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Interactive Effects of Classroom Digitalisation on Children's Learning Performance

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ABSTRACT

Technology has become the 'wings' that allows world education to fly farther and faster than ever. Digitalization affects all facets of human activities, and education is no exception, so its impactful influence on education and training is inevitable. A digitally literate citizen will be able to learn science and take responsibility for their learning. The contemporary twenty-first century has been observed a steady increase in the number of Nigerian schools opting to integrate technology into the classroom. Science educators often embark on digitalization projects despite a lack of consolidated theory to guide the process. However, this study aims at providing a categorization of digitalization formats to aid in the planning and design of digital classrooms to promote scientific development in Nigeria and the world over. To foster scientific skills and attitudes among students for national development, the study identifies seven digital classroom settings including one-to-one computing with students seated in traditional rows; paired seating; small group seating; multi-screen classrooms; subject areas; media areas; mobile learning. This classification may be useful to science educators in the start-up phase of digitalizing their classrooms and schools. Digital classroom applications and processes that enhance scientific development include Web-based learning, computer-based learning, virtual classroom opportunities and digital collaboration; and its content is delivered via the Internet, intranet/extranet, audio or videotape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video, and audio.

INTRODUCTION

Technology has become the 'wings' that allows education to fly farther and faster than ever before. Digitalization affects all aspects of human activity, and education is no exception, so its impact on education and training is indispensable. A digitally literate citizen will be able to learn and take responsibility for their learning so this results in a higher demand for education and feel of the needs for their availabilities. This study is about the evolution of the educational industry. It describes the era of the 21st century in terms of educational progress and how the 'old school' systems became the 'new school' systems that boosted digital education (Burke & Burke-Samide, 2004).

Concept of Digitalisation

Digitalization is the integration of digital technologies into everyday life. Digitalization is the trending term, describing the 21st century in the most precise manner as possible. We are in an era where unprecedented ideas are unfolding in our education industry and creating the advancement that can't be matched by lagging in terms of technology. The digitalization of education entitles any means of communicating with learners except communicating indirect form, face-to-face interaction, or personal contact. According to Weinstein (1981), digitalization in this definition consists of the following elements:

a. The instruments and equipment which are used to support teaching (including software, programs, and networks, web, video player, data projector, overhead computer, television monitors, and so forth).

b. The skills needed to produce or apply the tools and equipment effectively (for example, writing, designing, programming, and production).

c. An understanding of the teaching and learning process and how knowing educational instruments and materials can be chosen and used appropriately to support such processes.

d. The human resource needed to make the most effective use of the instruments, including technicians, engineers, educational designers, web programmers, and so on, as well as experienced teachers.

How Digital Classroom Influences Students' Understanding of Science Ideas

This review has identified several key areas in which digital classroom has a strong effect on the education system. One of these is the effectiveness of Information and communications technology (ICT) applications in teaching and learning in the core curriculum subjects of science education (Tremblay, 2010). The issue of the effectiveness and impact of ICT in core science education is important. In science, ICT has opened up a whole range of potential applications. At the same time, a wide range of potential benefits resulting from the use of ICT has been claimed for both students and teachers by several groups (policy-makers, researchers, some teachers, employers).

Although there is significant literature on ICT in science education, much of it takes the form of articles on applications for use in teaching situations: the emphasis is on how to use ICT, rather than exploring its effects. There is a sense in which it is taken rather for granted that ICT is a 'good thing', with students being motivated when they use it, and this leads to better learning. Thus the central purpose of this review is to assess the strength of the evidence base to support the notion that the use of ICT activities in science lessons enhances students' understanding of science ideas.

The term understanding of science encompasses scientific knowledge and explanations (facts, laws, theories), the scientific approach (evidence, scientific methods, prediction, problem-solving and so on) and ideas about science (its limitations, the scientific community, risk and so on).

The development of ICT in digital classroom simulations for a large variety of virtual experiments and virtual environments would provide several teaching and learning benefits. These include internal, saving experimental time and resources, reducing the need to kill animals for dissection, allowing students to repeat experiments with ease, and providing experiences (through virtual environments) that would not otherwise be available to students. The importance of the structured or guided use of ICT in particular simulations needs to be stressed to teachers. It is not sufficient just to provide the software unless it has in-built guidance or a virtual mentor. Without either of these, the teacher needs to provide that support. Teachers may also need induction or training if the simulation is part of a complex teaching program (Burke, Burke-Samide, 2004).

Categories of Digital Classroom

To foster scientific attitudes and skills in Nigerian learners, the new phase of learning in digital Classroom has been developed and which involves various advanced techniques like:

1. Courseware: Courseware is a term that combines the words 'course' with 'software'. It was originally used to describe additional educational materials intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer. Some are only available online, such as Web pages, while others can be downloaded as PDF, DOC, EXCEL, IMAGE files or other types of documents. Many forms of educational technology are now packaged in the form of courseware (Hayward, 1995).

2. Classroom aids: Some educational software is designed for use in school classrooms. Typically such software may be projected onto a large whiteboard at the front of the class and/or run simultaneously on a network of desktop computers in a classroom. This type of software is often called classroom management software. While teachers often choose to use educational software from other categories in their IT suites (e.g. reference works, children's software), a whole category of educational software has grown up specifically intended to assist classroom teaching.

3. Online Courses: for students who want to learn a new language or maybe to get trained in some specific course, but have no time to cover the distance, online courses are developed by experts who have unmatched proficiency in their specific field and can give them the experience of real-time learning by designing an online course.

4. Online Exams: Digitalisation gives way to the online exam, making the examination process convenient for both teachers and students. Eg, Computer Based Examination (CBT) like JAMB, Npower aptitude test and host of others.

5. Digital Textbooks: Also prevalent with other names like e-textbooks and e-texts, digital textbooks provide an interactive interface in which the students have access to multimedia content such as videos, interactive presentations, and hyperlinks.

6. Animation: This is a captivating approach in which students learn in a better manner. By offering a visual representation of the topic, students grasp the concept in a more

understandable manner. Even the toughest topics can be presented in a simplified way with the help of animation.

7. Internet: Making Digitalisation Possible: Nigeria has been rated low as internet consumers because so many of our schools are yet to be connected with internet access. The core existence of online education platforms is being possible with the internet which has abilities in promoting inquiry learning through individualistic instruction or cooperative learning. A few schools in Nigeria in recent times make use of the internet and they use it for conducting online exams and quizzes (Sandholtz, Ringsta, & Dwyer, 1997)**.**

8. Administrative Activities: An Integral Part of the Education Industry: With digital systems being prevalent in education we are experiencing different levels of ease in online education, but the administrative part is not off the table. Keeping the records of students and maintaining their attendance and roll number is a big headache, that too when the students are outnumbering the administrative heads. So colleges and schools are adopting more hassle-free computerized methods and avoiding the old manual methods of maintaining the records.

Digital Classroom Models

The study identified seven different digital classroom models. These models, therefore, referred to as seating. They include one-to-one computing; paired seating; small group seating; multi-screen classrooms; subject areas; media areas; and mobile learning.

1. One-to-One Computing with Students Seated in Traditional Rows

In this setting, each student is supplied with a laptop computer for personal use (Penuel, 2006) and the desks are arranged in rows. In terms of proxemics, a traditional classroom model is implemented, with students seated at equal intervals and the teacher tending to stay close to the chalkboard and her desk.

The technologies use consists mainly of one laptop or netbook per student (depending on the budget available) loaded with contemporary productivity software selected by the teachers at the beginning of the school year. One of the main aims of this setting is to substitute all educational materials/equipment (e.g. book, netbook, workbook) with a single digital device, as is likely to be the case in the course of the children's future lives. The didactic focus is on

using electronic devices to complete multiple tasks such as homework assignments, tests, and presentations or to access digital content during lessons (Weinstein, 1981).

The teacher has access to student PCs via remote access software to check individual work and correct it directly on the student's screen; this alters the proxemics coming into play during the discussion of errors (i.e., the teacher does not walk around the classroom standing beside individual students to correct their work but intervenes remotely while remaining seated at her desk).

2. Paired Seating

This second set is based on pair work. Technology, teaching support, and desktop computer are shared. Learning tasks must be organized and divided between two students: one student uses the computer, while his partner organizes information drawn from other resources (books, paper materials, cards). Sometimes, this choice of setting is dictated by a lack of sufficient funding to provide all students with an individual PC, but in many cases, it is chosen to facilitate and activate processes of peer-tutoring. In the latter scenario, teachers tend to pair students with different cognitive levels or different levels of relational skills to "bridge the gap", or to pair students with complementary cognitive profiles or resources to enhance productivity, creativity or ability to work together in pairs before moving on to working in larger groups.

3. Small-Group Seating

This setting is organized around work stations, each equipped with technological devices to support group work. Specific school furniture is used: a large round or a hexagonal/octagonal table is at the center of each station with students' chairs placed around it. The classroom is composed of four/five work stations and the students are divided into four/five working groups. The teacher moves from group to group to supervise the work, and to provide support and advice in line with specific needs. Explanations no longer take the form of a one-way lecture: the teacher changes position continuously so as not to turn her back to certain students and also to move close to groups requiring specific input or information.

Each work station is equipped with several technologies (notebooks and other devices) and is connected to both classroom and teacher tools (interactive whiteboard, teacher's notebook, internet, intranet, etc.). The teacher manages levels and timing of access to shared resources

and directs the students' attention to the various devices as appropriate. Learning activities are organized on the principle of teamwork: in an initial phase, the teacher guides and structures group work; subsequently the group learns to work independently as a team. Workstations integrate multiple learning resources used to carry out a range of tasks promoting and developing active learning processes.

4. Multi-screen classrooms

This is a variation of the previous three settings, characterized by the presence of more than one large screen on one or more walls. Such a setting can modify classroom proxemics in different ways: if the screens are used to deliver several multimedia objects during a lesson, then students need to change the direction of their gaze to follow the teacher's presentation and the seating arrangement should be designed so to provide all students with a good view of all screens; also, students should preferably be supplied with mobile chairs. Alternatively, if the screens are used for group work, then it is important to leave enough space between them to facilitate a positive working atmosphere with lower noise levels.

The technology implementation can vary from situation to situation. It is possible to use multiple electronic whiteboards, projectors or large screen monitors, each of which can be viewed easily by at least four-five students (small group). This kind of setting can be useful in implementing teaching methods based on group work. The students use the large screen initially as a board during their joint work activities and subsequently to share their output with the other groups; the simultaneous use of multiple screens and devices allows the groups to alternate flexibly and interact with one another when presenting their work.

5. Subject areas

In this setting, the choice of technology is linked to the specific discipline. Hardware and software are planned as a function of the learning content and the specific tasks to be carried out at dedicated science labs at specific locations, specialized software for mathematics, word processing stations, etc. Stations are placed around the edge of the classroom (like peninsulas) or at the back and students move from one work area to another according to the type of activity they need to carry out. Students come back and sit at their desks when teaching requires explanation, individual study or assessment. The teacher shifts between delivering traditional teaching methods, providing individual support, fostering collaborative learning and mentoring group work/peer tutoring.

In this setting, the technology is designed to cater for specific needs within specific subject areas and is only accessible to a few students at a time. If the teacher wants to assign the same learning activities to the entire class, this can only be done by rotating small groups around the different technologies.

6. Media areas

In this setting, the technology is designed to support activities that cut across disciplines, typically involving the implementation of educational projects such as school web radio, school newspaper office, TV channel. Depending on the space available, dedicated work areas may be located inside or outside the classroom (in the latter case, the setting design requires students to move outside the boundaries of the classroom). Specific areas are purpose-designed and equipped. For example, cameras and lights for making film footage placed next to a computer for editing and post-production, rooms with special lighting for photography, classrooms in which the walls are painted specifically to enhance the effects of pictures displayed or to mark out dedicated environments.

The teacher supports the workgroups in planning work schedules and provides technical support, while the students are free to organize their teamwork independently. This setting is an application of Freinet's principles for the physical arrangement of schools in terms of the availability of a rich and appropriate stock of tools (1967).

7. Mobile Learning

It is difficult to define a layout for this classroom setting because its key characteristic is that students are free to move outside the classroom although remaining connected by handheld mobile devices. This kind of setting is not to be seen as merely a mobile device-based audience response system (Tremblay, 2010) because it allows students to freely enter and exit the classroom, using their devices to gather and graphically represent data from in situ observation and live experiments (Roschelle, 2003).

This setting has a major impact on proxemics because communication between teachers and students can be maintained via mobile devices even when they are not in together in the classroom or at the same location; the desk no longer determines the relative positions of students and teacher. The technology used for this setting has shifted over the past few years from PDAs (Personal Digital Assistant) to Smartphones or handheld tablets. These devices

are designed to work without a keyboard and are usually equipped with a touchscreen or pen-based input system; furthermore, developers have significantly improved user interface by introducing features such as motion feedback, making this kind of device more user-friendly (Doyun, Ji-Hyun, & Sangtae, 2011). Such devices have the potential to enhance many forms of learning by experience and field learning, for example in the area of environmental education.

Impact of Digital Classroom on Teacher Practice

Digital classroom requires a shift from a teacher-centered to a student-centered environment where the instructor must take on multiple new roles. The constructivist theory that supports asynchronous learning demands that instructors become more than dispensers of knowledge; it requires that they become instructional designers, facilitators, and assessors of both grades and their teaching methods. As instructional designers, the emphasis is placed on establishing the curriculum, methods and the media through which the content will be effectively delivered. Once the design is in place and executed, the instructor must then facilitate communication and direct the learning. Through this project, teachers became involved in building their knowledge base.

Impact of Digital Classroom on Students

The rapid development of information and communications technologies (ICT) inevitably affects education, just as they affect everything related to people. Today, there are studies on the positive and negative effects of digital technologies that we are used to seeing in the classroom. In this context, each day there have been more studies on the integration of new digital tools with education (McGee & Diaz, 2005; Bullock, 2011; Gu, Zhu & Guo, 2013; Mishra & Koehler, 2006; Toledo, 2005; Tondeur, Van Keer, Van Braak & Valcke, 2008; Vanderlinde & Van Braak, 2010; Wang & Woo, 2007). The common purpose of studies related to the integration of technology with education is to successfully integrate technology into the classroom environment. Bringing technology into the classroom does not necessarily mean the integration of technology with education (Coklar, Kilicer, & Odabasi. 2007).

Learning environments enriched with technology have shifted from simple computer labs to highly technological environments equipped with computers, projection machines, internet connection and communications technology (Ott, 2000), and started to be named as digital classrooms with ICT opportunities. Any studies can examine the types of technology that

digital classrooms have, are required to have and the technological competence level required by the teachers and partners of digital classrooms. What all of these possible studies foresee may be of great significance in terms of revealing the effects of the use of technology in the classroom environment.

The main purpose of integrating many digital technologies into the learning environment is to increase the quality and success of education. Looking through the related literature indicates that several studies support using digital technologies in classrooms to increase students' academic success (Chen et al., 2013; Lopez, 2010). According to Sezgin's (2002) research, the classroom environment enriched with multimedia class software increases students' academic success level. Similarly, Aktumen and Kacar (2003) have determined that using a computer and an internet connection in the classroom increases students' success. On the other hand, some research shows that there are no positive effects of using technology in the classroom up students' academic success (Dunleavy & Heinecke, 2008). Aktas, Alioglu, and Vardar (2007) determined that the academic success of students using information and communications technology is lower.

All these studies have shown that the use of various digital technologies in a classroom environment may have positive or negative effects on academic success (Chen et al., 2013; Mashhadi & Kargozari, 2011; Brown, 2011; Lopez, 2010; Dunleavy & Heinecke, 2008; Rollins & Almeroth, 2004). At this point, it could be thought that efficiency in using these technologies is important for students so that they can be successful both in and outside the classroom with digital technologies. Regarding that digital classrooms use online technologies both in and outside the classrooms, the level of students' online technologies self-efficacy could be seen as important to raise academic success. Online technologies self-efficacy defined by Miltiadou and Yu (2000) being suitable for the studies on digital classroom contains internet competencies, synchronous interaction and also asynchronous interaction. That is, the level of the students' self-efficacy in these subtitles may affect academic success. Supporting this thought, Chang et al. (2014) have determined that there is a meaningful relation between online college students' internet self-efficacy and performances. Likewise, Tsai and Tsai (2003) have decided that the students whose internet self-efficacy is higher can reach information more easily and learn better than the students whose self-efficacy is lower.

The student-centered nature of online learning requires students to be actively involved and take more responsibility for their learning. In addition to their normal duties as learners, students are required to:

a. Become proficient with the technology required for the course;

b. Use new methods of communication with both peers and instructors;

c. Strengthen their interdependency through collaboration with their peer

d. Students use background knowledge and then interpret, implement, analyze, and evaluate it to create a new product.

e. A digital classroom generally promotes individualized instruction and cooperative learning among the students. Most importantly, the students are allowed to learn at their own pace.

Advantages of Digital Learning Over Traditional Education Methods

Digital learning is replacing traditional educational methods more and more each day. With how rapidly classrooms are changing, it is best to forget methods we may remember from when we were in school and start thinking about newer teaching and learning techniques based on digital learning tools and technologies. The inclusion of digital learning in the classrooms can vary from simply using tablets instead of paper to using elaborate software programs and equipment as opposed to the simple pen.

This could entail using sites, services, programs, teaching tools, and technologies like study aids built for at-home use. Even social networks and communications platforms can be used to create and manage digital assignments and agendas. Irrespective of how much technology is integrated into the classroom, digital learning has come to play a crucial role in education. It empowers students by getting them to be more interested in learning and expanding their horizons. Here is how digital learning is a step up from traditional education methods.

Learning tools and technology enable students to develop effective self-directed learning skills. They can identify what they need to learn, find and use online resources, apply the information on the problem at hand, and even evaluate resultant feedback. This increases their efficiency and productivity. In addition to engaging students, digital learning tools and

technology sharpen critical thinking skills, which are the basis for the development of analytic reasoning. Children who explore open-ended questions with imagination and logic learn how to make decisions, as opposed to just temporarily memorizing the textbook.

Educational tools by Young Digital Planet such as Bingiel teach children how to collaborate and work successfully in groups. This is typically done through gamification. Gamification is a great feature of interactive learning because it teaches children to play in a group to depend on and trust each other to win a game or achieve their goals. They also promote cooperation and teamwork which are very important skills, in every aspect of life.

Interactive social skill games are excellent learning tools that teach children discipline because playing games require children to follow rules and guidelines to participate. Even children who might grow frustrated with other learning methods may stick with games longer because playing itself is rewarding. This ends up helping them develop patience, another useful life skill. Children also develop positive feelings of accomplishment from mastering new knowledge and skills using digitized learning tools giving them the confidence they need to want to learn even more new things. It is commendable that millions of courses by the best educators are available for free to anyone with an internet connection. The possibilities are endless (Proshansky & Wolfe, 1974).

Digital learning tools and technology fill the gaps where traditional classroom teaching falls behind. Some of the efficiencies such tools bring are simply unmatchable by traditional learning techniques. From the environmental impact recognized by the need for less paper for handouts and books to saving time with quick access to information and the ease of research, digital learning provides an effective way to cut costs, maximize resources and heighten both reach and impact for students and educators alike.

CONCLUSIONS AND RECOMMENDATIONS

Digitalization has no doubt changed our education system, but we cannot say that it has completely diminished the value of our old-time classroom learning. The best part about the digitalization of education in the 21st century is that it is combined with both classroom learning and online learning methods (Wolfe, 1974). Digitalization in education has also proved to be the right method for saving resources. Online examination platforms have restricted the frivolous usage of paper, directly confining the cutting down of trees. It is recommended that the classroom should be digitalized to implement full ICT in education by

involving students in the transformation of the classroom through the use of computers and their accessories. This will assist the teacher in making a significant departure from convention to modern classroom that used ICT.

REFERENCES

1. Burke, K., & Burke-Samide, B. (2004). Required changes in the classroom environment: It's a matter of design. *The Clearing House, 77*(6), 236¬239.
2. Hayward, P. (1995). When novelty isn't enough: A case study of students' reactions to technology in the classroom environment. *College Student Journal, 28*(3), 320-325.
3. Park, D., Lee, J.-H., & Kim, S. (2011). Investigating the affective quality of interactivity by motion feedback in mobile touch screen user interfaces. *International Journal of Human-Computer Studies, 69*(12), 839-853. doi:10.1016/j.ijhcs.2011.06.006
4. Penuel, W. R. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. *Journal of Research on Technology in Education, 5191*(3), 329-348. Retrieved from http://proxy.lib.utk.edu:90/login?url=http://vnweb.hwwilsonweb.com/hww/jumpstart
5. Roschelle, J. (2003). Keynote paper: Unlocking the learning value of wireless mobile devices. *Journal of Computer Assisted Learning, 19*(3),260-272. doi:10.1046/j.0266-4909.2003.00028.x
6. Sandholtz, J. H., Ringsta, C., & Dwyer, D. C. (1997). Teaching with technology: Creating student-centered classrooms. New York: Columbia
7. Proshansky, E., & Wolfe, M. (1974). The Physical Setting and Open Education. The School Review, 82(4), 556-574. Retrieved from http://www.jstor.org/stable/1084003
8. Roschelle, J. (2003). Keynote paper: *Unlocking the learning value of wireless mobile devices*.Journal of Computer Assisted Learning, 19(3), 234-237.
9. Sandholtz, J. H., Ringsta, C., & Dwyer, D. C. (1997). *Teaching with technology: Creating student-centered classrooms.* New York: Columbia University Press.
10. Tremblay, E. (2010). Educating the Mobile generation-using personal cell phones as audience response systems in post-secondary science teaching. *Journal of Computers in Mathematics and Science Teaching, 29*(2), 217-227. Retrieved from http://www.editlib.org/p/32314
11. Weinstein, C. (1981). Classroom design as an external condition for learning. *Educational Technology, 21*(8), 12-19.
12. Wolfe, M. (1974). The Physical Setting and Open Education. *The School Review, 82*(4), 556-574. Retrieved from http://www.jstor.org/stable/1084003