UBIQUITOUS LEARNING: AN INNOVATIVE PEDAGOGY THAT WILL TRANSFORM EDUCATION IN NIGERIA FROM ACCESS TO QUALITY

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Abstract

Ubiquitous learning is one of the new innovative pedagogies enhanced by technology and telecommunication which is widely being talked about at the moment. We cannot talk about new horizon in education without mentioning this innovative style of learning which definitely will transform education not only from access but to quality. This paper critically examined the concept of ubiquitous learning pedagogy and some of its characteristics that stand it out from other similar telecommunication enhanced pedagogies. Based on conflicting and confusing literatures on the nature, concept, characteristics and practicability of u-learning, this paper unsparingly critiqued the lack of generally accepted models of u-learning. This paper also made some suggestions on the way forward towards smooth and efficient integration of u-learning in the field of education.

Keywords- Innovative pedagogy, Ubiquitous learning

Ubiquitous learning is an innovative pedagogy enhanced by technology that will greatly bring about a new paradigm shift in the field of education in Nigeria cumulating to a move from access to quality. Innovation refers to new methods, new ideas or approaches of doing something. Innovative pedagogies within the educational context are learning approaches that explain how knowledge is assimilated, produced and introduced in a way that implies innovations. An innovative approach to teaching and learning creates an exciting opportunity for exploring and trying new methods. It is a process that involves constantly improving knowledge as well as generating and applying new ideas and practices that deviates from well known approaches (Oxford Advanced Learners Dictionary, 2005).

Having understood in a broad sense the concept of innovative pedagogy, it would be germane to narrow it down to e-learning innovative pedagogies. These are new learning approaches that have emerged as a result of the application of information and

communication technology (ICT) in teaching and learning. Heiner (2001) outlined four principles of learning as a result of the integration of technology in education and these principles truly capture the vision of Mark Weiser who propounded the theory of ubiquitous learning. The principles are:

1. The shift from teaching to learning
2. Student-centered approach
3. Construction of learning environment
4. Self-organized and self-directed learning

Concept of Ubiquitous Learning

Ubiquitous means being everywhere or in several places at the same time. It also refers to things or activities which are very common and found everywhere. When 'ubiquitous' is related to the field of education, it therefore implies teaching and learning activities which is done at any place and anytime using ubiquitous computing devices. u-learning can be defined as a new educational paradigm in which we learn about anything at anytime and anywhere utilizing ubiquitous computing technology and infrastructure. The term "ubiquitous computing" was coined by late Mark Weiser (1952 – 1999) He envisioned 'Ubiquitous' computing as the future (Fekos, 2013). Mark Weiser envisaged an environment pervasive with technologies which enables people to exchange information and services at anytime and anywhere (Weiser, 1991). Ubiquitous computing is causing a lot of excitement in the information and communication world. It is normally associated with a large number of small electronic devices which are commonly found everywhere (Yahya, Ahmad and Jalil, 2010). U-learning can be termed the learning environment of tomorrow. This is due to the fact that in reality, the practicality of u-learning remains what it is a vision for tomorrows learning environment.

According to Lyytinen & Yoo (2002) the evolution of ubiquitous computing has been accelerated by the improvement of wireless telecommunications capabilities and increases in computing power. U-learning allows individual learning activities embedded in computing devices which we come in contact with in our daily life. However, as mentioned by Hwang (2008), there is no clear definition of u-Learning due to rapid changes of the learning environments. Researchers have different views in defining the term "u-learning". The embedded computers in the environment allow learners to learn, hence, attaching them to their learning environment. These small computers are equipped with sensors thus allowing them to interact with the learner who may operate them through biometric finger print, eye sensors or generic password. In addition to that, the availability of telecommunication enables data exchange within environment and devices. It obviously shows that the level of embededness of small electronic devices do have a significant impact on the learning environment. According to Fekos (2013) Ubiquitous computing is a model of human and computer interaction in which computer processing has been integrated fully into daily activities, and also integrated into objects with which we routinely interact. A ubiquitous Learning Environment enables learning at any time, at any place without any mobile device.

Ubiquitous learning is an emerging educational paradigm made possible in part by the omnipresence of digital devices implanted in the environment**.** As new media empower practically anyone to produce and disseminate knowledge, learning can now occur at any time and any place (Bill Cope and Mary Kalantzi, 2009)

Casey (2005) stated that u-learning can be broadly defined as "anywhere and anytime learning made possible through ICT resources. The definition is referring to any environment that allows learners to access the learning and teaching contents via wireless networks in any location at anytime **(**Dochev & Hristov, 2006). These definitions are almost alike. However, when learner's mobility is concerned, the definition is much more related to mobile learning concept as learning goes on everywhere. Therefore, u-learning definition needs to be clearly expatiated to avoid any misconception or ambiguity. In this expose, the researcher will simply define Ubiquitous learning as the acquisition of general knowledge on anything as a result of ubiquitous computing. Computers are increasingly found in all of the devices we interact with, from our cars to our televisions to our kitchen appliances, home thermostats, and so on. Ubiquitous learning is a natural outgrowth of ubiquitous computing. It refers to the constant opportunity for learning experiences and media transfer/communication that our constant computing connectivity provides. Any situation can provide an opportunity for learning, with or without computers or other mobile devices. The increased pervasiveness of computer technology and especially the internet means any situation can become a purposeful instructional experience; not only can people learn at any time, but they can receive media that is explicitly learning-focused (Rangnekar,2015).

U-learning is defined in diverse ways by different people. This creates obstacles in understanding, which a researcher could find confusing when seeking to define u-learning. According to Bill and Kalantzis(2014) the term 'ubiquitous computing' describes the pervasive presence of computers in our lives. The terms "anywhere and anytime learning" and "learning with ubiquitous computing technology" raise confusion for researchers. It is based on the above conflicting and confusing definition of u-learning that Saadiah, Erny and Kamarularifin (2010) propose the following definition of u-learning. U-learning is a learning paradigm which takes place in a ubiquitous computing environment that enables learning the right thing at the right place and time in the right way.

The pervasive presence of these technologies is the most tangible and practical way in which ubiquitous learning can be made possible. Ubiquitous computing lay the ground work for ubiquitous learning given room for a paradigm shift in our education. Bruce (2003) strongly believes that ubiquitous learning is more than just the latest educational idea or method. At its core, the term conveys a vision of learning which is connected across all the stages on which we play out our lives. Learning occurs not just in classrooms, but in the home, the workplace, the playground, the library, museum, and nature center, and in our daily interactions with others. Learning is through active engagement, and significantly, is no longer identified with reading a text or listening to lectures**.** It is understandable to see ubiquitous computing necessary for this kind of ubiquitous learning and sufficient to make it possible. Education would certainly benefit

a lot if we could simply identify some new technologies that would make ubiquitous learning occur. They are embedded in devices such as dishwashers, cameras, Refrigerators and medical monitors, smart cars, road signs, houses, and offices. Within the university environments, it is difficult to escape the thought that new forms of learning have already arrived. It also appears that a kind of ubiquitous learning has arrived without any intention or forethought; the technologies alone have made it happen. This is exactly what Weiser foresee as 'seamless. Learning is an aspect of living not of place. We have always been able to learn in diverse settings other than the formal classroom, ubiquitous learning serves to remind educationists of the need to continually re-examine how learning occurs through the pervasiveness of new technologies. The rapid development of wireless networks has played a significant role in bringing about a paradigm shift in teaching and learning. Technology and its services facilitate the way people communicate with each other and allow people to be linked together regardless of their physical locations.

U-learning is one way of utilizing various technologies to expand the delivery of learning materials. There has been little research to determine the difference between m-learning (Mobile learning) and u-learning (Ubiquitous learning) as to comparing how the learners interact with devices in both environments. M-learning focuses on the mobility, u-learning on the other hand is concerned about everyday learning environment that is supported by embedded computers and wireless network in our everyday life. According to Ogota cited in kinshuk and Graf (2009) it is very vital for educational organization to begin building u-learning efforts which is aimed to provide learners with content and interaction anywhere and anytime that our constant computing connectivity provides. Any situation can provide an opportunity for learning. The pervasiveness of computer technology especially the internet means any situation can become a purposely instructional experience. Bates (2011) stated that u-learning is often simply defined as learning anywhere, anytime and is therefore closely associated with embeded technologies. It is also considered as learning that is situated and immersive. By immersive, we imply that ubiquitous computing devices are found everywhere. The students and teachers are surrounded by such devices which can be utilized in teaching and learning Successful application of u-learning paradigm in the field of education will make the classroom not to be considered as the only or major environment for learning.

The Characteristics of Ubiquitous Learning

The main characteristics of ubiquitous learning are as follows: firstly, they are situated in human-centred personalized environments. What this means is that ubiquitous computing systems which are enablers for U-learning are embedded in specific predetermined physical devices which are pervasive or within our environments. Sensing makes ubiquitous systems more aware of involved learners. This awareness allows the devices to adapt to the learners and enable the learners access the required information. (Poslad, 2009). According to Chen , 2002; Curtis, 2002 cited in Fekos, 2013) the Key characteristics of Ubiquitous Learning are:

1.Permanency
2.Accessibility
3.Immediacy
4.Interactivity
5.Situated instructional Activities
6.Adaptability

It will be germane to elucidate on each of the above characteristics of u-learning. permanency: The information remains unless the learners purposely remove it. Learning materials are always available unless purposely deleted. This is actualized through cloud computing and internet.

Accessibility: The information is always available whenever the learners need to use it.

Immediacy: The information can be retrieved immediately by the learners. Wherever a student is, he/she can immediately access learning materials through any nearby embedded device.

Interactivity: The learners can interact with peers, teachers, and experts efficiently and effectively through the different embedded computing devices. Online collaboration with teachers and/or peers (chat/blogs/forums). Context-awareness: The environment can adapt to the learners real situation to provide adequate information for the learners. Learning in context is one of the features of u-learning. Context-awareness is the major characteristic that distinguishes u-learning from others. Dey and Abowd cited in Saadiah, and Kamarularifin (2010) define context-awareness as "the ability of a program or device to sense various states of its environment or itself". Accordingly, location, identity, time, and environment are the primary context types for characterizing the situation of a particular entity.

Adapatability: Learners can adapt by getting the right information , at the right place and the right way. The definition and characteristic of u-learning is still unclear and being debated by the research community. Researchers have different views in defining and characterizing u-learning and this leads to misconception and misunderstanding of the original idea of u-learning.

Critique of U-learning

With conflicting and confusing definitions and explanations about the concept and practicality of u-learning, it would not be wrong if one concludes by saying that u-learning is a muddled concept which borrows heavily from or adapting from all the technology enhanced learning styles which are offshoots of e-learning. At best, u-learning remains what it is, 'an envisioned learning style or future learning style which is yet to materialize. The present notion that u-learning paradigm has arrived is deceptive and contrary to what was visualized by Mark Weiser (1952-1999). He envisaged a seamless ubiquitous computing pervasive in all devices we come in contact with on daily basis. This 'seamless' characteristics of u-learning is the reason he stated that 'the most profound technologies are those that weave themselves into the fabric of everyday life until they are indistinguishable from it'. Put in a better perspective, what mark weiser envisioned in respect to ubiquitous learning is a seamless transition of

knowledge from ubiquitous computing devices which are pervasive in our everyday environment. What is implied is that the pervasiveness of these miniature technological devices which are built in all technological gadget we come in contact with in our everyday dealings; whether at homes, cars, school, malls, football or basketball fields will enable us learn about anything at anywhere. When we critically examine the original paper presented by Mark weiser on Ubiquitous computing, we will realize that he did not initially have the school environment in mind. What is required now is for stakeholders in education to come up with strategies towards installing the right technological devices and software (making them pervasive) within the school environment to enable the students learn about anything at anywhere they find themselves within the school environment without necessarily carrying any mobile device.

Most of the researchers whose works were reviewed did not state succinctly the concept of u-learning and its application within the educational setting. The working model of this learning style especially as applied within tertiary institutions was not clearly stated. It therefore implies that most educators writing on u-learning lack basic knowledge of the envisioned concept and applicability of this innovative learning style or the learning style has not been fully developed or still in the offing. In agreement to the above assertion Hee-Jung Jung (2014) opined that despite the fact that ubiquitous technologies have been introduced to many parts of the society, there have been limited applications, and little is known about learners' behaviour toward ubiquitous technologies. Most researchers, in rigmarole, pontificate around key issues such as pervasiveness, ubiquitous computing and embededness. Some even confuse u-learning with m-learning that utilize mobile devices. Some can't even make a clear distinction between ubiquitous computing and ubiquitous learning. It should be noted that ubiquitous computing is the driver to ubiquitous learning while pervasiveness and embededness are some of the characteristics of u-learning. In the attempt to define u-learning, there seems to be a mix up of all the ICT enhanced learning styles ranging from m-learning, cloud computing, Pervasive learning, U-learning, Virtual learning, situated learning and collaborative learning (Rangnekar (2015). Even some researcher confuse u-learning with situated learning. The fact is that u-learning is related to situated learning but there is a clear distinction between them in terms of the provision of real life activities which is dominant in the later and missing in the former. All these learning styles are muddle up together in the process of defining u-learning which leads to much confusion. This lack of clear working model and practicality especially within the African context could be the reason scarce literature on u-learning abounds from African researchers.

Furthermore, some of the works reviewed did not in clear terms show their deep knowledge of u-learning or the extent it can be applied in teaching and learning. They did not in the process of their expose, explain how u-learning can be integrated in teaching and learning within the educational environment. Most of the literatures reviewed seemed not to have done in-depth analysis of the concept of u-learning nor the clear process involved in its integration in an environment where there is pervasiveness

of technology. Even the processes to be followed in making educational environment pervasive with ubiquitous computing devices were not outlined. Most attempts made in explaining the application of u-learning in the teaching and learning process are fussy and impracticable within the African school context for now especially those proposed by Weiser (1991). Most of the working models are activities which most Africans watch in a James Bond, Mission Impossible and other related science fiction movies. Consider the practicality of the following scenario within the Nigerian educational context as captured by Aljohani, Davis and Loke(2011).They stated that:

> *'in the spirit of Weiser(1991), the idea is that computing is carried out in a way that it is situated with the user, not necessarily relating to any device with the user; for example, the user when entering a lecture room may not carry any mobile device, but may interact with all the devices (the computer, the lights, the display projector, etc.) first, by identifying him/her-self to the devices via biometrics, eye sensors and then operating the devices via hand gestures and body movements recognized by the system'.*

In this discourse, the researcher tries to explicate clearly on all the key words that constitute the definition as well as the characteristics of u-learning . All these were done with the intent of making u-learning a well understood learning style with suggested approaches to its applicability in the field of education. For Ubiquitous learning to be understood clearly, the following should be borne in mind:

a. U- learning is not limited to the classroom (No physical barrier)
b. It may have fixed or structured curriculum (this can be planned and uploaded by the university)
c. The type of u-learning Weiser (1991) envisioned is unstructured curriculum that is the reason, ' learning about anything' is dominant as one of the characteristics of u-learning.
d. You learn about anything, anywhere and anytime (Even things that are not related to your field of study).
e. Pervasiveness means that the technologies are everywhere embedded (built in) in devices we use everyday in different environment.
f. U-learning is more related to learning 'anything' made possible by ubiquitous computing.
g. Ubiquitous learning is made possible through ubiquitous computing.
h. Environment is the determinant of what you learn made possible by the pervasiveness of ubiquitous computing within the environment. Therefore, u-learning is embedded in the context. A learning environment consists of a place and devices that are used to support learning process, which no doubt influences or determines the learning system or method. It therefore implies that if the learning environment is highly embedded or pervasive with ubiquitous computing devices, then ubiquitous learning definitely takes place. A ubiquitous learning environment is a place or environment that has resources in form of devices, to enable learners to nurture and value their learning

experiences and ideas. Learners have the ability to access learning resources in the environment through pervasive devices (Rieber (2001, Chaka and Govender, 2016). The main pedagogical premise of Ubiquitous Learning is related to 'situated learning' which is a general theory of knowledge acquisition that is based on the notion that 'true' learning occurs in the context of real life activities (mikelloyd, 2013). U-learning provides the right learning materials according to learners' situation by getting information from learning contexts embedded with technological devices (Hee-Jung Jung, 2014).U-learning is embedded in the context.

h. Mobility is not one of the characteristics of U-learning. That is why U-learning is said to be situated or embedded in the context. Environment plays a vital role in what a student learn though this is contestable. The local content resources situated in the context can through telecommunication allow learners within the context to have access to millions of online resources in anywhere in the world. This puts a question mark on the idea that learning resources are situated in the context. Moreover, u-learning does not provide context for real life activities as exemplify by situated learning.

i. Permanency as one of the characteristics of u-learning is contestable too. For instance, the height of Mount Everest, for geography students quartered in Mount Everest cannot be the same every year. Similarly, outdated resources in telecommunication enhanced u-learning devices embedded in the context can be expunged to make room for current information. Unless what is implied is the permanency of the physical devices and not the learning resources programmed in the computing devices then permanency as one of the characteristics of u-learning is fuzzy and contestable.

Questions on Ubiquitous Learning

There are so many questions about the concept and applicability of u-learning which could provide an insight into the original concept of u-learning as envisioned by Weiser. The answers to these questions will provide a way forward for planning an effective ubiquitous learning environment.

a. Do the things we learn under u-learning have any academic value?
b. Is u-learning a random learning exercise?
c. Is there any teacher or facilitators to explain difficult issues or ideas encountered through u-learning?
d. Are all answers to difficult issues required by student provided by the ubiquitous computing devices?
e. How can ubiquitous computing be made pervasive in the university environment to guarantee effective u-learning tailored towards students' field of study?
f. Is u-learning a directionless learning which focused on every aspect of life with no relationship with the students' discipline?
g. Can universities, especially those within the African continent with paucity of fund be equipped with such sophisticated technologies such as biometric finger

reader and eye sensors mounted in all strategic places within the university to enable students access learning resources?

Ways to Implement U-learning in Higher Institutions

1. First, universities should endeavour to install ubiquitous computing devices in all strategic places in the university such as the Cafeteria, football field, swimming pool, gardens, parks, hostels, halls, classrooms, ICT centres, libraries, walk ways, road signs, car park, school farms, medical centres, table tennis/snooker rooms, theater house, security offices, worship centres, kitchen, indoor sport centres, stadium, workshops, Dean's and HOD's offices.

2. All the installed ubiquitous devices should be connected with internet network and should be made to function 24 hours.

3. Data of all the students, lecturers and staff should be captured and made permanent in all the devices. Information in respect to how to locate all the buildings, offices, lecturers' offices and other interesting places within the university should be uploaded in all the ubiquitous computing devices.

4. All courses with their respective notes made by the lecturers should be uploaded in all the ubiquitous computing devices embedded in all the physical devices within the context.This will enable the students wherever they are within the university environmen (without carrying any mobile device) to access both synchronous and asynchronous learning resources.

5. School libraries should be the first place to equip so that students can locate any book they are looking for by themselves through the ubiquitous computing device.

6. Ubiquitous computing devices is usually very helpful for year one students and other strangers in the school environment who always find themselves lost within the verse university environment. They can approach any of the ubiquitous computing devices situated in the environment they find themselves probably on the street sign board or road signs and enquire about the registration procedure and registration centres as well as the particular office they are looking for and instantly the information will be provided.

7. Some of the ubiquitous computing devices mounted at strategic physical structures within the school environment can be in the form of both audio and audio/visual devices.Virtual reality videos about the university, phone numbers to call and contact addresses should be uploaded in all the pervasive devices in the environment.

8. When attacked or raped within the university environment the affected students can approach any of the ubiquitous device and press or dial alarm code and the security offices will be alerted knowing the exact location of the student.

9. Provision should be made for students to leave question through the ubiquitous devices on any topic they don't understand for the lecturer in charge of the course to provide.

10. When students learn through the ubiquitous computing devices made pervasive within the university environment without carrying any mobile device with them, ubiquitous learning has taken place.

Conclusion

Great effort has been made to explain clearly the concept of u-learning. A critique of this learning model as well as its applicability within the university environment has also been made. All things being equal, the integration of u-learning within the university context will totally bring about a new paradigm shift in education therefore moving education from access to quality.

Suggestions

a. The universities especially those within the African context should make great effort to embark on u-learning.

b. Universities should install the right technological devices to enable u-learning to be effective.

c. Training should be organized for students and lecturers for them to understand clearly the concept and practicality of u-learning.

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