Adopting mobile learning in Nigerian basic education programme to improve access and quality: prospects and challenges

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Abstract

The integration of technology at all levels in the Nigerian educational system is best described as non-existent, this is because of the absence of the factors that promote such integration. The absence of technology in the country's educational system has been identified, among other factors, as being responsible for the poor access and quality associated with the Nigerian basic education programme, that has made the country the home of the highest out of school children globally. This paper aims at considering the possibility of integrating mobile learning technology into the Nigerian basic education programme in order to improve its access and quality. Literature relating to the application of mobile learning in education were reviewed with a view to understanding the current status of its application in improving access and quality of education in the Nigerian basic education programme. Literature reviewed revealed that with adequate deployment of mobile learning technology into education along with

competent personnel as well as the necessary support, access and quality can be improved. Comprehensive integration of mobile learning will bring about improved access (reduce the number of out of school children) and take learning beyond the traditional classroom context in the implementation of basic education programme as well as enable learners gain lifelong learning skills.
Keywords: Mobile learning; Basic education; Improved access; Improved quality

Introduction

Education is a critical instrument for transforming the society. Globally, nations are striving not only to promote quality education but also to improve its access. UNDP (2016) agreed that education is globally accepted as a means through which society can be developed. This is because it is a means of eradicating illiteracy and ignorance among the citizens [1] These roles of education have made the issues of poor standard and out of school children global challenges as they negate child's right to quality education, and frustrates the child's opportunity to become a productive citizen.

The importance of quality education cannot be over-emphasized because it prepares children to realize their potentials and equip them with greater capabilities to participate in the society. UNESCO [2] observed that education itself is a human right and an invaluable instrument for achieving other human rights as it offers disadvantageous and marginalized individuals the freedom from poverty and ability to adequately participate in the society as well as preventing the disadvantaged children from social vices.

Information and Communication Technology (ICT) has played an important role in enhancing the quality and access to education. Government and educational institutions have continued with the efforts to appropriately and adequately deploy it into their activities [3,4] This is because ICT has the capabilities to fast-track, improve and widen skills, inspire and engage learners as well as assists in relating what is learnt in school to work situations. It also assists in making learner relevant in future work and helps to bring about positive changes in school; improves teaching and provides platform for schools and the world to connect [4,5,6] Advancement in ICT has led to a new trend in e-learning, that educators now refer to as mobile learning. Mobile learning offers learners the platform to participate in learning

both within and outside the traditional classroom setting. Oye, Salleh & Iahad [7] stated that mobile learning presents learner with the learning experiences that are not obtainable in most parts of the world and at the same time equipping the learners with the necessary ICT consciousness and skills that are essential to actively participate in the modern world. Liaw & Huang [8]; Giousmpasoglou & Marinakou [9]; Alwraikat & Al Tokhaim [10] described mobile learning as the type of learning that take place with the use of portable devices like Personal Digital Assistants (PDAs) computer tablets and smart phones. Lam & Duan [11]; Al Emran & Shaalan [12] defined mobile learning as the learning that is mediated by mobile technology in order to make learning occur anytime and anywhere.

Any country that aspires to achieve progress must focus on issues relating to education and technology as no society can attain greatness without quality education [1] Unfortunately, Nigerian government has continued to pay lip-service to education and technology as express in the current standard of its educational system and lack of conscious efforts to transform it, to reflect present day realities. These issues of poor standards and access as well as lack of determined efforts to reposition the system to achieve the desired results have led to alarming rate of children not in school. Therefore, this paper focuses on the integration of technology, specifically, mobile learning into the Nigerian basic education programme with a view to improving its quality and access.

Basic Education in Nigeria

Nigerian basic education is a 9-year programme, comprising 6-year primary education and 3-year junior secondary education [13] At the primary school level, it aims to: (a) develop enduring literacy and numeracy, and capacity to interact effectively; (b) provide foundation for systematic and reflective thinking; (c) provide citizenship education as a basis for effective participation in and contribution to the development of the society; (d) mould the character and develop sound attitude and morals in the child; (e) develop in the child capacity to adapt to the changing environment; (f) offer the child platforms for acquiring manipulative skills that will enable the child to function effectively in the society; (g) guarantee the child a solid base for further educational advancement, including preparation for trades and crafts of the locality [13] And at junior secondary school level it is to equip the child, to have suitable living within the society and adequate preparation for higher education [13] It is obvious that in this 21st century society, these goals of basic education in Nigeria cannot be accomplished without the integration of technology in the implementation of the programme.

Current state of Nigerian education system

The Nigerian educational sector has continued to utilize crude and old approaches in delivering its service to the society despite the obvious breakthrough and ongoing evolution in educational technology. This outdated and less effective methods and approaches have resulted in poor standard and access. Odia & Omofonmwan [14] stated that the issues of poor standards and inadequate/obsolete facilities readily come to focus when describing the present state of Nigerian education system. Technological development has affected every aspect of human endeavour and nations are embracing it to enrich their educational systems. Taking advantage of this innovation requires a departure from the previous processes of human endeavours to the current innovative system. The ubiquitous of ICT has resulted in a network society that is ICT oriented [15] Cuban [16] claimed that despite the potentials of educational technology, most 21st century teachers still employ, in their professional practice, the same approaches and methods used by their predecessors, who did not witness the recent technological trends. Aduwa-Ogiegbaen & Iyamu [17]; Adomi & Kpangban [18] maintained that the use of ICT for educational activities in public schools in Nigeria is best described as non-existent. From observation, one can conveniently say ICT is not in Nigerian education system.

The usage of these less effective traditional approaches in Nigerian educational system is partly responsible for the falling standard in the sector and the inability to extend teaching and learning to the disadvantageous and marginalized children. UNESCO [19] declared Nigeria as a country having the highest number of out of school children globally, with 10.5 million, and the country tops other 12 countries that were studied, where it holds 47% of the global out of school children. The report further stated that the country has continuously witnessed the highest rate of out of school children since 1999. Bobboyi [20] also revealed that the number of school-age children, that are not in school, has moved from 10.5 million in 2015 to 13.2 million in 2018 and again the highest globally. Nigerian education system has remained underfunded despite its importance to the country's development. As the number of out of school children continues to soar in Nigeria, the country's budgetary allocation to education has regrettably continued to shrink annually. In 2016 the government allocated 7.92% of its annual budget to education while in 2017, 2018 and 2019 7.4%, 7.04% and 7.05% of the budgets were allocated respectively [21,22,23]

In this 21st century any educational system that its operators still feel comfortable with the traditional approaches and methods of teaching and learning can neither achieve the desired result in the profession nor able to prepare the learners for the expectations of today's

ever-changing world that expects the best from every individual. The innovation in educational technology is being witnessed in the mode of educational content delivery, improvement in the content itself, the extent to which the content can reach the audience and the evaluation of the learner. Agbetuyi & Oluwatayo [4] emphasized that studies in educational technology are no longer seeking to ascertain if technology enhances learning rather studies are now focused on the appropriate technology and processes for enabling and enriching learning.

The evolution of educational technology has, among others, offered opportunity to educators to deliver educational content more effectively, enrich content and access to wider audience, as well as a better means of evaluating the learner and measuring educational outcome [24,25,26] For decades now, the country's educational system has continued to experience poor curriculum contents and low rates of enrolment, attendance, falling standard and poor evaluation method that is characterized with examination malpractice [14,27]

What is mobile learning?

Initially, the main function of mobile devices was to make it possible for users to interact through voice call anytime and anywhere, however through development, the functions of mobile devices have been extended to replicate a resourceful computer. This development has given rise to what educators now refer to as mobile learning as a result of the improved capabilities of modern mobile devices. The advent of mobile learning has extended the capabilities of e-learning. It encompasses mobile computing, e-learning, personalized learning with anytime and learning anywhere [28,29] Unlike the resourceful computer, mobile learning offers additional opportunities of learning anywhere and anytime as well as making learning more adaptive to the learner's peculiarity.

There is no single acceptable definition of mobile learning, this could be partly because the field is evolving rapidly. Park, Nam & Cha [30]; Sarrab, Al Shibli & Badursha [26] see mobile learning as any educational platform that majorly utilize smartphone, personal digital assistants and tablet computers. Examining the field of mobile learning broadly, it could be seen as the deployment of pervasive handheld electronic devices to enhance, support, improve and expand the access to teaching and learning activities [31,7,26] Mobile learning can take place in any location, at any time, including the conventional learning setting (classrooms), in workplaces, at home, and while on the move. Interestingly, it allows learning in both formal and informal contexts without restrictions by taking educational activities beyond conventional classroom boarders [6,26]

It is a veritable tool in education as it has the potential of allowing learning take place outside the conventional education setting. Geddes [32] stated that, mobile learning happens when an individual acquires knowledge and skills by using mobile technology, anywhere, anytime, that results in an alteration in behaviour. Yousuf [33] further posited that unlike the constraint of restricting learning to classroom environment, mobile technology permits access to educational moments without time and location barriers. It involves the application of mobile devices in a manner that allows delivery of learning materials with harmonized approaches that enable learners to gain knowledge from anywhere at any time [34] It utilizes mobile application for learning purposes, offering learners the opportunity to gain high level education in locations where learning institutions and teachers are not accessible [35] Harris [36] claimed that mobile learning is the possibility to participate in an educational moment from a mobile device or a personal digital assistant. With a mobile device, the interaction between the device and its owner becomes one-to-one, always on, always there, location aware, and individualized 29,37]

Examples of some countries that have integrated mobile learning into their education at all levels

Globally, mobile learning has been integrated into a number of education institutions at all levels. United States of America has integrated mobile learning in all levels of its education. Mobile devices have been utilized at all levels from primary to tertiary level in many curricular and subject areas such as literacy, mathematics, science and social studies [38] In Chicago mobile learning has been integrated in schools and such schools have reported that the programme has been very successful due the keenness of the teachers [39]

As part of efforts to prepare the country towards becoming a smart nation, Thai government initiated a programme tagged One Tablet Per Child (OTPC), where android tablet PCs, loaded with subjects including Thai language, science, English language, mathematics, social studies, etc, were distributed to students across all levels of education nationwide to encourage lifelong learning [40,41,42] In addition, Thai universities are consistently reforming their traditional approach of teaching and learning, by embracing online learning procedures. An example of such is “ClassStart” programme developed by Prince of Songkla University. This platform is available, free of charge, to other universities in the country [43,44] This initiative is to assist the country’s educational system and to promote student-centered learning, by enabling the users to access educational moments with internet-enabled devices without time

and location barriers.

Elphick [45] carried out a pilot program called iPilot, to study students' motivation regarding the use of mobile devices for learning. During the two-year duration of the initiative, iPads were provided to the students, and the study revealed that they improved their access to learning outside of traditional settings.

In 2011 Australian government distributed more than 700 units of iPad to nine schools and one education institute in the State of Victoria where it introduced iPads for learning project. In the project, it was observed that the quality of teaching was significantly enhanced when combined with purposeful and effective use of ICT [46] The Faculty of Sciences in the University of Adelaide in an experiment, gave new students iPads in their first year of study in 2011 and concluded that the devices immensely enhanced communication and offered opportunity for better teaching approaches [47] The Faculty of Education in the University of Western Australia during the same year gave students iPads in their first year of post-graduate studies in early childhood and primary programs and found that the devices improved the pre-service teachers' learning in their field of study [48]

It is based on these stunning possibilities offer by mobile learning that this paper is advocating the adoption of mobile learning in Nigerian education system, with specific reference to basic education, to make the education inclusive to cater for the marginalized children who due to poverty, cultural/religious beliefs, conflicts, child labour are being deprived of education in Nigeria.

Mobile learning and access to education

The capability of mobile devices allowing learners to access instructional materials anywhere and anytime makes them important tools for extended access to education. Studies indicated that mobile learning is as effective as traditional teaching approaches [49,50,51] In addition, learners appreciate the improved, speedy and easy access to more resourceful educational materials that are associated with mobile learning devices [52,53

The mobility of technology in the last decade has resulted in the emergence of mobile learning that has given rise to new ways of learning in different settings that were not available before [54,35] Yurdagül & Öz [55] stated that it enables learners to have rapid and easy access to learning materials while on the move.

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iPads were provided to the students, and the study revealed that they improved their access to learning outside of traditional settings. Lepp, Barkley & Karpinski [56] posited that owing to the portability of mobile devices, they permit users to access various services and platforms, including educational materials anywhere and anytime.

Song & Siu adopted a project called Bring Your Own Device (BYOD) in Hong Kong which has been utilized both in and outside of classrooms with the aim of facilitating teaching and learning anywhere and anytime. This program helped to eliminate the gap between teachers and students, extending learning beyond conventional classes and allowing teachers to engage larger audiences of learners. Mobile learning enables students' learning process to be tracked by offering them opportunities to reflect on their studies and collaborate in accessing instructional materials, as well as reviewing and making comments on their peers' work. Mwapwele & Roodt [58] revealed that almost three-quarters of six form students in Tanzanian schools that were surveyed, had utilized Google on their mobile devices for their studies and 44% of them had used Youtube to connect to various learning activities via their mobile devices.

Mobile learning and quality education

Learners have reported that mobile learning projects have favorable impacts on their studying activities [59,60,61] Elphick's [45] study revealed that mobile devices improved digital literacy, creative ability, confidence, interactions and engagement among the majority of students. Mobile learning tools motivate students to participate actively as they collaborate with other students and/or their peers in groups which encourage them to share perspectives on issues relating to learning [62,63,64]

Mobile devices provide easy access to a wide range of educational resources that support learners [65] In addition, mobile learning offers the opportunity to learners to better organize their free time between classes [66,60,52] and such utilization has been linked with enhanced performance in examinations [67,68,69] Mobile devices offer the opportunity via the internet for both learners and teachers to bring the outside world into their learning environment in forms of images, text, video and audio recordings. In England, the British Educational Suppliers Agency (BESA) annual report on mobile devices and connectivity in schools for 2016, indicated that 71% of the 446 primary schools surveyed were making use of mobile devices to support learning [70]

Examples of such initiatives include: using gaming on mobile devices to stimulate collaborative group learning Williams [71] using school-owned smartphones to scaffold

individualized inquiry learning on school trips to places like zoos, museums, factories [72] or using mobile digital storytelling that was stimulated by a school trip to a cultural center [73] Furthermore, examples of innovative ways in which students are using mobile devices to enrich learning outside the classroom include: using cameras to obtain real examples of chemical reactions in their homes [74] or via developing animations [75] and augment reality with location stimulated videos and information for social sciences [76] These devices have become an integral part of peoples' lives and can assist in accessing internet resources, run experiments in field studies, capture, store and manage daily events as images and sounds, and share the information with their peers and experts globally [77,78,79]

Prospects of mobile learning Integration in Nigerian Educational system

An educator that possesses appropriate and adequate proficient skills in the manipulation of mobile technology as it relates to education will significantly direct the learners positively and bring out the best in them to better equip them for the future. Where the appropriate mobile technology is deployed to teaching and learning with the right personnel, the following include the benefits.

Improved access to learning: Since mobile learning supports teaching and learning anywhere and anytime, it helps to guarantee greater access to education. Mobile learning offers learners the opportunity to gain high level education in locations where learning institutions and teachers are not accessible [35] Aduke [31] posited that it offers unconfined access to both the teacher and the learner for appropriate and recent trends in various subject areas. Tinio [80]; Agbetuyi & Oluwatayo [4] emphasized that ICTs are effective tools for positive change in education and when deployed correctly, help to extend access to teaching and learning and make education more viable to the world of work and also help to improve quality by enabling an active experience that can be linked with actual life realities. This means mobile learning has the capability of equipping learners with modern employable skills and extending learning to children who are not in school, particularly, the marginalized children who due to certain factors are unable to be in school to participate in education with the traditional classroom settings.

Up-to-date and unrestricted access to educational resources: The restriction to what the teacher and textbooks can offer the learners in traditional learning environment is eliminated with the integration of mobile technology in education. The learners are at liberty to search and obtain current resource on any subject matter on the internet. According to

Agbetuyi & Oluwatayo [4] with ICT learners and teachers are offered vast learning materials in various subjects and this is specifically important to the less developed countries like Nigeria that has limited and non-current learning materials. Educational technology, in addition, promotes access to emerging developments in all fields of education globally. As it allows learning anytime and anywhere, it also enables the learner search and acquire recent trends on whatever issue the learner is engaged with regard to learning. It also offers the teacher the opportunity to broaden his knowledge on issues with the unrestricted access to vast and current educational materials on the internet.

Learner-centered education: Mobile learning is adaptive to the peculiarities of the learner. The learner is not location and time bound as he can engage in learning anytime and anywhere and at his own pace.

Enhanced collaboration: Mobile learning generally promotes collaboration among the learners and the teachers, this possibility helps to build the spirit of team work in the learners and expose them to richer perspectives of other learners on issues as they exchange information across the platform. In the same vein, it also encourages collaboration among teachers as the teacher can reach out to other teachers within and outside the school to share ideas of issues and even seek technical support on challenging areas on the use of the technology.

Better engagement of the learner: Generally, the use of technology in education, especially, mobile devices motivates learners to participate in learning actively as they are able to collaborate with other learners or their peers in teamwork and sharing perspectives on issues. Mobile learning improves the engagement, motivation and interests of young learners in learning activities [81,62,63,64]

Better evaluation: Technology in education can help to enhance evaluation of the learner thereby eliminating malpractice in the process of evaluation. This is because it has, among others, the possibilities of posing different (personalized) questions to different learners at the same time and result of the evaluation accessed instantly, thereby making the evaluation process more reliable.

Challenges of mobile learning integration in Nigerian education system

Poor funding: Poor funding is a critical challenge that is adversely affecting the utilization of technology in Nigerian educational system. Odia & Omofonmwan [14] found that underfunding has led to falling standard of the system as classrooms, laboratories and

libraries are all in bad state. Education requires adequate funds to cater for the activities of teaching and learning. Among others, the sector needs fund for engagement of qualified hands, deployment of technology, in-service training of personnel, provision of facilities like adequate classrooms, modern libraries/laboratories, etc. Investigations revealed that poor financial support is the major challenge of the National Open University of Nigeria (NOUN) to build the necessary infrastructure to adequately provide its students with learning materials online [7]

Inadequate competent teachers: The lack of sufficient qualified teachers is also the bane of technology integration in Nigerian educational system. Computer facilities are abandoned in the few schools where they exist as the teachers lack the fundamental skills to proficiently utilize the technology in their daily professional activities. According to Devie (2017) to be seen as literate in 21st century such individual must possess adequate digital skills. A teacher that is not proficient in the manipulation of computer technology cannot prepare the students to adequately participate in the 21st century world that is technology-driven. Adegun [82] revealed that the utilization of technology in education in Nigeria is at the infancy level as the teachers and students have to be physically present at the same place and time for teaching and learning to occur. The poor usage of technology persists inspite of the spectacular advances in hardware and software [83] Resnick [84]; Folorunso, Ogunseye & Sharma [85]; Oye, Salleh & Iahad [7] identified poor computer literacy among teachers and learners as one of the factors militating against e-learning in Nigeria. Most of the teachers who are to engage the students in e-learning lack the skills to proficiently manipulate the technology. Sharma, Ekundayo & Ng [86] stated that e-learning demands the teachers and learners to be more proactive and disciplined compared to the traditional context of face-to-face learning context.

Expensive internet connectivity: Allied with the above-mentioned challenges is the high cost of Internet connectivity as one can hardly find Wi-Fi services in Nigerian schools. Accessing the internet in Nigeria is very expensive and most students cannot afford it along with other costs they are burdened with [31] The high cost of internet connectivity makes it difficult for both teachers and students to access the opportunity and benefits ICTs offer in educational context.

Poor power supply: Electricity is the bedrock for ICT utilization. Electricity supply in Nigeria is epileptic as the supply is characterized with frequent outages and the cost of alternative source of power supply is on the high side. Ajadi, Salawu & Adeoye [86] emphasized that this poor power supply is a major constraint for the country to advance technologically as most of the rural communities are yet to be connected to the national grid

and most students who reside in such areas experience challenge to effectively use ICT in their learning activities [86]

Limited technical support: The problem of limited technical support also inhibits the development of ICT in Nigeria. Ajadi, Salawu & Adeoye [86] revealed that there is no adequate technical support team at the National Open University of Nigeria. The challenge of absence or limited trained personnel to offer technical support to the ICT users limit the utilization of ICT in many Nigerian institutions of learning [31]

Conclusion

However, these challenges are fizzling out gradually, as educational stakeholders and civil society organizations are prevailing on the government to redefine its educational services to the citizenry. These efforts have started to yield positive results as the various governments (both federal and state) are formulating strategies to revamp the educational sector comprehensively in recent times.

Recommendations

The government should faithfully depart from lip-service funding to education and give education its desired attention by funding the sector adequately. This will help to revamp the deteriorated existing facilities and upgrade them to meet the needs of education as far as 21st century is concerned. The government should make efforts to comply with the UNESCO recommendation of 26% of the total budget of a nation to its educational sector in order to comprehensively address the rot in the educational sector.

With the provision of adequate funding technology can be deployed to the educational sector to improve access and achieve inclusive education as well as improving its quality. The integration of technology into education sector will go a long way in addressing the challenge of excluded children from education in Nigeria which has assumed an alarming proportion. Comprehensive integration of technology into the educational system will eliminate the challenge of examination malpractice which has ridiculed the quality of graduates that passed out of these institutions.

Collaborative efforts should be made by the three tiers of governments (federal, state and local governments) to initiate a continuous professional development scheme for teachers in order to equip them with the attributes expected of 21st century teachers as well overhauling of the various teacher training institutions across the country with a view to

repositioning them for up-to-date training of teachers.

The deployment of technology will also help to address the problem of poor monitoring of educational activities by the various agencies that are charged with such responsibilities.

Above all the education stakeholders in the country should as a matter of urgency come up with a more comprehensive and feasible policy and framework that will deeply entrench modern technology into its educational sector as a means of correcting the existing abnormality in the system and to enrich its practice.

References

[1] Odukoya, J. A., Bowale, E. & Okunlola, S. (2018). Formulation and implementation of educational policies in Nigeria. *African Educational Research Journal*, Vol. 6 No.1, pp. 1-4.

[2] UNESCO. (2003). Right to Education: Scope and Implementation. General comment 13 on the right to education. UNESCO Economic & Social Council. Available at: http://portal.unesco.org/education/en/file_download.php/c144c1a8d6a75ae8dc55ac385f58102erighteduc.pdf Accessed December 11th, 2018.

[3] Kwasha, P. Z. (2007). The imperative of information and communication technologies for teachers in Nigerian higher education. *Merlot Journal of Online Learning and Teaching.* Vol. 3 No. 4, pp. 395-399.

[4] Agbetuyi, P. A. & Oluwatayo, J. A. (2012). Information and Communication Technology (ICT) in Nigerian Educational System. *Mediterranean Journal of Social Sciences* Vol. 3 No. 3, pp. 41-45.

[5] Lemke, C. & Coughlin, E. C. (1998). Technology in American schools: Seven dimensions for gauging progress. *Milken Exchange Commission on Educational Technology*. Available at: http://www.mff.org/pubs/ME158.pdf Accessed December 31st, 2018.

[6] Yusuf, M. O. (2005). Information and communication technology and education: Analysing the Nigerian national policy for information technology. *International Education Journal*, Vol. 6 No. 3, pp. 316-321.

[7] Oye, N. D., Salleh, M. & Iahad, N. (2011). Challenges of e-learning in Nigerian university education based on the experience of developed countries. *International Journal of Managing Information Technology*, Vol. 3 No. 2. pp. 39-48.

[8] Liaw, S. S. & Huang, H. M. (2012). A Case of Study of Investigating Users' Acceptance

toward Mobile Learning. In Recent Progress in Data Engineering and Internet Technology, 299- 305. Springer Berlin Heidelberg. http://dx.doi.org/10.1007/978-3- 642-28798-5_41

[9] Giousmpasoglou, C., & Marinakou, E. (2013). The Future Is Here: m-Learning in Higher Education. *In Proceedings of the 4th International Conference on e-learning Best Practices in Management, Design and Development of e-Courses: Standards of Excellence and Creativity"*, pp. 417-420. Available at https://www.researchgate.net/publication/262324568_The_Future_Is_Here_m-Learning_in_Higher_Education Accessed 5th January, 2019.

[10] Alwraikat, M. A. & Al Tokhaim, H. (2014). Exploring the Potential of Mobile Learning Use Among Faculty Members. Vol. 8 No. 3, pp-4. Available at: http://dx.doi.org/10.3991/ijim.v8i3.3682 Accessed December 24th, 2018.

[11] Lam, J. & Duan, C. G. (2012). A review of mobile learning environment in higher education sector of Hong Kong: technological and social perspectives. *In Hybrid Learning*, 165-173. Springer Berlin Heidelberg. Available at: http://dx.doi.org/10.1007/978-3-642- 32018-7_16 Accessed December 21st, 2018.

[12] Al Emran, M. & Shaalan, K. (2014). E-podium Technology: A medium of otanaging Knowledge at Al Buraimi University College via M-learning. In conference proceedings of the 2nd *BCS International IT Conference*. Abu Dhabi, United Arab Emirates

[13] Federal Republic of Nigeria, (2004). National policy on education. NERDC Press 3, Jibowu Street, Yaba, Lagos-Nigeria.

[14] Odia, L. O. & Omofonmwan, S. I. (2007). Educational System in Nigeria Problems and Prospects. *Journal Social Science,* Vol.14 No. 1, pp. 81-86.

[15] Castells, M. (1996). The Rise of the Network Society (vol. 2). Oxford: Blackwell Publishers.

[16] Cuban, L. (2001). Oversold and underused: Reforming schools through technology, 1980–2000. Cambridge, MA: Harvard University Press.

[17] Aduwa-Ogiegbaen, S. E. & Iyamu, E. O. S. (2005). Using Information and Communication Technology in Secondary Schools in Nigeria: Problems and Prospects. *Educational Technology & Society*, Vol. 8 No. 1, pp. 104-112.

[18] Adomi, E. E. & Kpangban, E., (2010). Application of ICTs in Nigerian Secondary Schools. *Library Philosophy and Practice (e-journal)*. 345. Available at: http://digitalcommons.unl.edu/libphilprac/345 Accessed November 21st, 2018

[19] UNESCO. (2016). Global education monitoring report. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000246230 Accessed November 2nd, 2018.

[20] Bobboyi, H. (2018). 13.2 million Nigerian children now out of school -UBEC. *Punch* 5th October. Available at: https://punchng.com/13-2-million-nigerian-children-now-out-of-school-ubec/ Accessed December 3rd, 2018.

[21] Eghomeka, U. (2018). 2018 budget and the paltry allocation for education. *Punch* 28th June. Available at: https://punchng.com/2018-budget-and-the-paltry-allocation-for-education/ Accessed December 30th, 2018.

[22] Adedigba, A. (2018). Budget: Buhari allocates 7% to education. *Premium Times* 8th November. Available at: https://www.premiumtimesng.com/news/top-news/248663-2018-budget-buhari-allocates-7-education.html Accessed December 21st, 2018

[23] Ameh, J. & Aluko, O. (2019). 2019 budget: Education gets N620.5bn, against UNESCO's advice. Punch 4th January. Available at: https://punchng.com/2019-budget-education-gets-n620-5bn-against-unescos-advice/ Accessed December 21st, 2019.

[24] Liu, Y. (2008). An adoption model for mobile learning. In Proceeding for the IADIS International Conference e-Commerce. Amsterdam, The Netherlands.

[25] Sánchez, I. A. & Isaías, P. (2014). Proceedings of the International Conference on Mobile Learning. (10th, Madrid, Spain, February 28-March 2, 2014). *International Association for Development of the Information Society*. Available at: https://files.eric.ed.gov/fulltext/ED557171.pdf Accessed December 27th, 2018.

[26] Sarrab. M., Al Shibli, I. & Badursha, N. (2016) An Empirical Study of Factors Driving the Adoption of Mobile Learning in Omani Higher Education. *International Review of Research in Open and Distributed Learning*. Vol. 17 No. 4. Available at: https://files.eric.ed.gov/fulltext/EJ1108438.pdf Accessed December 13th, 2018.

[27] Hassan, Y. & Varshney, D. (2019). Appraisal of Youths Employability Challenges in Nigeria *International Journal of Humanities and Social Science Invention*, Vol. 8 No. 1, pp. 01-08.

[28] Quinn, C. (2001). Get ready for m-learning. *Training and Development*, Vol. 20 No. 2, pp. 20–21.

[29] Motiwalla, L.F. (2007). Mobile learning: A framework and evaluation. *Computer and Evaluation*, Vol. 49 No. 3, pp. 581-596.

[30] Park, Y. S., Nam, M. W. & Cha, S. B. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. *British Journal of Educational Technology*, Vol. 43 No. 4, pp. 592-605.

[31] Aduke, A.F, (2008). Usage and challenges of information and communication technology (ICT) in teaching and learning in Nigerian universities. *Asian Journal of Information*

Technology, Vol. 7 No. 7, pp. 290-295.

[32] Geddes, S. J. (2004): Mobile learning in the 21st century: benefit for learners. Knowledge Tree e-journal: An ejournal of flexible learning in VET, Vol. 30 No. 3, pp. 214-28.

[33] Yousuf, M. I. (2007). Effectiveness of Mobile Learning in Distance Education. *Turkish Online Journal of Distance Education*, Vol. 8 No. 4, Article 9. Available at: https://files.eric.ed.gov/fulltext/ED499346.pdf Accessed November 5th, 2018.

[34] Ally, M. (2004). Designing effective learning objects for distance education. In McGreal R. (Ed.), *Online education using learning objects* (pp. 87-97). London: Routledge Falmer.

[35] Heflin, H., Shewmaker, J. & Nguyen, J. (2017). Impact of mobile technology on student attitudes, engagement, and learning. *Computers & Education Journal*, Vol. 107 Issue C, pp. 91–99.

[36] Harris, P. (2001). Going mobile – learning circuits ASTD Magazine All about elearning. Available at: https://www.researchgate.net/publication/26477395_Effectiveness_ of_ mobile_learning_in_distance_education Accessed December 22nd, 2018

[37] Homan, S. & Wood, K. (2003). Taming the mega-lecture: wireless quizzing, Syllabus Magazine. Available at: http://www.syllabus.com/article.asp?id=8251 Accessed November 21st, 2018.

[38] Banister, S. (2010). Integrating the iPod touch in K-12 education: Visions and vices. Computers in the Schools. *Interdisciplinary journal of practice, theory, and applied research*. Vol. 27 No. 2 pp 121–131.

[39] Mifsud, L. (2002). Alternative learning arenas – pedagogical challenges to mobile learning technology in education. In Proceedings of the IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'02). Available at: http://www.cin.ufpe.br/~mlearning/intranet/m-learning/Alternative%20learning%20 arenas-pedagogical%20 challenges%20to%20mobile%20learning%20technology% 20in%20education.pdf Accessed November 27th, 2018.

[40] Ministry of Education. (2011). Executive summary, information and communication technology (ICT) master plan for education, 2011-2013. Bangkok: Ministry of Education of Thailand.

[41] OECD/UNESCO (2016). Education in Thailand: An OECD/UNESCO perspective. Paris: OECD and United Nations Educational, Scientific, and Cultural Organization, OECD Publishing.

[42] Panjaburee, P. & Srisawasdi, N. (2018). The opportunities and challenges of mobile and ubiquitous learning for future schools: A context of Thailand. *Knowledge Management*

& E-Learning, Vol. 10 No. 4, pp. 485–506.

[43] ClassStart Learning management system (2016). Available at: classstart.com Accessed 7th April 2020.

[44] Thongsri, N., Shen, L & Bao, Y. (2019): Investigating factors affecting learner's perception toward online learning: evidence from ClassStart application in Thailand, *Behaviour & Information Technology*. Available at: https://arxiv.org/ftp/arxiv/papers/1903/ 1903.09485. pdf Accessed 7th April 2020.

[45] Elphick, M. (2018). The impact of embedded iPad use on student perceptions of their digital capabilities. *Education Sciences*, 8(102).

[46] Pegrum, M., Oakley, G. & Faulkner, R. (2013). Schools going mobile: A study of the adoption of mobile handheld technologies in Western Australian independent schools. *Australasian Journal of Educational Technology*, Vol. 29 No. 1, pp. 66-81.

[47] Herrick, C. (2011). iPads have reduced costs, improved communication for University of Adelaide. *Computerworld*. Available at: http://www.computerworld.com.au/article/ 404175/ ipads_reduced_costs_improved_communication_u ni_adelaide/ Accessed December 31st, 2018.

[48] Pegrum, M., Howitt, C. & Striepe, M. (2013). Learning to take the tablet: How pre-service teachers use iPads to facilitate their learning. *Australasian Journal of Educational Technology*, Vol. 29 No. 4, pp. 464-479.

[49] Kurth, R. J., Silenzio, V. & Irigoyen, M. M. (2002). Use of personal digital assistants to enhance educational evaluation in a primary care clerkship. *Med Teach*., Vol. 24 No. 5, pp. 488–490.

[50] Schooley, B., Walczak, S., Hikmet, N. & Patel, N. (1016). Impacts of mobile tablet computing on provider productivity, communications and the process of care. *Int J Med Inf*. 88, pp. 62–70.

[51] Lee, L. A., Chao, Y. P., Huang, C. G., Fang, J. T., Wang, S. L., Chuang, C. K., Kang, C, J., Hsin, L. J., Lin, W. N., Fang, T. J. & Li, H. Y. (2018). Cognitive style and mobile E-learning in emergent otorhinolaryngology head and neck surgery disorders for millennial undergraduate medical students: randomized controlled trial. *Journal of Medical Internet Research*, Vol. 20 No. 2.

[52] Twiss-Brooks, A. B., Andrade, R., Bass, M. B., Kern, B., Peterson, J. & Werner, D. A. (2017). A day in the life of third-year medical students: using an ethnographic method to understand information seeking and use. *J Med Libr Assoc JMLA*, Vol. 105 No. 1, pp. 12-19.

[53] Law, J. K., Thome, P. A., Lindeman, B. M., Jackson, D. C. & Lidor, A. O. (2018). Student use and perceptions of mobile technology in clinical clerkships – Guidance for curriculum design. *The American Journal of Surgery* Vol. 215 No. 1. DOI: 10.1016/j.amjsurg.2017.01.038

[54] Pachler, N., Pimmer, C. & Seipold, J. (2011). Work-based mobile learning: an overview. Available at: http://www.newbooks-services.de/MediaFiles/Texts/0/9783039119820_Intro_005.pdf

[55] Yurdagül, C. & Öz, S. (2018). Attitude towards Mobile Learning in English Language Education. *Education Sciences*, 8(142).

[56] Lepp, A., Barkley, J. E. & Karpinski, A. C. (2014). The relationship between cell phone use, academic performance, anxiety and satisfaction with life in college students. *Computer in Human Behavior* 31, pp. 343-350.

[57] Song, Y. & Siu, C. K. (2017). Affordances and constraints of BYOD (Bring Your Own Device) for learning and teaching in higher education: Teachers' perspectives, *The Internet and Higher Education*, Vol. 32 No. 1, pp. 39-46.

[58] Mwapwele, S. D. & Roodt, S. (2016). The extent of usage of mobile devices for learning outside the classroom in a secondary school in Tanzania. *In Proceedings International Conference on Information Resources Management*, 65.

[59] Gormley, G. J., Collins, K., Boohan, M., Bickle, I. C. & Stevenson, M. (2009). Is there a place for e-learning in clinical skills? A survey of undergraduate medical students' experiences and attitudes. *Med Teach*. 31(1), 6–12.

[60] Alegría, D. A. H., Boscardin, C., Poncelet, A., Mayfield, C. & Wamsley, M. (2014). Using tablets to support self-regulated learning in a longitudinal integrated clerkship. Med Educ Online 19 https://doi.org/10.3402/meo.v19.23638.

[61] Green, B. L., Kennedy, I., Hassanzadeh, H., Sharma, S., Frith, G. & Darling, J. C. (2015). A semiquantitative and thematic analysis of medical student attitudes towards Mlearning. *J Eval Clin Pract*. Vol. 21 No. 5, pp. 925–930.

[62] Boyce, C., Mishra, C., Halverson, K. & Thomas, A. (2014). Getting students outside: Using technology as a way to stimulate engagement. *Journal of Science Education and Technology*, Vol. 23 No. 6 pp 815-826.

[63] Ciampa, K. (2014). Learning in a mobile age: An investigation of student motivation. *Journal of Computer Assisted Learning*, Vol. 30 No. 1, pp 82-96.

[64] Davie, S. (2017). Mobile learning in early childhood education: A school-university partnership model (Doctor of Philosophy (College of Education)). University of Notre Dame

Australia. Available at: https://researchonline.nd.edu.au/theses/163 Accessed December 26th, 2018.

[65] Chase, T. J. G., Julius, A., Chandan, J. S. C., Powell, E., Hall, C. S., Phillips, B. L., Burnett, R., Gill, D. & Fernando, B. (2018). Mobile learning in medicine: an evaluation of attitudes and behaviours of medical students. *BMC Medical Education* 18:152 https://doi.org/10.1186/s12909-018-1264-5.

[66] Ifiedo, E. (2013). Mobile learning for instructional purpose in Nigeria: An exploratory analysis. Available at: https://jyx.jyu.fi/bitstream/handle/123456789/42765/1/URN% 3ANBN% 3Afi%3Ajyu-201401071029.pdf

[67] Beland, L. P. & Murphy, R. (2015). I'll communication: technology, distraction & student performance. CEP Discussion Paper No 1350. London: London School of Economics.

[68] Smeds, M. R., Thrush, C. R., Mizell, J. S., Berry, K. S. & Bentley, F. R. (2016). Mobile spaced education for surgery rotation improves National Board of medical examiners scores. *J Surg Res*. Vol. 201 No. 1, pp. 99 –104.

[69] Baumgart, D. C., Wende, I. & Grittner, U. (2017). Tablet computer enhanced training improves internal medicine exam performance. *PLoS One*. Vol.12 No. 4, e0172827.

[70] Wishart, J. (2018). Ethical considerations in the incorporation of mobile and ubiquitous technologies into teaching and learning in educational contexts. DOI: 10.1007/978-981-10-6144-8_5. Available at: https://www.researchgate.net/publication/321150203. Accessed February 14th, 2019).

[71] Williams, C. (2012). Raising Standards in Boys' Writing using the iPad for Gaming. Personal Blog MrAndrewsOnline 24 June 2012. Available at: http://mrandrewsonline.blogspot.co.uk/ 2012/06/raising-standards-in-boys-writing-using.html Accessed February 21st, 2019.

[72] Looi, C. K., Zhang, B., Chen, W., Seow, P., Chia, G., Norris, C. & Soloway, E. (2011). 1: 1 mobile inquiry learning experience for primary science students: A study of learning effectiveness. *Journal of Computer Assisted Learning*, Vol. 27 No. 3, pp. 269-287.

[73] Nordmark, S. & Milrad, M. (2015). Influencing everyday teacher practices by applying mobile digital storytelling as a seamless learning approach. *In Proceedings of MLearn: International Conference on Mobile and Contextual Learning* (pp. 256-272). Springer International Publishing.

[74] Wishart, J. M. & Ekanayake, S.Y. (2014). Mobile phone images and video in science teaching and learning. *Learning, Media and Technology*, 39(2), 229-249.

[75] Wishart, J. M. (2016). Learning science through creating of simple animations in both

primary and secondary schools. *School Science Review*, 97(361), 117-124.

[76] Clarke, J. (2013). Augmented reality, multimodal literacy and mobile technology: An experiment in teacher engagement. QScience Proceedings, (12th World Conference on Mobile and Contextual Learning [mLearn 2013]), 28.

[77] Sharples, M, Corlett, D. & Westmancott, O. (2002). The design and implementation of a mobile learning resource. *Personal and Ubiquitous Computing*, 6(3), 220–234.

[78] Churchill, D. (2011). Conceptual model learning objects and design recommendations for small screens. *Educational Technology & Society*, Vol. 14 No. 1, pp. 203–216.

[79] Abdulrrahman, J., Beer, M. & Crowther, P. (2015). Pedagogical requirements for mobile learning: A review on MOBIlearn Task Model. *Journal of Interactive Media in Education*, 1 (12), 1-17.

[80] Tinio, V. L. (2002). ICT in education. Available at: http://www.eprimers.org Accessed December 4th, 2018.

[81] Chiong, C., Ree, J., Takeuchi, L. & Erickson, I. (2012). Print books vs. e-book: Comparing parent-child co-reading on print, basic and enhanced e-book platforms. Available at: www.joanganzcooneycenter.org/upload_kits/jgcc_ebooks_quickreport.pdf accessed November 24th, 2018.

[82] Adegun, A. I. (2007). Managing e-learning to achieve education for all in Nigeria. *In proceeding 12th Cambridge International Conference on open and distance learning, London.*

[83] Venkatesh, V. & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, Vol. 46 No. 2, pp. 186-204.

[84] Resnick, M. (2002). Rethinking Learning in the Digital Age. Available at: http://web.media.mit.edu/~mres/papers/wef.pdf Accessed November 30th, 2018.

[85] Folorunso O., Ogunseye, O. S. & Sharma S. K. (2006). An exploratory study of the critical factors affecting the acceptability of e-learning in Nigerian universities. *Information Management and Computer Security Journals*, Vol. 14 No. 5, pp. 496-505.

[86] Sharma R., Ekundayo, M. S. & Ng E. (2009). Beyond the digital divide: policy analysis for knowledge societies. *Journal of Knowledge Management*, Vol. 13 No. 5, pp. 373-386.

[87] Ajadi T. O., Salawu, I. O. & Adeoye, F. A. (2008). E-learning and Distance Education in Nigeria. *The Turkish Online Journal of Educational Technology*, Vol. 7 No. 4, Article 7.