

Prospects And Challenges In The Integration Of Process-Based Learning (Animated Cartoon) Into Post-Primary Educational System In Developing Africa

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Abstract

The need for alternative learning pedagogies to improve students' educational achievements at post-primary levels in developing countries inspired this article. Due to the lack of a global policy framework, process-based learning faces significant implementation challenges. This paper investigates the numerous benefits of a blended learning system, specifically animated cartoons, as an alternative learning tool for students. The cognitive theory of multimedia learning and the technology acceptance model are the preferred theoretical frameworks for this study. This article identifies two challenges as factors limiting the integration of blended learning systems in third world countries: difficulties associated with study conditions and difficulties associated with the teacher's personality. Successful implementation of blended learning technology is only possible if the two groups of problems are solved. Underestimating any of the listed groups of factors will make it difficult to achieve the desired results.

Keywords: Blended Learning, Animated Cartoon, Integration, Post-Secondary Education, Developing countries.

Introduction

Without a doubt, education is the foundation of human and national development. The quality of a nation's human capital, the aggregate of skills and knowledge imparted to its citizens by its educational system determines a country's position in today's highly competitive global knowledge economy (Adamu, 2017). Education is no longer solely dependent on teachers and textbooks for information, as technology has paved the way for students to learn through a process-based pedagogy. This new technological literacy promotes the need for learners to develop skills in analyzing, validating, and synthesizing information in order to gain a deep understanding of what is taught rather than memorization. Traditional methods of teaching, which typically involves oral recitation of lessons, are currently used in most third world countries particularly Nigeria; however this method has proven to have limitations. Despite clear evidences of the potency and efficiency of traditional teaching patterns, they are befuddled by their inability to be far-reaching and inclusive for underperforming students. Underperforming students are defined in this study

as students who have below-average academic scores and performance gaps that are far below their natural ability and inherent intelligence level. One of the factors responsible for the ineffectiveness of traditional teaching patterns for underperforming students is the teacher's inability to use teaching methods and practical examples to explain abstract ideas (Karo et al., 2018). Traditional education is gradually shifting away from pen-and-paper instruction and towards a more interactive and integrated learning environment (Md Baharul et al., 2014). Since the last decade, technology has rapidly revolutionized the world, and the instructional style used by teachers and instructors should reflect these changes. (Bai, 2018) observes that certain trends in the millennium age are resulting in innovations in teaching and learning, emphasizing the efficacy of technology in education. Technology can help academic advancement in two ways: first, by removing the restriction on learning to only physical space, and secondly, by shifting the emphasis from retentiveness of knowledge to its application. Courville goes on to say in (Francis, 2017) that the removal of physical barriers has given teachers greater access to professional

development and graduate education. The diminuendos and subcomponents of technology have given birth to inventive learning spaces (both physical and virtual), and as a result of the exponential burgeoning of computer hardware and software, computer animation has gained entry into almost every sphere of interaction, including science, arts, education, and so on.

Animation is increasingly being recognized as an alternative method of teaching and an instructional tool for young adults and children worldwide, particularly in Europe, the United States of America, South America, and Asia. However, in Africa, particularly in Nigeria, animation is rarely, if ever, recognized and used as an art form. Animation, which is a technique of photographing successive drawings to create the illusion of movement, has been used as an entertainment model for children all over the world to help them identify and relate to their surroundings. Learning never stops, and in order to effectively retain knowledge, the processes of acquiring it for learners who have difficulty understanding through the traditional teaching pattern must be optimized. In light of this, this paper investigates the numerous advantages of using animated cartoons as an alternative learning method for all learners, particularly underperforming students.

Literature Review

Animation has gained notoriety as a viable entertainment medium for children and it is progressively recognized as an alternative method of teaching and an instructional tool for young adults and children both in formal and non-formal settings around the world. In a previous study titled 'Can Animations Effectively Substitute for Traditional Teaching Methods'? A pretest and posttest study was used to compare the results of students who were taught through animations with those who were taught with text books in class. Results indicated that while both groups showed learning gains regardless of the mode of education, those who were taught with animations obtained higher scores than the control group (Gregorius et al., 2010). In 2017, Gregorius compared students taught traditionally against students taught with animation. The study revealed an increase in A's and B's for students taught with animation when compared to those taught with the traditional teaching style. The study further revealed a drop in performance for those who were taught with animations after they stopped being taught with

animation model. In a recent study (Syeda et al., 2021) compared animation based learning with traditional method of teaching English language subject. After four weeks lesson plan for both learning groups, animation based learning proved to be a better method for comprehending grammar concepts as well as to retain lesson learnt. The work "Short Animation Movies as Advance Organizers in Physics Teaching: A Preliminary Study" was undertaken by (André et al., 2012). The study came up with a set of recommendations for making an instructional short animation film. To assess the usefulness of the strategy, a short film was prepared, animating a piece of a Physics lesson on the topic of "moment of a force." The research took place in a Brazilian school in Arapoti, Brazil. Pre- and post-tests were used to generate data. According to the findings, the movie aided in the creation of linkages between prior knowledge and the new material presented in the class. (Akpınar & Ergin, 2008) conducted a research on the impact of interactive computer animation accompanied with teacher and student-made lessons. A quasi exploratory pre-test/post-test configuration was utilized in the review. The exploratory gathering got guidance including intuitive computer animation movement joined by educator and student - arranged idea maps, while the benchmark group got conventional guidance. Discoveries showed that the trial bunch had altogether higher scores than the benchmark group in the science accomplishment test. With respect to demeanor towards science, there was no huge contrast between the gatherings in the pre and post-test results. (Hoban & Nielson, 2013) directed a review on Learning Science through making a "Slowmotion", in which they propose another way for pre-service educators to learn science by planning and making a described stopmotion animation as an educational asset to clarify science idea. The finding showed that making a slow animation worked with the pre-administration instructors' finding out about the existence pattern of a ladybird beetle and changed their elective originations.

A study was conducted to determine the extent to which animated educational resources facilitate education at post-primary institutions in Bauchi state, Nigeria. According to (Kwasu & Ema, 2015), the human digestive system was taught through animation in this study. Based on the utilization of animated teaching materials, there was a difference in the level of knowledge assimilation. Those who were taught using an

animated educational material outperformed those who were not. Furthermore, students who were taught with animated instructional material retained more information than those who were not. The findings of this study imply that animation is a reliable technique for the teaching and learning process. Inanimate objects come to life through animation, which helps to concretize learning and make it more enjoyable. These will greatly improve students' performance rates, and a reduction in failure rates will also entail a reduction in all other linked issues, such as Bauchi state's high dropout rate. (Aremu & Sangodoyin, 2010) looked at the impact of computer animation on Nigerian senior secondary school biology students' academic performance. The participants were 189 senior high school Year II biology students from two Federal Government Colleges in two states in Southwestern Nigeria, who were chosen at random. The intervention employed in this study was the Computer Animation Learning Packages in Genetics (CALPG). A sequence of interactive slides with animations and images make up this computer software. The usage of hyperlinks allows students to choose what content they want to learn and when they want to learn it. The experiment's findings led to two new discoveries. First, the learning package's novelty makes it appealing to students, and the fact that they can observe movements and changes in the vivid diagrams and visuals that depict the processes motivates them. (Chen & Sun, 2012) in a review evaluated the Effect of various Multimedia Materials on Emotions and Learning Performance. In this review, three unique media materials, static message and picture based sight and sound material, video-based mixed media material, and enlivened intuitive interactive media material, were introduced to verbalizers and visualizers to research what different mixed media materials mean for individual learning execution and feeling, and distinguish connections between learning execution and feeling. Trial results show that video-based sight and sound material produces the best learning execution and best feeling for verbalizers. In addition, dynamic media materials containing video and animation are more proper for visualizers than static sight and sound materials containing text and picture. (Chien & Chang, 2012) led a review for the examination of various informative media plans for further developing students' science - process ability mastering. This study created three types of computer based interactive media, including Static Graphics (SG),

Simpler Learner Pacing Animation (SLPA) and Full Learner Pacing Animation (FLPA), to help students in learning topographic measuring. The review showed that there was a huge distinction with an enormous impact size in mental exertion appraisals among three groups, and the posttest demonstrated that FLPA forced less mental burden on understudies than did SG. It likewise uncovered that the distinctions of functional execution scores among bunches arrived at a measurably huge level with an enormous impact size and the post-test demonstrated that FLPA cultivated preferable learning results over both SLPA and SG.

While noting on the importance of animation as a viable tool for facilitating learning, (Liu & Fei, 2014) refute the stance of the integration of animation as an independent resource for students and as a substitute for the traditional teaching methods. In a discussion on the traditional teaching and multimedia teaching in college education, Liu and Fei, opines that a synergy of both teaching methods will result in higher proficiency of students. This claim reflects on the stance of (Dancy & Beichner, 2006). They opine that animation should not be perceived as a replacement or substitute for traditional teaching pattern but as a medium for facilitating learning. Similarly, (Ong & Mannan, 2004) observes that animations can help teachers to effortlessly illustrate abstract and complex concepts to students. (Schlosser, et al., 2012) in a review assessed the impacts of movement on straightforwardness, name understanding and ID of realistic images for action words and relational words, in pre-schoolers of 3 age groups. Consequences of the review showed that animated images were more straightforward than static images. Animated words were named more precisely than static action words, however there was no distinction among energized and static relational words. Action words were recognized more precisely than the relational words, yet there was no distinction between image designs. (Unal- Colak & Ozan, 2012) directed a review on the Effects of Animated specialists on students' accomplishment and attitudes. The point of the review was to break down the impact of the utilization of educational specialists in learning materials planned in sight and sound, on the accomplishment and perspectives of students. The exploration discoveries show that the utilization of mixed media programming created by utilizing instructive specialists emphatically influence students' accomplishment and attitudes. The

accomplishment of the students who worked with the product essentially expanded. (Kayaoglu, et al., 2012) led a review entitled „A limited scope Experimental review: Using Animations to Learn Vocabulary to see if there is a difference between learning language through animation and acquiring vocabulary through traditional paper-based methods. The research was carried out at the Karadeniz Technical University. The experimental and control groups were chosen at random from the pre-intermediate classes. The results of the data collected with a pre-test and a post-test for each group were evaluated using the t-test. Although there was no statistically significant difference between the pre-tests of each group, the post-test scores of the animation group increased when compared to the pre-test levels. This rise suggests that incorporating multimedia, such as animations, can help kids acquire vocabulary more effectively. (Sanchez & Wiley, 2010) conducted research on "Sex Differences in Science Learning: Closing the Gap via Animation." Males and females in this study read a scientific paper about plate tectonics with static illustrations, animated copies of the static pictures, and no illustrations. Participants were divided into groups based on their visual-spatial abilities as well as their working memory capacity. While males outperformed females on both the Visuo-spatial measure and total science learning, the introduction of animations completely negated performance differences for this science issue, according to the study's findings.

Theoretical framework

This study is based on Richard E. Mayer's Cognitive Theory of Multimedia Learning and the Technology Acceptance Model (TAM) theory. Mayer's Cognitive theory of multimedia learning is based on Paivio's dual coding theory, Baddeley's working memory model, Sweller's cognitive load theory, Wittrock's generative theory, and Mayer's SOI model of meaningful learning. The theory is based on a combination of visual and verbal information processing, in which voice narrations are processed verbally and animation is processed visually. The learner engages in three important cognitive processes during multimedia learning: selecting, organizing, and integrating. The first cognitive process, Selecting, is applied to incoming verbal information to produce a text base and is applied to incoming visual information to produce a visual base. The second cognitive process, organizing, is applied to the word base to

create a verbally-based model of the system to be explained and to the image base to create a visually-based model of the system to be explained. The third process, integrating, occurs when the learner establishes links between corresponding events (or states or parts) in the verbally and visually-based models. (Mayer, 1997) explains the model in greater detail, and it has resulted in a series of experiments that have yielded various principles for using multimedia to help students understand a scientific explanation. The Multiple Representation is one of the principles which state that it is preferable to present an explanation in words and pictures rather than just words. This principle simply states that it is preferable to present an explanation in two modes of representation rather than one. This allows learners to create two distinct mental representations—a verbal model and a visual model—and connect them.

The Technology Acceptance Model (TAM) is widely regarded as the most influential and widely used theory for describing a person's acceptance of information systems (Lee et al., 752). Fred Davis developed the Technology Acceptance Model (TAM) in 1986 as an adaptation of the Theory of Reasonable Action. TAM's goal is to explain the general determinants of computer acceptance, which leads to an understanding of user behavior. TAM, according to Lee et al., is specifically designed for modeling users' acceptance of information systems or technologies, as well as analyzing and exploring factors influencing the acceptability of a particular information technology. However, two major variables influence an individual's acceptance of information systems technology: perceived usefulness (PU) and perceived ease of use (PEU) (PEOU). Perceived usefulness is defined as the potential user's subjective likelihood that using a specific system will improve his or her action, whereas perceived ease of use is the degree to which the potential user expects the target system to be simple to use. Other factors, referred to as external variables in TAM, can influence a person's belief in a system.

Benefits of learning through Animated Cartoon

- Makes learning faster:

Individual Differences in Mental Animation (Hegarty & Sims, 1994) During Mechanical Reasoning, it is stated that animation may assist

students in learning more quickly and easily. Furthermore, they state that this is an excellent tool for teachers to use when teaching difficult subjects such as science and mathematics to their students. Parents generally view computers favorably, and believe that contents lacking animation programs are at a disadvantage.

- **Visual attributes:**

According to new research, information that is coded both visually and verbally is more likely to be remembered than information that is coded only visually. As a result, animation doubles the likelihood of information being stored and, as a result, easily retrieved. (Rieber & Kini, 1991) also suggest that animation has a number of advantages over static graphics. Learners, for example, do not need to generate a mental image of the event or action being targeted when using animated graphics, reducing the risk of developing a false understanding. (Yunis, 1999) adds that the movement element in animation film is regarded as the most important in terms of confirming information in the minds of students. Furthermore, animation provides viewers with two visual attributes: images and motion. Other advantages include; Saving time and effort, Converting abstract ideas into concrete images and creating images that appear realistic.

Integration of Animation into Teaching Curriculum

The researchers of this article were able to identify two broad patterns for the integration of animated cartoons into the teaching curriculum through analysis of the various experimental studies carried out by scholars on the efficacy of animation in teaching. The researchers identified Blended Animated Teaching (BAT) and Independent Animated Learning (IAL) as pedagogical models for optimizing learning for all students, particularly underperforming students.

Blended Animated Teaching (BAT)

The blended animated teaching model is a learning pattern that emphasizes the use of multiple simultaneous techniques in the design of instructional messages. It is a method of teaching that combines animated cartoons and traditional place-based classroom methods. It necessitates the physical presence of both the teacher and the students, as well as some student control over time,

place, path, or pace. The researchers coined the term "Blended Animated Teaching" from the concept of blended learning. Although blended learning has been around for a long time, its terminology was not firmly established until the early twenty-first century. According to (Graham, 2004), "blended learning systems" are learning systems that "combine face-to-face instruction with computer-mediated instruction". According to Martyn Margie, in research literature, the terms "blended learning," "hybrid learning," "technology-mediated instruction," "web-enhanced instruction," and "mixed-mode instruction" are frequently used interchangeably. Although the concepts underlying blended learning emerged in the 1960s, the formal terminology used to describe it did not emerge until the late 1990s. One of the first instances of the term appears in a 1999 press release issued by Interactive Learning Centers, an Atlanta-based education company, announcing a name change to EPIC Learning. "The Company currently operates 220 on-line courses, but will begin offering its Internet courseware using the company's Blended Learning methodology according to the release. According to (Bonk et al., 2006) the term "blended learning" was initially ambiguous, encompassing a wide range of technologies and pedagogical methods in various combinations (some making no use of technology whatsoever).

Independent Animated Learning (IAL)

The Independent Animated Learning model is another method for incorporating animated cartoons as an instructional tool in schools. This is a learning pattern that emphasizes student independence through the use of animated cartoons rather than traditional place-based classroom methods. Unlike BAT, where animated cartoons are used as a teaching aid in the classroom at the same time, IAL is used by students during their free time and at relaxation centers within the school environment. This could happen during long and short breaks at school dining halls and hostels. This is a more relaxed instructional material embedded within entertainment, such as music, song, or dance, allowing for a friendlier learning environment. With the introduction of the animated cartoons, accurately perceiving one's location (in mind and spirit) becomes essential to both usability and learning, emphasizing the importance of humanizing the animated teaching pedagogy. When discussing a rewarding

pedagogical model for a higher level of interactivity in education, an animated cartoon is an indispensable didactic tool.

Prospects of learning through Animated Cartoon and the Challenges of its Integration

The analysis of other researchers' experiences and their own pedagogical activity allows us to highlight the Prospects and overwhelming challenges of integrating blended learning into the Nigerian educational system.

Prospects

Process-based learning offers the possibility of cognitive understanding and interaction. This integrated learning system ultimately allows learners to develop their cognitive understanding of what is being taught. The incorporation of animated cartoons allows for a more flexible and convenient learning environment in which teachers and students can interact with one another. This is an excellent tool for teachers to use when teaching difficult subjects such as science and mathematics to their students, putting learners who do not have animation programs at a disadvantage. Furthermore, information that is visually and verbally coded is more likely to be remembered than information that is only verbally coded. As a result, animation increases the likelihood of information being stored and retrievable. According to (Rieber and Kini, 1991), animation has several advantages over static graphics. When using animated graphics, for example, learners do not need to create a mental image of the event or action being targeted, reducing the risk of developing a false understanding. According to Yunis (1999), the movement element in animation film is the most important in terms of confirming information in the minds of students. Furthermore, animation gives viewers two visual elements: images and motion. Other benefits include: saving time and effort, converting abstract ideas into concrete images, creating realistic-looking images, flexibility (choice of time, place, and pace), student centricity, broadening horizons, and increasing student motivation.

Challenges

The Nigerian educational sector faces numerous challenges in implementing the blended learning

teaching method. These limitations in the application of this technology can be divided into two categories: difficulties associated with the study conditions and difficulties associated with the teacher's personality. The first set of factors includes insufficient conditions for successful blended learning implementation. There is no way to implement blended learning without first establishing the necessary infrastructure. According to Moskal et al. (2013), reliable and robust infrastructure is required to support students and faculty. The main impediments here are a lack of classrooms equipped with necessary modern equipment, a slow Internet streaming speed for playing video materials and performing interactive exercises, and insufficient electricity supplies. According to Moskal et al. (2013), blended learning necessitates a strong IT infrastructure and network services supported by highly qualified technical staff. There are times when the site is unavailable due to technical issues caused by electronic equipment malfunction.

The second set of issues is related to the teacher's personality and professional competencies. Few teachers have a fixed mindset when it comes to incorporating blended learning. They are hesitant to try out new teaching-learning methods and are unwilling to revise tried-and-true pedagogical strategies. They consider using technology in the classroom to be a waste of time because the traditional chalk and board classroom method is easier. These can sometimes stymie the process of implementing this method. Awareness programs, seminars, webinars, and workshops on the advantages of blended learning. Inadequate information and communication skills, insufficient time for the development of new educational technologies, and the difficulty of creating high-quality electronic content. Not all students are sufficiently motivated to learn and willing to accept responsibility; it is the responsibility of teachers to instill the necessary discipline to motivate learners through process-based learning pedagogy.

Process-Based Learning in Third world Countries

Despite the fact that the scope of this study is the Nigerian educational system, it reflects the realities in third-world countries such as Malawi, Niger, Liberia, Kenya, and Ghana, to name a few. As previously stated, funding gaps and limited access are significant barriers to the adoption of emerging technologies in developing countries. Funding is required to upgrade IT infrastructure, purchase

computers and software, and train teachers in new skills such as programming, among other things. Most developing-country governments do not prioritize the incorporation of computer animation technologies into education in the face of more fundamental developmental challenges such as the provision of basic medical services, the supply of safe drinking water and electricity, youth unemployment, the need for safe affordable housing (Akorede 2016). According to Rosalyn Mckeown, a well-known author on the subject of educational growth that is sustainable. She hypothesized that most educational challenges are caused by a lack of understanding of the link between education at all levels and long-term economic growth (Mckeown 2002). Because education is undervalued, government planners prioritize teaching as a secondary priority. A high level of awareness leads to a high level of priority, adequate planning, policy, and funding. As a result, Mckeown advised all stakeholders in education, including governments, community leaders, and parents, to be aware of the link between education and sustainable development, and to prioritize education, including the use of ICT.

The recognition of a link between sustainable development and education will naturally lead to policy, funding, and access issues becoming a national priority, resulting in better returns on social developments. Despite limited resources, all developing countries should strive to create a meaningful roadmap for the use of animation technology. They could accomplish this through meaningful collaboration with United Nations education systems, development partners, non-governmental organizations, local universities, and friendly countries. The paper submits that since education is a pre-requisite and a crucial quality determinant, there's a need to prioritize the ICT sector. Over time, any investment made to enhance education through the creation and deployment of realistic computer technology will have a multiplier effect on the long-term growth of these nations.

Conclusion

The researchers were able to reestablish the link between animated cartoons and education as a result of the preceding discussions. Learning through animated cartoon pedagogy is more effective in improving students' educational achievement however this pedagogical style

requires significant funding as well as a thorough policy review in developing nations. The animated cartoon template suggests a feasible and sustainable use of the theatrical method of teaching in both informal and formal settings, reaffirming the potency of Process-based pedagogy as a strategic tool for humanizing traditional classroom teaching pedagogy. The short time benefit of the incorporation of animated cartoon pedagogy into the post-primary school curriculum is that this approach will stimulate students' interest in learning, make learning fun, open the imagination of learners and spark their enthusiasm which at the long run will improve their proficiency. Based on the cognitive theory of multimedia learning and the technology acceptance model theory, it is possible to conclude that animated cartoons have significant benefits for learning; however, this model will be used based on perceived importance and perceived ease of use by learners. Advocating for collaboration among educators, computer designers, and 3D animators is thus required for the development and design of an animated cartoon instructional model that can be used by both learners and teachers for the incorporation of animated cartoons into school curricula.

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