only in the computer lab or at a fixed location. Some features such as GPS are specifically related to place and are closely related to mobility. This type of learning activity as **situated learning**; learning that is not restricted by a physical setting. Mobile learning can take place whereas the learner is static in their **own environment** or physically **on the move** [7].

2.   Access to information

Mobile learning technologies enable learners to access a wide variety of information; learners can gather information and access research through search engines on the World Wide Web. According to [4] notes that it is impossible for the human brain to remember everything and nowadays the common way to recollect in detail voluminous data is through digital technologies. Learners can save their learning material to disk or the cloud3 storage and mobile technologies can enhance our access to any stored data.

3.   Collaboration

Mobile devices enable people to communicate with each other and they are also

capable of communicating and exchanging data with other communication devices. Smart phones are capable of accessing the internet but these features are not exclusive to mobile devices (desktop computers share most of the features). Mobile devices like "smart" phones can effortlessly connect with many other devices through Bluetooth connections and can identify the current location through GPS [3]. Video conferencing; also known as video Cloud storage is used to store digital data in logical pools, the cloud storage environment is managed and owned by the hosting (cloud storage service providers) company, the responsibility of the hosting company is to enable the enterprise and end users to store digital data, to run and protect the physical environment, and to ensure that the digital data is available and accessible.

2.2 Review of RelatedLiterature

In this section, we examined some of the previous approaches used by researchers for mobile learning enhancement. Various approaches have been used for mobile learning enhancement and they can be roughly grouped into quantitative, qualitative and game-based. Below, we gave a brief review of research studies that have been conducted using these approaches.Game-based approach is ideally suited for repackaging existing e-Learning content in ways that not only lead to improved learner engagement but also support critical thinking, while quantitative approach gathers information that focuses on describing a phenomenon across a larger number of participants thereby providing the possibility of summarizing characteristics across groups or relationships and qualitative approach involves analyzing and collecting non – numeric data (e.g, text, video or audio) to understand concepts, opinions or experiences. It can be used to gather in depth insights into a problem or generate new ideas. Below are existing approach used by researchers:

According to [8], proposed an adoption and application of mobile learning in the education industry. Mobile learning is giving its popularity as it is accepted to be an effective technique of lesson delivery and knowledge acquisition as its main strengths are any time and place, people can now learn from anywhere across the globe without physically being present in the learning location. However, the limitation is not based on the fact that there are no inherent concerns regarding the teaching and learning through mobile learning but rather due to the fact that there exist lack of in-depth studies in this aspect, as a result of the very high cost of gadgets which most individuals can't

afford and the very small usability screen size of mobile gadgets.

In [9], Analysis of using a mobile phone to improve educational outcomes. Mobile phone reduces barriers to education while attaining educational outcomes that are at minimum, comparable to those well-known traditional educational methods. The limitation of this study is to be governed by the validity of the data that were presented by the sources, and also the absence of a process of primary data collection meant for the study, which in some cases the data resulting from the projects reviewed did not always relate to the research questions of the study.

[10], proposed a game-based language learning environment for students perceptions and competition. This paper focus on separate game elements rather than on games as a whole and also takes into account students perceptions of instructions as they are likely to affect students interpretations and learning outcomes. The limitation of the research is that the learning time may have been too short in order to support deep learning, also the learning content was probably too varied and complex as the instructional environment was designed for the learning of complex tasks.

In [11], proposed a mobile learning for student's acceptance. It was shown that performance expectancy, social influence , perceived playfulness of learning and voluntaries of use were all significant determinant of behavioral intentions to make use of mobile learning. The limitation is the effort expectancy and self-management was not found to be significant predictor variables.

According to [12], proposed an improved e-learning system. The system allows online upload of learning materials and gives room for one-on-one interaction between the lecturer and the students, creating an avenue for the students to ask questions and get their answers online. The limitation however, is that this system is not totally free of flaws as the video upload aspect is the major challenge, owing to the fact that the size of the video to be uploaded is directly proportional to the bandwidth to be consumed, which also determines the quality of the uploaded video.

In [13], proposed an educational app through mobile learning. As the students practiced their math's skills when playing the educational app on their tablets, there is no incentives to compete against their peers as they were given rewards (and results) during their game play. The limitation is that there is no other motivations

among different demographics, on the use of digital game-based learning.

As indicated [14], proposed a team competition based ubiquitous gaming approach. The approach significantly enhanced the student's collective efficacy as well as their awareness of collaboration and communication. The limitation of this research is to integrate gaming scenarios into an authentic learning environment in order to enhance students learning effectiveness.

According to [15], proposed a mobile game learning in secondary education. The result showed playing of the frequency 1550 game to produce a clear learning effect in terms of knowledge of medieval Amsterdam. The limitation is that the technology did not always work as planned, in the first three game days particularly, there were problems with the GPS which either displayed the wrong position for the pupils or no position whatsoever.

In [16], proposed a self-learning environment for development of e-learning content and delivery. This research addressed the problems of scarcity of learning resources by using ICT tools in the design and development of e-learning content and delivery for the self-learning environment to reduce the problem. However, the limitation is that the extending content accessibility and summative evaluation of tanssel content is out of scope of this research.

As indicated [17], Proposed a frame work for using game theory tournaments as a base to implement competition based learning (CNBL). The combination of the game theory with the use of friendly competition provides a strong motivation for the students, which in return helps to increase their performance. The challenge comes from other disciplines located far away from mathematics and informatics.

III.   GAME BASED LEARNING (GBL)

Game based learning (GBL) is the design of subjects or courses in a game like platform that will arouse the interest of the students. The goal is to engage and motivate learners to acquire new skills, study indirectly and improve on their academics. Game-based learning consists of various designs running on top of each other.

1. Affective engagement: Learnersget so engrossed into the gamethat they do not want to stop until the game is over. Researchers term this phenomenon as "intrinsic motivation" and attribute it to four sources, namely - challenge, curiosity, control, and fantasy. Immediate Rewards: Learnersget excited when they

win or get points. Affectivestates such as flow and curiosity tend to have positive correlations with learningwhile negative states such as boredom and frustration have the opposite effect. The findings demonstrate that game-based learning environments can simultaneously support learningand promote positive affect and engagement.

2. Behavioral engagement is the observable act of students being involved in learning; it refers to students' participation in academic activities and efforts to perform academic tasks.

3. Cognitive engagement is defined as the extent to which students' are willing and able to take on the learning task at hand. This includes the amount of efforts students are willing to invest in working on the task and how long they persist.

4. Cultural/social engagement is related to mental health independent ofsocio-economic status. Socio-economic status (SES) explains only half of the association [7].
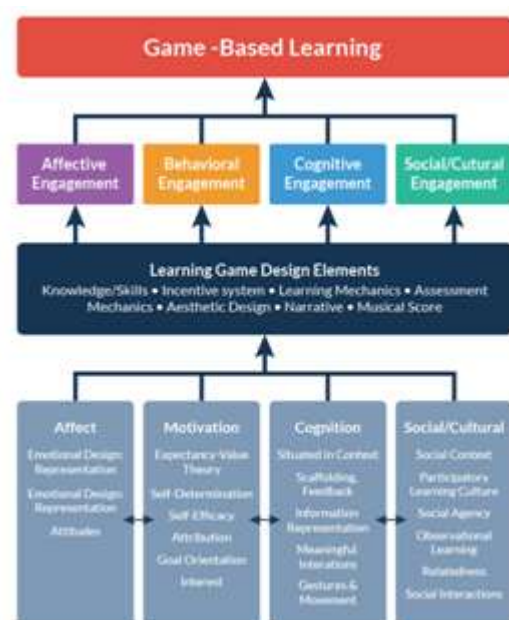

Figure 1: Integrated Design Framework of Game-Based Learning.

3.1 ANALYSIS OF THE PROPOSED SYSTEM

The proposed framework looks to resolve every one of the issues distinguished in the current framework by offering a contest based intuitive versatile learning climate to help understudies' mental capacity and increment their advantage in learning. The framework will go quite far

supplementing the current method of learning. The proposed framework when introduced on the client's cell phones will give them admittance to learning and information evaluation questions which is equipped towards aiding their mental capacities. This framework isn't time or area limited as it tends to be gotten to whenever and from anyplace.

The following are the basic features of the proposed system:

1. The proposed framework is completely gotten that it utilized cell phone number check method for enlistment.
2. The proposed framework is an adaptable and self-guided web based learning framework that furnishes senior optional school understudies with week by week information evaluation inquiries in all subjects.
3. The framework was planned such that it obliged three principal clients which incorporates: the understudies, the instructors and the guardians. The understudy involves the framework in surveying their insight in the different subjects and furthermore in doing their school tasks. The educators utilizes the framework to evaluate their school understudies in type of giving them tasks and the understudies downloads the tasks, takes care of the given issue and sends back to the teacher. The guardians then again utilize the framework to screen the educational experience and progress level of their kids.
4. The framework has a rivalry situated design of discovering that empowers understudies to contend with their kindred understudies in their different branches of knowledge as a method for aiding increment inspiration.

IV.   RESULT ANDDISCUSSIONS

The product of this work brings in rich features that a mobile device supports. With the increase in the usage of mobile phones, learners can now enjoy the same mobility, convenience and portability that a mobile device has. This project enables students to learn at anytime and anywhere. This Learning can be done with limited network accessibility. Learning is the major target as the students' cognitive abilities is built up alongside their knowledge being enhanced in a very interesting and interactive manner leaving them with rewards according to their levels of competence in the learning process. This can be viewed as a great achievement in the field of computing. It is also a unique product in the educational sector in Nigeria.

V.   CONCLUSION

In conclusion, technology has revolutionized classroom training and learning and made it convenient for learners to learn from anywhere and anytime. Electronic learning has metamorphosed into mobile learning, where learning can be delivered on mobile devices. This project aimed to enhance learning among senior secondary school students in Nigeria. It has been built so that different subjects are made available for all students both in the science option and the arts option to choose from to assess their knowledge in that particular subject and win rewards based on their competence levels. The application is also available to teachers and parents but with limited functionalities. The applications can function despite fluctuation in network services.

REFERENCES

[1].   https://en.m.wikipedia.org/wiki/Competition-based_learning

[2].   Burguillo, Juan C. (26 February 2010), "Using game theory and Competition-based Learning to stimulate student motivation and performance", Computers & Education, 55(2): 566–575,doi:10.1016/j.compedu.2010.02.018

[3].   Traxler, J. (2007). Defining, discussing, and evaluating mobile learning: The moving finger writes and having write...International Review of Research in Open and Distance Learning, 8(2),1-12.

[4].   Salmon, L. (2004). E-moderating: The Key to Teaching and Learning Online. 2nd edition. London: Routledge-Falmer.

[5].   Collins N. Udanor and Thomas A. Nwodoh, "A review of M-learning models". Indian Journal of Computer Science and Engineering, Vol 1 No 4 426-435.

[6].   Y.S. Chen, T.C. Kao & J.P. Sheu, "A mobile learning system for scaffolding bird watching learning" Journal of Computer Assisted Learning (2003) 19, 347-359. Available from: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.324.151&rep=rep1&type=pdf[Accessed 29th April, 2021].

[7].   SamsiahBidin, Azidah Abu Ziden. "Procedia social and Behaviourial sciences", 6th international conference of Uni learning and teaching 2013, Pg 720-729.

[8].   John Harmen Valk et al, "using a mobile phone to improve educational outcomes: an analysis of evidence from Asia". International review of research in open and distance learning. Vol 11, issue 1

[9].   Sylke Vander Cruysse, MiekeVandeWactere, et al. "Competition and students perceptions in a game based language learning environment. Education tech research dev (2013).

[10].   Robin lee Donaldson. "Student acceptance of mobile learning". Florida state university college, college of communication and information. 2011

[11].   Bello alhajibuhari, abubakar rook. "An improved E-learning system" Saudi journal of engineering and technology.

[12].   Adriana caterinacamilleri, Mark Anthony camilleri. "Mobile learning via education apps: an interpretative study. Conference paper. 2019.

[13].   Chih-hung chen and Givo-jenhwang. "Effects of the team competition based ubiquitous gaming approach on student's interactive patterns, collective efficacy and awareness of collaboration and communication. International forum of educational technology and society. 2017

[14].   J.huizenge, w.admiraal, s.akkerman and G.ten dam. "Mobile game based leaning in secondary education: engagement, motivation and learning in a mobile city game. Journal of computer assisted learning. August 2009

[15].   Suzan lujara. "Development of e-learning content and delivery for self-learning environment (case of selected rural secondary school in Tanzania). Blekinge institute of technology. 2011

[16].   Juan c. burguilla. "Using game theory and competition based learning to stimulate student's motivation performance. Journals of computers and education. 2010, Pg 566-575

[17].   Janlplass, bruceD.homer, charlesk.kinzer. "Foundations of game based learning. Educational psychologist. Vol 5, issues 4, 2015, Pg 258.