

Coping with the Digital Age in Pedagogy in Tertiary Institutions.

by

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Preamble

In February 2007, I had the privilege of reviewing a book written by a Professor of Education on Environmental Education and Sustainable Development. The most fascinating aspect of this book to me then was the author's view on the dynamics of pedagogy. Emphasis was placed on learning and not just teaching in the delivery of Environmental Education. A radical departure from the archaic pedagogic concept whereby a teacher merely regurgitates the contents of a textbook to students without actually imparting any knowledge in them was emphasized by the author. According to him, the student commits whatever he is taught to memory, passes examinations and when he/she becomes a teacher, joins the regurgitation race, which ends nowhere but at the starting point (Ehinder, 1987). By emphasising learning and not teaching in Environmental Education, the author sought to put an end to the vicious cycle of producing half-baked graduates and the consequent feedback effect on awareness, policy formulation and political direction in the country.

Perhaps the sharp contrasts between learning and teaching should be exposed first before explaining the concept of pedagogy with a view to exposing the dynamics of education in the context of the classroom instruction in our ever changing world.

Learning versus Teaching

The old notion is that teachers teach, students learn. But in the expanded sense, everybody learns. Teachers and students on the one hand, non-teachers and non-students on the other. For the purpose of this workshop, the emphasis of my presentation will be on teachers and students as well as how teaching should facilitate learning in tertiary institutions. Students learn from a variety of sources which include their teachers, reading widely, the environment they live in, the society they interact with, their parents and guardians etc.

Right from the medieval up to the 20th Century, traditional education focused on teaching, not learning. Traditional education assumed that for every ounce of teaching there is an ounce of learning by those who are taught. This has been proved wrong. Most of what students learn is not what they are taught. This is the reason why emphasis had been growing on how to make students learn effectively from teaching.

Memorization for example had always been mistaken for learning. The truth is that most of what is memorized is remembered only for a short time. In cases where they are not forgotten, they are merely regurgitated without their meanings being clear to the student. That is the reason why students don't learn from teachers who merely dictate their lecture notes to students at the tertiary level without taking pains to explain the concepts being taught.

The task ahead of me today is to look at the evolution of the writing slate of the 20th Century to the Personal Computer of the 21st Century and provide justification for this evolution in respect of learning and not just teaching. Please note that as I do this, I will focus on technological advancement of the Computer of the late 20th Century to the present digital age where virtually everything on earth can be done on a hand-held miniature piece of electronic gadget.

From Writing Slates to the Personal Computer

A writing slate is a thin piece of flat material used as a medium for writing. The original slate material itself is a piece of metamorphic rock created by the re-crystallization of the minerals in flake-like minerals in the earth's crust. It is on record that slates have been used as far back as the fourteenth century. A typical slate in the mid/late 20th Century had two faces just like a coin. Chalks were used to write on them and dusters were used to erase the writings. Some of us didn't have the privilege of using the original writing slate. Improvised slates made from soft wood and pulps were in vogue in this country in the mid 20th Century. There are gross limitations of the slate in respect of retention of what is written on them. The limitations of the slate are also the limitations of blackboards. Once information is erased, it can never be retrieved unless it has been copied by the student. This is what many of us passed through from primary through secondary to tertiary level.

Nobody uses slates anymore. Personal Computers are now all over the place. Before the invention of Personal Computers, the state of the Art Computer was a grandiose equipment assembled in a large room. The operations were restricted to trained Computer Operators with orthodox typing skills. The limitations of this now archaic instrument are well known to those of us who witnessed the transformation to Personal Computers and from analogue to digital systems.

The evolution of the writing slate is the same as the evolution of the camera from Pin-Hole through several versions of manual to digital. Use of negative films in photography is no longer in vogue. So also is the wall clock that has transformed from Galileo's pendulum clock to hand held digitals.

I am making these comparisons to make it obvious that adherence to old ways of teaching in the 21st Century is counterproductive. The education sector must also move with time.

Evolution of the Personal Computer from Analogue to Digital Systems

The study of Computer Science crept into the tertiary education curriculum in this country in the late 20th Century. In the first generation universities in this country, Computer Science emerged as a discipline the mid seventies. Computer Science as well as Computer Engineering gradually

evolved into Information and Communications Technology (ICT). I remember that in the early 90s, colleagues from neighbouring universities came to Ife to send e-mails. Colleagues used to queue in the Computer Centre to check mails. That was the period of transition from restriction of ICT to a few privileged Nigerians. Obafemi Awolowo University (in OAU), Ife had to go into an agreement with the International Centre for Theoretical Physics (ICTP) in Trieste to get Internet connection. This is one of the reasons why OAU, Ife has consistently been among the top five universities in this country since inception of Webometrics Ranking in 2004. A trip to the website of the Information Technology and Communications Unit (INTECU) in OAU will reveal a lot about what such a Unit should be doing in a world class university. The Mission of INTECU is to develop a set of policies that guide the deployment of ICT for the purpose of assisting the university to achieve her educational research and public service functions. In INTECU, there are the following sections: Centre of Excellence in Software Engineering (CoE); iLAB that runs several virtual experiments and other remote instrumentations; HP innovations in Education Lab (donated by HP); Students e-Learning Centre. A trip to INTECU by management and academic staff of fledgling universities is recommended.

In a lecture I delivered recently in a sister university, I stated clearly that it is imperative that a university that does not have a functioning website and/or ICT unit cannot rise above the ladder of Webometrics rankings (see Badejo, 2015). I am adding to this assertion that an ICT unit within a university that does not embrace Digital Technology to ensure that students learn from teaching is not in tune with the 21st Century demands for effective learning.

Technology Integration

The first step towards achieving excellence in Digital Technology is Technology Integration. According to Okojie *et al.* (2015), the degree of success teachers have in using technology for instruction could depend in part on their ability to explore the relationship between pedagogy and technology. Common excuses for the limited use of technology to support instruction include shortage of computers, lack of computer skill and computer intimidation. While these could affect the success of technology integration, it should be acknowledged that the degree of success teachers have in using technology for instruction could depend in part on their ability to explore the relationship between pedagogy and technology. In some critical cases, some lecturers do not even have Personal Computers. How can a lecturer who does not have a Personal Computer explore the relationship between Pedagogy and Technology? A university that does not provide a Personal Computer on the desk of every academic staff is far from the 21st Century expectations in Pedagogy. Laptops are properties that every academic staff should also have either as official properties or as personal properties whose purchase are facilitated by their universities. The intent of my discussion is that Technology Integration is a policy issue which the university management should enforce at the level of the Governing Board.

Lecturers who want to have an insight into how they can improve their use of technology to support instruction should read Okojie *et al.* (2015). The paper explores pedagogical issues that are relevant and need to be considered in order to successfully apply technology into teaching and learning. It is important that educators perceive technology in education as part of the pedagogical process. This paper also stress that Technology Integration should be considered as part of the process of instructional preparation.

A typical illustration of technological integration into teaching is the use of audio-visual aids. Audio-visual aids used to be operated manually without using computers before the 21st Century. The trend now is for Audio-Visual aids to be used in conjunction with Personal Computers. The days of sole dependence on analogue overhead projectors are gone. These days, SMART Boards have replaced the use of manually operated overhead projectors and added value to its operations by including the use of ICT facilities which has now reached a digital state.

What are SMART Boards?

The SMART Board interactive whiteboard is the first interactive whiteboard that provides touch control of computer applications and the ability to write over standard Microsoft Windows applications. It is the product of intensive research by a man called David Martin, a Canadian distributor for a U.S. projector company in 1987.

The technology is simple. It operates as part of a system that includes the interactive whiteboard, a computer, a projector and whiteboarding software - either Smart Notebook collaborative learning software for education, or Smart Meeting Pro software for business. The components are connected wirelessly or via USB or serial cables. A projector connected to the computer displays the desktop image on the interactive whiteboard. The whiteboard accepts touch input from a finger, pen or other solid objects.

The Smart Board interactive whiteboard uses DVIT (Digital Vision Touch) technology to detect and respond to touch interactions on the interactive whiteboard surface. This camera-based touch technology for interactive whiteboards and interactive displays uses **digital** cameras and proprietary software and firmware to detect finger or pen contact with the screen.

Smart's digital ink operates by using an active digitizer that controls the PC input for writing capabilities such as drawing or handwriting. The Smart Board interactive whiteboard uses passive pen tools, which means that no technology is housed in the pen tool to use digital ink or determine colour. All digital ink options can be selected from the Smart Board Pen Tray.

According to Johnson-Eilola (2005), the Smart Board has three distinct attributes: (i) it allows users to work with large amounts of information; (ii) it offers an information space that invites active collaboration; and (iii) the work produced is often “dynamic and contingent”.

One huge advantage of the SMART Board over older audio-visual aids is its connection to the Internet. The Internet is an instrument of communication that has great potential for positive change. It is an empowering technology that opens the global information superhighway to the user. A teacher can go online to retrieve information on virtually anything available on earth, all things being equal. A lecturer can teach students in another global location through the SMART Board technology as long as the Bandwidth is wide enough to allow communication across the two locations which may be in different continents.

Out of the 6 billion people on earth, only 332.73 million have Internet access, out of which less than 1% are in Africa (Bowie, 2000). Every university community should strive to be part of this 1% to remain relevant in the global scheme.

A university that does not have one Smart Board in each of its lecture rooms has a long way to go in coming to terms with the digital age in respect of learning. The 21st Century expectation from University lecturers is that they must not only be highly computer literate, they must be ICT compliant and in tune with the ever dynamic digital age. Gone are those days of regurgitation and sole dependence on memorization.

Let me sound this note of warning that having a SMART Board per lecture room does not mean that a university is doing well. The lecturers must take advantage of it by learning how to use it.

21st Century Definitions of Skills in Pedagogy

The 21st Century skills and knowledge in Pedagogy have been organized into the following four categories by Saavedra and Opfer (2012):

- *Ways of Thinking*: creativity/innovation, critical thinking, problem solving, decision-making, and learning to learn (or **metacognition** - "*thinking about thinking*", or "*knowing about knowing*")
- *Ways of Working*: communication and teamwork
- *Tools for Working*: general knowledge and information communications technology literacy
- *Living in the World*: citizenship, life and career and personal and social responsibility including cultural awareness and competence.

Wagner (2008) of Harvard University has also defined the 21st Century skills and knowledge in Pedagogy by identifying seven survival skills that students need to be prepared for 21st century life, work, and citizenship. These skills are:

1. Critical thinking and problem solving
2. Collaboration and leadership
3. Agility and adaptability
4. Initiative and entrepreneurialism
5. Effective oral and written communication
6. Accessing and analyzing information
7. Curiosity and imagination

All these are geared towards **global competence** in students under the tutelage of their lecturers. Global competence has been defined as the capacity and disposition to understand and act upon issues of global significance. In other words, globally competent students should be capable of the following:

1. Investigate the world beyond their immediate environment
2. Recognize perspectives, others' and their own
3. Communicate ideas effectively with diverse audiences
4. Take action to improve conditions.

I have a rhetorical question for teachers/lecturers here today. What role have you been playing in making your students globally competent? There is no doubt that many lecturers learn everyday and earn their promotions accordingly. Many lecturers teach aspects of subjects and even subjects that were not in existence when they were students. They cannot do this if they have not been learning. What they need to do is to ensure that their students also learn from them.

The challenges of joining the digital age are enormous, more so when Fullan (2013) of the University of Toronto had predicted that as far as integration of deep learning goals, new pedagogies, and technology is concerned, there will be a more radical change in the next five years (i.e. between 2013 and 2018) than has occurred in the past 50 years. Fifty years ago, there was no Personal Computer. Audio Visual Aids were completely manual. There was no SMART Board. The SMART Board of 2003 is not as sophisticated as those currently in the market. Lecturers who do not join the bandwagon of the Digital age now may find themselves completely irrelevant in World Class universities in a few years' time.

Cloud Storage

If we carry out a survey of proportion of participants at this Workshop who knows what Cloud Storage in ICT means, the result may be disappointing. Cloud Storage is a model of data storage where digital data is stored in logical pools, the physical storage spans multiple servers and the physical environment is typically owned and managed by a hosting company. These cloud storage providers are responsible for keeping the data available and accessible, and the physical environment protected and running. People and organizations buy or lease storage capacity from the providers to store user, organization or application data. The aim is to connect people and data from anywhere in the world and at any time. Cloud computing had been invented in the 1960s by Joseph C.R. Licklider but how many non-computer graduates are aware of this technology? You can read more about Cloud Storage from https://en.wikipedia.org/wiki/Cloud_storage

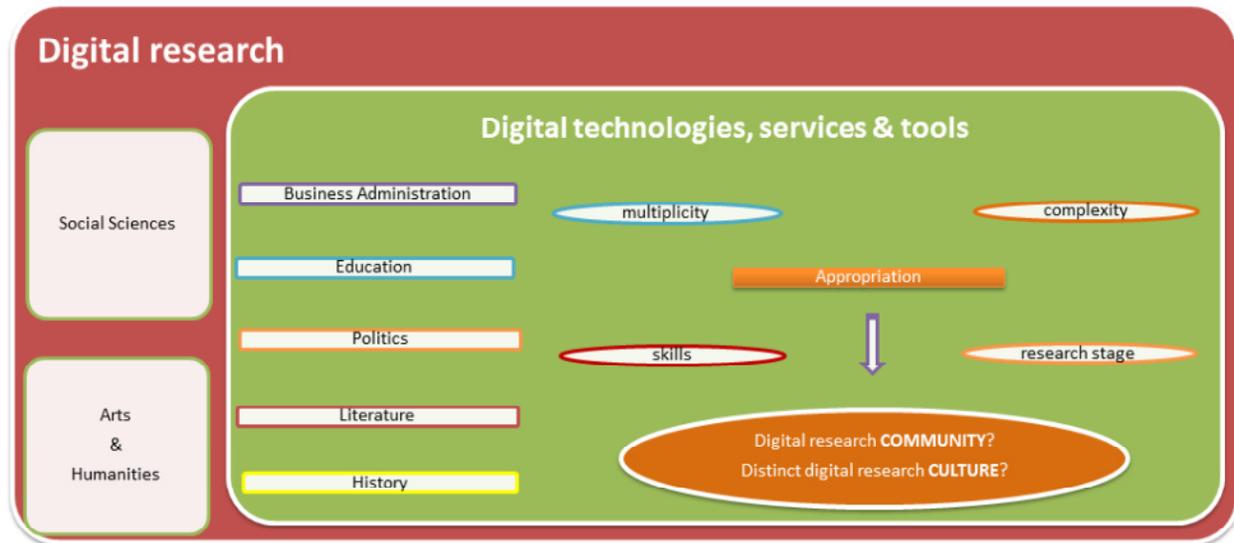
Digital Libraries

How many universities in Nigeria have Digital Libraries? Digital libraries are large, organized collections of information objects that have the potential to enable non-specialist people to conceive, assemble, build, and disseminate new information collections on-line. In April 2010, Wesley University Library received a donation of The Essential Electronic Agricultural Library (TEEAL) from Albert R. Mann Library, Cornell University USA. This equipment which is worth \$1,000.00 contains 140 Science Journals and 19 monographs, updated to the year of donation and this has been maintained by updating annually at affordable cost. This software is responsible for the high score in Library facilities which to a large extent earned the university Full Accreditation in all Biological Sciences programmes in 2011.

Digital Microscopy

How many microbiologists in the academia know that virtual microscopes now exist that can take digital photographs of microorganisms right from the laboratory without going to the field physically? The time is now that we must get on the board of the ever dynamic digital train.

Digital Applications are Universal!



Source: <http://www2.le.ac.uk/departments/media/people/dr-panayiota-tsatsou>

Conclusion

It has often been said that efficient and effective teaching is borne out of intrinsic and extrinsic motivation (Adeyanju, 2015). Innovation is usually a precursor for Motivation. Innovation in classroom teaching is the introduction of something new and useful, not necessarily an invention. According to Adeyanju (2015) innovation is introducing new methods, techniques, or practices for the purpose of achieving higher or better results in teaching. This can emanate from the use of new or altered products and services. This can actually be quite challenging. This is the reason why I hereby advocate **digital literacy** in all tertiary institutions of learning in line with the current trend in the world of academia.

Digital literacy should not be misconstrued as **digital technology** or **digital competence**. It involves finding, using and disseminating information in the digital world. It underpins teaching and research, **regardless of discipline**, and is an essential skill for effective participation in employment and all aspects of life. You can call **digital technology** rocket science. You can also extend it to **digital competence**. But **digital literacy** is definitely not rocket science. It is just as simple as understanding the difference between Galileo's Pendulum Wall Clock and a Digital wrist watch that is in vogue today.

For Further Reading

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