Use of Animation in Simplifying the Learning of Abstract Concepts of History and Government in Secondary Schools in Kenya

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Abstract

Students' diverse learning abilities render the need to develop various learning materials for effective learning. Existing literature has shown the increasing use of real-life and documentary videos and teaching aids to complement classroom teaching. While there are studies on effectiveness of documentary videos in existing literature, relatively little is reported on use of animation videos in teaching History and Government in comparison to traditional written text in terms of their impact on learning outcomes in secondary schools in Kenya. In response to this, this study sought to examine the role of animation in simplifying the teaching of abstract concepts of History and Government in Secondary Schools in Kenya and the impact that animation has had on comprehension and learner retention of war-related concepts. The study adopted a qualitative research model that relied on document analysis, observation and oral interviews to collect data. A sample of 179 History and Government learners was engaged and divided into two groups. One group was exposed to animated videos based on content taught in three subtopics while the other did not watch these videos. Thereafter, a written and oral examination was administered to both groups. The group that had watched animated content performed better than the latter. The second group later watched animated content and was examined. Its performance became better than the first group. These results imply that that animated video can effectively complement text materials. It is recommended that the KICD in collaboration with the TSC should further improve existing learning materials by developing animated content based on the Kenyan syllabus and make the content freely available online.

Key words: *animation, learning, comprehend, abstract, recall, secondary school, history*

Introduction

History and Government is an important discipline because it plays a key role in the development of society. Knowledge of the past is critical to the understanding of the present and to planning for the future. It is through the study of the subject that the youth of a nation acquire knowledge about the past and the present so as to develop positive attitudes about the future. Thus, learners are able to recognize the relationship between the events of today and the world of tomorrow.

The Kenyan secondary school History syllabus addresses key themes such as the social, economic and political organizations of African societies during the colonial period, European colonization, world wars, the rise of African nationalism, developments in trade, transport and communication, industry, agriculture and urbanization. It also covers the issues of morality, responsible citizenship, good governance, national integration, conflict resolution and international cooperation.

While some of the concepts taught in the secondary school history syllabus in Kenya are easy for the learner to comprehend, others are abstract. These are mainly themes in world history which learners have not had encountered before, chief among these are; the first and second world war and the cold war (KNEC report, 2016). Failure of learners to comprehend the content in these two topics hinder achievement of the eighth and ninth objectives of the history syllabus, which are; to promote an understanding and appreciation of intra-national and international consciousness and relationships and; derive through the study of History and Government an interest in further learning.

Traditional methods of teaching the aforementioned topics have been used but failure in internal and external examinations has been reported by teachers of history. Textbooks and charts have not brought the reality of war and while documentaries have tried to capture the war as it was, some are too detailed and very lengthy for use in class. This created the need to apply other effective methods of teaching content on war especially those that would elicit learner interest and stir the desire for further learning. This gap was filled by the use of animation in teaching content on war.

With the advancement in educational technology, the delivery of still images has evolved into animation. Animations can be used as a delivery media where learning can be conducted as occurring through technology and assisted through technology (Goldsworthy, 1999). Animation refers to computerized simulation of processes using images to form a synthetic

motion picture. In the context of learning, Cooper, (1998) points out that the use of the pictorial form of communication leads humans to improved comprehension and retention. Animation appeals to the power of the human visual system (Rieber, 1990). Animation assists learners to visualize a dynamic process, which, otherwise may be difficult to visualize. Animation might thereby reduce the cognitive load (Rieber, 1990). According to CGPundit (2018) the first purpose of animation in academics is to fulfil a cognitive function. In this role, animations are intended to support students' cognitive processes that ultimately result in them understanding the subject matter. Animation can be used to make very exciting and fun animations into which education and training can easily be incorporated. CGPundit (2018) further argues that instructors can also use animation to demonstrate things and concepts visually exactly how they want to since they have control of every aspect of the animation. It can be used to show how things come together and work together. In science for example, the computer animation might be used to show how our solar system works, and in math, a computer animation might show a student how one can algebraically manipulate specific equation. Other subjects such as English, foreign language, music, and art can also be thought by using animation.

Secondly, as an affective learning tool that attracts attention, engages the learner, and sustains motivation aspect. Young people are fascinated by animation and animated stories and they enjoy the opportunity to create their own. The creative potential of animation is enormous, and integrating animation activities into the school curriculum offers the possibility of tapping this potential to meet a range of educational objectives.

According to Bai, H. (2018), the use of technology in education also affects learning and teaching environments. It has been suggested by Szabo, M. & Poohkay, B. (1996) that with the use of animation in education, there is a significant increase in the attitudes and academic achievements of the students in a positive way. Betrancourt, M. & Tversky, B. (2000) further add that it has been shown that animations as technological tools used in education have contributed a lot to the students in terms of security, speeding and slowing time, examining very rare events, simplifying complicated systems, being useful and cheap and motivation as well as providing a significant increase in students' attitudes and academic achievements towards the courses in positive manner.

It is in the background of poor comprehension of war-related concepts among history learners in secondary schools in Kenya that that this study sought to examine the role of animation in simplifying the teaching of abstract concepts of History and Government in Secondary Schools in Kenya and the impact that animation has had on comprehension and learner retention of war-related concepts.

Theoretical Framework

Animation is situated as a tool in aid of visualization and the development of mental models. In this perspective, the use of animations in facilitating learning is informed by learning theories: Behaviorism, Cognitivism, and Situated Learning. (Gregorius, R. 2010). The main design guidelines for use of animations in learning according to Meyer (2005) are grounded in the cognitive theory of multimedia learning (CTML). To the authors' knowledge, there are no other comprehensive theories of multimedia design. Despite the rapid changes in the instructional technology adopted in medical education, CTML is a useful framework because it has extensive empirical support and builds on other established theories, such as dual coding theory(Paivio,1986) and cognitive load theory,(Sweller,1998) to help explain and predict a variety of learning outcomes. According to dual coding theory, images and words are processed in separate, limited capacity channels of working memory before becoming integrated into a single, coherent mental model, which is an organised conceptual framework of the subject matter at hand(Meyer,2005 and Paivio,1986). Verbal and pictorial components provide unique contributions to mental model formation: words contribute theory-based information, such as explanations of complex relations, and images contribute similarity-based information, such as exemplars or other basic visual representations.(Bartholome´ & Bromme ,2009) The generative process of combining these theory-based and similarity-based elements to construct a detailed mental model helps learners solve related problems and anticipate future events in that context(Martindale,1993&ParkO and Gittelman,1995). Thus, animations that use words and images appropriately are potentially ideal tools for aiding student learning. Also linked to CTML, cognitive load theory incorporates learners' cognitive capacity for forming mental models into the designing of instructional materials, such as animations(Sweller,1998 & 2005). Lowe(1995)adds that an effective animation contains sequences of motion frames and presents the essential attributes of a concept in a manner that facilitates learning. According to Sweller (2005)animations that accomplish this goal are designed with the learner's cognitive capacity in mind and aim to optimise the balance among three types of cognitive demand: essential processing; extraneous processing, and generative

processing. This thought is also supported by Meyer(2010.) Each type of processing imposes a different type of load for the learner, and each needs to be addressed in a specific manner to facilitate learning. Essential processing, which imposes intrinsic load, is the cognitive processing inherently required by the nature of the task to mentally represent the lesson content. Extraneous processing, which imposes extraneous load, involves inefficient mental activities in which learners engage when faced with irrelevant or ineffective learning situations (e.g. distracting sound effects and images that are separated from their verbal descriptions). Generative processing, which imposes germane load, occurs when the learner creates a coherent mental model of the subject at hand. Meyer(2010) adds that this type of processing, although effortful, is necessary for the learner to understand the topic as well as the overall learning domain. The instructional design of animations should attempt to manage essential processing, minimise extraneous processing and facilitate generative processing.

Literature Review

There are several instructional opportunities that can be explored with the change in the representation form from static graphics to graphical computer simulations. Animation is one of those components (Rieber, 1990). In several studies involving scientific subject areas, Mayer (2001) has pointed to the importance of animation. Animation facilitates descriptive and procedural learning (Rieber, 1990; Lih-Juan ChanLin, 2000; Mayer, 2001). Animation is an important component in designing interactive multimedia which creates a visual interest and makes scientific learning more appealing and enjoyable for learners (Lih-Juan ChanLin, 2000). Furthermore, animation is one such component which can be part of computer based instruction and which cannot be combined with any other media (Rieber,1990). Animation adds two unique components as compared to the static graphic – motion and trajectory (Klien, 1987). 15 Animated visuals explain the visual and spatial information when these two components are used effectively. The pace of animations, when controlled by the learners, allows the users to view the motion and replay as many times as desired. This series of actions allows students to explore the different strings of actions (Klein, 1985). Through computer-based instruction, a student constantly creates, manipulates, and interacts within a dynamic conversation of his own creation. S/he constructs mental models (Klein, 1985). Other information delivery media have important similarities and distinctions that may make a difference for the learner. Animations are created symbols which differentiate the real life events but create an opportunity for the learner to interact and move from being a passive information receiver to an active interactor (Klein, 1985) Animation and simulation features

have been used in engineering (Wozny, 1978), physics (Disessa, 1982) and mathematics (Hooper, 1982; Wegman, 1974). These have made effective contribution to instruction by conveying the information through the help of its interactivity and special effects (Hellet, 1999). There are many variables which can affect learning with the aid of animations. Practice and rehearsal is one of them (Bruning, Schraw & Ronning, 1998). "Wyzt's Playground," a multimedia tool, was created for animation research in fourth grade mathematics. This tool emulates and simulates the real-life scenario of building a playground, and creates an environment that engages the students in active learning (Johnson & Neil-Jones, 1999). This study used interactive videodiscs to discover the nature and proportion of the different learning activities exhibited by group 12-13 year old student to ascertain that the repeated use of disc improved their problem solving 16 skills. The study found that well designed applications could enhance learning (Blissett & Atkins, 1993). Reports by Hamel & Ryan-Jones (1997) reviewed the use of state of the art graphic and animation for instructional material, and pointed out that animation uses interactive graphics, with hints on viewing strategies and presents procedures that enhance visual learning.

Methodology

The study employed a qualitative research model that relied on document analysis, observation and oral interviews to collect data. The study engaged 179 History and Government learners at Karoti Girls High School and was carried out between May and July 2019. The learners were divided in two groups; the first one with 41 learners in one class while the second group had 138 learners in three classes. Both groups were taught three war-related subtopics; the first world war, the second world war and the cold war during the normal classroom lessons. However, upon completion of the subtopics, the first group (of 41 learners) was exposed to animation videos whose content was based on the core ideas of the aforementioned subtopics while the second group did not watch the animated content.

Two days later, both groups were subjected to a Continuous Assessment Test (CAT) of 50 marks whose test items were based on the three subtopics taught. A day after the CAT was administered, learners from both groups were randomly picked and asked questions that tested their comprehension and ability to recall and explain content from the three sub-topics taught to their fellow learners in class. The teacher recorded the observations noted as different learners explained content asked to the class as required by the teacher. The CAT's were marked and results analysed. The second group then watched animations of the content

taught and was given a second CAT. Learners were also asked questions orally from the three subtopics.

Results

Results of the CAT revealed that on the one hand, 68% of the learners in the first group(that had watched animations of content taught) scored above 50% and more than half of them were able to coherently respond to questions asked orally in class by the teacher on the content taught. On the other hand, only 53% of the learners in the second group scored above 50% in the CAT and only a third were able to respond coherently to questions asked orally without requiring the assistance of the teacher. Results of the second CAT that was administered to the second group revealed that 69% of the learners scored above 50% while more than half of them were able to coherently respond to questions asked orally in class.

Conclusion

Results of the study can be interpreted to mean that watching animated videos of the content taught in the first world war, second world war and the cold war improved learners' ability to comprehend and recall. This is in line with the suggestion by Szabo & Poohkay (1996) that with the use of animation in education, there is a significant increase in the attitudes and academic achievements of the students in a positive way. The use of visual elements combined with sound complemented the explanations given in class by the teacher and this explains the different scores of the two groups in the CAT and oral tasks given. These results are therefore proof that animation appeals to the power of the human visual system (Rieber, 1990) and that animation assists learners to visualize a dynamic process, which, otherwise may be difficult to visualize.

Recommendation

In order to ease understanding of abstract content not just in History and Government but in other subjects too, the Teachers Service Commission should liaise with the Kenya Institute of Curriculum Development to create animated content. This is because part of the animated content available online may not be relevant in the Kenyan curriculum and the teacher therefore has to spend a lot of time customizing it for his learners. Further, this content should be made freely available on the KICD or TSC website so that teachers and learners can download it when it is needed because currently, all videos produced by the KICD are only

available at a cost. Accessibility of animated content will improve learner competency and improve teacher preparedness for effective curriculum implementation.

References

Bai, H. (2018). *Preparing teacher education students to use instructional technology in an asynchronous blended course.* In Innovative Practices in Teacher Preparation and Graduate-Level Teacher Education Programs (pp. 603-619). IGI Global.

Bartholomé´ T, Bromme R. (2009)*Coherence formation when learning from text and pictures: what kind of support for whom?* J Educ Psychol;101 (2):282–93.

Betrancourt, M. & Tversky, B. (2000). *Effect of computer animation on users' performance: A review.* Le Travail Humain, 63(4), 311-329.

Blissett, G., & Atkins, M. (1993). *Are they thinking? Are they learning? A Study of the use of interactive Video.* Computers Education, Vol. 21, No. ½, pp31-39, 1993.

Bruning, R. H., Schraw, G. J., & Ronning, R. C. (1998). *Cognitive Psychology and Instruction* (3rd ed.). New Jersey:Prentice Hall.

CGPundit (2018)*Animation in Education* available on https://www.cgpundit.com/animation-in-education/

DiSessa, A. (1982). *Unlearning Aristotelian physics: A study of knowledge-based learning.* Cognitive Science, 6, 37-75.

Goldsworthy, R. (1999). *Lenses on Learning and Technology: Roles and Oppurtunities for Design and Development. Educational Technology* / July-August 1999, 59-62.

Gregorius, R. (2010) *Good Animation: Pedagogy and Learning Theory in the Design and Use of Multimedia.* ACS Symposium Series

Hallet, T. L. (1999). *Multimedia materials for language and literacy learning.* Reading Horizons, v40. n2 p147-58 1999.

Hamel, C. J., & Ryan- Jones, D. L. (1997). *Using Three-dimensional interactive graphics.* Educational Technology Research & Development Vol. 45, No. 4. pp 77-87.

Hooper, K. (1982). *The use of computer graphics in the development of mathematical imagery.* Paper presented at the annual meeting of the American Educational Research Association, New York [On-line]. http://www.icbl.hw.ac.uk/ctl/mayes/paper4.html.

Johnson, L., & Neil-Jones, P. (1999). *Innovative mathematical learning environments: using multimedia to solve real-world problems.* Educational Technology/September-October 1999

Lai, Y. L., Kuan, K. K., Hui, K. L. & Liu, N. (2009). *The effects of moving animation on recall, hedonic and utilitarian perceptions, and attitude.* IEEE Transactions on Engineering Management, 56(3), 468-477.

Lih-Juan, C. L. (1994). *Graphic aids in electronic texts. Reading Research and Instruction* v33, n3 p207-232 Spr 1994.

Lowe RK. (1999) *Extracting information from an animation during complex visual learning.* Eur J Psychol Educ vol 14:225–44.

Martindale M. (1993) *Mental models and text schemas: why computer-based tutorials should be considered a communication medium.* J Comput Based Instr Vol;20:107–12.

Mayer RE, ed (2005). *Cambridge Handbook of Multimedia Learning.* New York, NY: Cambridge University Press; .

Mayer, R.E. (2001). *Multimedia Learning.* Cambridge University.

Paivio A(1986). *Mental Representations: A Dual Coding Approach.* Oxford: Oxford University Press;53–83.

Park O, Gittelman SS. (1995) *Dynamic characteristics of mental models and dynamic visual displays.* Instr Sci;23:303–20.

Rieber L. P. (1990). *Using computer animated graphics in science Instruction with children.* Journal of Educational Psychology, Vol. 82, No. 1, 135-140

Sweller J. (2005) *Implications of cognitive load theory for multimedia learning. In: Mayer* RE, ed. Cambridge Handbook of Multimedia Learning. New York, NY: Cambridge University Press.

Sweller J, van Merrienboer JJG, Paas FGWC. Cognitive architecture and instructional design. Educ Psychol Rev 1998;10:251–96.

Szabo, M. & Poohkay, B. (1996). *An experimental study of animation, mathematics achievement, and attitude toward computer-assisted instruction.* Journal of Research on Computing in Education, 28(3), 390- 402

Wegman, E. (1974). *Computer graphics in understanding statistics.* International Journal of Mathematical Education in Science and Technology, 5(1), 15-23.

Wozny, M.(1978). *Interactive computer graphics for engineering education.* Professional Engineer, 1978, 48(6), 14-18.