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CONTENTS

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   INTRODUCTION

   REVIEW OF LITERATURE

   NEED/IMPORTANCE OF THE STUDY

   STATEMENT OF THE PROBLEM

   OBJECTIVES

   HYPOTHESES

   RESEARCH METHODOLOGY

   RESULTS & DISCUSSION

   FINDINGS

   RECOMMENDATIONS/SUGGESTIONS

   CONCLUSIONS

   SCOPE FOR FURTHER RESEARCH

   ACKNOWLEDGMENTS

   REFERENCES

   APPENDIX/ANNEXURE

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CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

REINFORCEMENT OF LECTURE PRESENTATION BY USE OF ANIMATION IN MATHEMATICS

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ABSTRACT

This paper discusses how animation simplifies the task of demonstrating technical concepts in mathematics to students who have challenges in comprehending instructions in the English language. The study group consists of students who are doing Mathematics for Computing in the Faculty of Computing at Botho University (N=38) Botswana. In the study, complex mathematical topics were selected and re-designed to include animation to simplify the presentations and demonstrations. Each class session was scheduled to take one hour and fourty five minutes (105 minutes) per week plus two hours (120 minutes) tutorials after lunch every Friday. The experiment sessions were conducted for 7 weeks starting from the 5th week of the semester (2012-2013 cohorts) amongst the first years doing mathematics for computing. Data were collected by using a questionnaire specific to the use of animation in the mathematics for computing course and interviews on the learners' views of animation as a tool for effective learning at the end the 11th week. The findings of the study revealed that including animation in the complex topics of mathematics during the experiment sessions was more effective in increasing students' understanding and enjoyment of the concepts than when traditional methods are used in the control sessions.

KEYWORDS

animation, progression class, dual-coding theory, textual-static-narration, textual-animation-narration.

INTRODUCTION

Animation is the simulation of movement by displaying a series of images on frames (Wikipedia, 2009). Animation on computers is one of the chief ingredients of multimedia presentations and has been extensively used in molecular and cellular biology (McClean, et al., 2005) , chemistry, and physics education (Adegoke, 2010) and computer algebra systems (Lipeikiene & Lipeika, 2006) and programming (Myungsook, 2006); (Nkomo, et al., 2014). The idea behind animation is used to simplify complex topics during presentations and to make it possible to demonstrate some concepts that would not be possible without it. In molecular biology, the DNA structures have been constructed in expanded forms and analysed and reconstructed. In mathematics, it allows students to explore and experiment and in physics animation has enabled students to simulate concepts that would not be feasible in the really laboratory. In total, animation has made the science courses interesting, simplified and achievable without necessarily any need to setup expensive and complicated laboratory machinery. Furthermore, it can be argued that a mixture of text, graphics and animation can improve the quality of learning or teaching and it fits as one of the common learning styles amongst the learners today. Some positive studies have been reported in Botswana by William Nkomo and Samson-Zulu (2014). In their study, they proposed a visual graphics interface to simulate programming in C++ and the pass rate improved by 5% amongst the experiment group versus the previous semesters where traditional lecture methods were used. More so, the studies conducted by Chuang (1999) and Adegoke, (2010) concur with the present study. In their separate studies, they found that students' learning outcomes in physics improved significantly with the concurrent use of animation, narration and text when compared to the use of narration and on-screen text alone.

At Botho University, mathematics for computing is a module taken as a foundational course presumed to be a pre-requisite to programming and computer architecture courses in the BSc Computing Honours Degree programme. This module presents challenges to students ranging from; phobia, preconceived perceptions that it is difficult and lack of sound background from high school. To mitigate these challenges the present study proposes a simplified dimension to the presentation of concepts in class by enriching slides with the motion pictures, objects and graphics (animation). In the sections that follow, we discuss the background the present study, review related literature, outline the research methodology used in the study present the results and findings of the study and examine their implications to modern learning/teaching at Botho University.

MOTIVATION

Challenges faced by progression students: A common problem noted at Botho University with some progression students is their inability to comprehend technical instructions given to them during lectures or when they are reading books. The most dominating drawback in this case is the English language (Nkomo, et al., 2014). In the present study we propose that timely and systematic inclusion of text, narration and animation can help students to understand better. Normally, some students can understand better if the instructions are presented by use of pictures, or a combination of pictures and text (Chuang, 1999). Animation creates a multi-sensory learning framework where the students can explore, experiment, reflect, and visualise (Mayer & Anderson, 1991).

Consultant for the Post Graduate Certificate in Higher Education (PGCHE) programme: Dr. Mark Lejk had an opportunity to visit the CP-MAT-B1 Mathematics for Computing in Francistown on the 26th of October 2012. The topic discussed was Exponents and algorithms. Lecture presentations included use of text, animation and narration. During the lecture, extensive use of the multimedia was deliberately used and students' engagement was relatively high and students seemed to be thrilled by the approach. From this meeting, some commendations were that students' engagement is likely to improve via animated slides because animation could be appealing to students and can get them to improve on their learning outcomes.

REVIEW OF RELATED LITERATURE

A promising approach to assisting students to learn the science courses better and encourage their future participation in such courses is the application of multimedia animation. Blending textual and narration presentations with static and motion pictures (animation or video) provides for effective teaching and learning. According to (Adegoke, 2010), visuals such as graphs, maps and charts and dynamic pictures (animation and video) improve cognitive skill acquisition and problem solving. (Lipeikiene & Lipeika, 2006) and (McClean, et al., 2005), also share the same view that animation bring about visualization that augment the information presented in text and hence, allow students to explore, experiment and visualise mathematics as a dynamic process (McClean, et al., 2005; Lipeikiene & Lipeika, 2006). Research has shown that visual perception is the most developed sense in learners and is a dominant component in humans that facilitate effective learning. Literature on algebra learning/teaching (Lipeikiene & Lipeika, 2006), molecular and cellular biology (McClean, et al., 2005), physics

education (Adegoke, 2010), and programming (Myungsook, 2006) confirms that blending textual, narration and animations helps the teacher to turn the classroom into a dimension of sight, sound and mind. This work is supported by (Mayer & Anderson, 1991; Paivio, 1990).

Currently, the most dominant mode of presentation used by lecturers at Botho University is through mixing textual and static graphics (charts, pictures and diagram) to outline a concept or illustrate the steps involved to solving problems. There is need to upgrade this traditional **textual-static-narration** approach to presentation by demonstrating the **textual-animation-narration** approach. As already mentioned, animated presentations could be an effective intervention (Nkomo, et al., 2014), and we hope that the students can benefit from their valued effect in the learning process. The power of animation lies in its ability to stimulate both visual and auditory senses of the learner. (Adegoke, 2010; Paivio, 1990; Mayer & Anderson, 1991). The value of graphics and motional pictures appears to be associated with the dual-coding theory (Paivio, 1990) which suggests that long-term memory retention is facilitated by a combination of verbal and visual cues.

Animated presentations are have proved very effective in illustrating concepts in maths and molecular biology by using a sequence of objects, images or cartoons or real pictures in motion (Knight & Wood, 2005; Lipeikiene & Lipeika, 2006; Chuang, 1999; Mayer & Anderson, 1991). Researchers have used it to model ideas/hypothesis; architects use it to show constituents of a structure, and how different components combine to make a complete structure like a bridge. In molecular biology it has been used to demonstrate the structure of the DNA to new students (McClean, et al., 2005). In mathematics animation is effective when demonstrating an algorithm or a step-by-step method of solving a problem. If motional objects/cartoons are used, then the learners' visual senses are activated (Lipeikiene & Lipeika, 2006). Visual senses are a very effective approach in assisting learners to create long-lasting memorise (Paivio, 1990; Ronit, et al., 2003). In the following sections, we explain how **animation method** was used in teaching mathematics.

THE PURPOSE OF STUDY

The present study deals with the redesigning of presentations of complex mathematics concepts during a lecture to include animation in order to simplify them. That is, the study aims to examine whether animated presentations can significantly improve the quality of presentation, simplify the complex concepts and increase students' enjoyment of the mathematics sessions. For this purpose, answers are sought for the following questions:

- Can animation boost learners' achievements and interest by use of textual-animation-narration type of presentation in a lecture?
- Would there be any good learning experiences reported by students about the textual-animation-narration type of presentation?
- How best can educators integrate text, pictures and narration to improve on the presentation/demonstration of scientific concepts?

IMPORTANCE OF STUDY

The present study seeks to examine the effects of the textual-animation-narration (animated slides) presentation on boosting students' interest and academic achievement. This is one amongst many strategies of creating a vibrant and interesting learning environment of the learners. The findings and recommendations from the study therefore are likely to inform educators on yet another pedagogical paradigm of optimizing and aligning existing lecture presentation methods with the emergent learning styles of our modern learners. Such work can create an enjoyable learning environment and improve academic achievement amongst the learners.

STATEMENT OF THE PROBLEM

At Botho University (Francistown), we recruit progression students to do BSc in Computing which includes Mathematics for Computing as one of the fundamental modules at first year. This module is one of the most failed modules because some of these students find it very difficult to comprehend mathematical instructions The common challenges identified are that these students have; (a) had a long break from school, (b) not done mathematics at High School or (c) difficulties in communicating in English language. It is the onus of the teachers and the institution to optimize the existing lecture presentations to demystify mathematics and make it easier. In this study, we propose animation of specific topics in the module to achieve this.

OBJECTIVES

Based on the key questions presented above, the objectives of the present study are:

- Identify specific topics in the Mathematics for Computing module and re-design them to suite the textual-animation-narration type of presentation in a lecture,
- Evaluate the effect of the new presentation method through the analysing some data collected during the experiment and formal interviews with participants, and
- Design a schedule that best integrates text, pictures and narration to improve on the presentation/demonstration of scientific concepts.

RESEARCH METHODOLOGY

The present study is both an experimental model with the experiment sessions (where animation is used in week 5 to 11) and control sessions (where textual-static-narration presentation is used in week 1 to 4 and week 12 to 16) and qualitative. Students' views on their learning experiences during animated sessions were collected and analysed, and therefore its qualitative nature.

PARTICIPANTS

Thirty eight (38) students were involved in the study and all are from the progression classes at Botho University (Francistown). Amongst these students, 28(74%) are female and 10(26%) are male. The average class age is 23 years.

CHARACTERISTICS OF THE PROGRESSION CLASS

Progression classes constitute students who have not been in class for a couple of years or students who have been exempted from doing other modules because they have equivalent qualifications to meet the basic entry requirements for the computing degree programme at Botho College. The majority of these students find it hard to understand textual instructions from the lectures due to factors pointed out earlier. Therefore, there is need for interventional strategies in learning/teaching to keep these problems at their minimum.

DESIGN

The experiment was done using the CP-MAT-B1; Mathematics for computing module within the 2012 academic year. It was conducted during the final 7 weeks of the course. The class was scheduled for up to a maximum of three (3) one hour fourty five minutes (105 minutes) lectures per week plus two hours tutorials after lunch every Friday.

DESIGN OF THE EXPERIMENT

The experiment took place over the final 7 weeks of the course (weeks 5 -11). In the first week (week 5) to the progression students were alerted that a new approach to teaching will be introduced and will be mainly applied during the extra lessons conducted on Friday. Although Friday sounded informal to them, the register was to be marked because the mandate was sought from the Education Manager to conduct these extra lessons. However, a few of the experiments were conducted during the normal scheduled hours to avoid total disadvantaging some students who could not afford to be present in the afternoon extra lessons and tutorials. Figure 1 shows the schematic representation of the experimental design showing the dates for the maths lectures conducted in week 5 up to week 11.

Consent was sought from management and students. The times for conducting the experiment were proposed to be Friday afternoon (1440 hours to 1715 hours). After the first presentation, it was observed that students were very interested in the animated presentation and a decision was taken to incorporate it to most of the lectures.

IMPLEMENTATION OF ANIMATION IN PRESENTATION

Specific topics or sections of topics that were difficult to teach or presumed to confuse students were selected and redesigned with motion objects and images. Friday afternoon (1440 to 1715 hours) was identified and proposed to management as the ideal time for conducting the experiment. The presentation slides were designed so that animation would outline the flow of logic, effects of parameters or the sequence of steps involved in executing a task. For example, exponentials and logarithms, graphs, tree traversal were used. See Appendix B for slides.

PROCEDURE

The experiment was administered using the CP-MAT-B1 – Mathematics for computing module the within the 2012 academic year. It was conducted for 7 weeks of the course. The class was scheduled up to a maximum of four (3) one hour fourty five minutes (105 minutes) lectures per week plus two hours tutorials after lunch every Friday.

FIGURE 1: SCHEMATIC PRESENTATION OF THE EXPERIMENTAL DESIGN

	DAY AND TIME			
	WEDNESDAY (7:00 - 8:45) AM	THURSDAY (7:00 - 8:45) AM	FRIDAY MORNING (7:00 - 8:45) AM	FRIDAY AFTER NOON (3:40 - 5:15) PM
WEEK				
5	3/10/2012	4/10/2012	5/10/2012	5/10/2012
6	10/10/2012	11/10/2012	12/10/2012	12/10/2012
7	17/10/2012	18/10/2012	19/10/2012	19/10/2012
8	24/10/2012	25/10/2012	26/10/2012	26/10/2012
9	31/10/2012	1/11/2012	2/11/2012	2/11/2012
10	7/11/2012	8/11/2012	9/11/2012	9/11/2012
11	EVALUATION	EVALUATION	EVALUATION	EVALUATION

Orientation | Textual presentation | Animation presentation | Evaluation

Figure 1 shows lecture weeks in rows while modes of presentations are shown in columns. Dates are included in the cells indicating which day and time the lecture was conducted**.** The experiment was started on the 5th of October 2012 with the extra lesson in the afternoon and finished on the 9th of November 2012. Most of experiments were conducted on Friday afternoon and only five of these were administered during the normal periods on Wednesday to Friday for the reasons aforesaid. The blue colour denotes the dates and times when the animation presentations were conducted. On the 3rd and 4th of October (white square), students were introduced to the method and an explanation was given in class with regards to the advantages of animation. Furthermore, students were told the complex topics where animation has been built-in and the possible dates when the reinforcements will be made. The orange squares indicate the dates and times when the traditional textual and narration method of presentation was used. During the 11th week, an evaluation of the method was done where students filled the evaluation forms and also responded to the questionnaires given to them

RESULTS AND FINDINGS

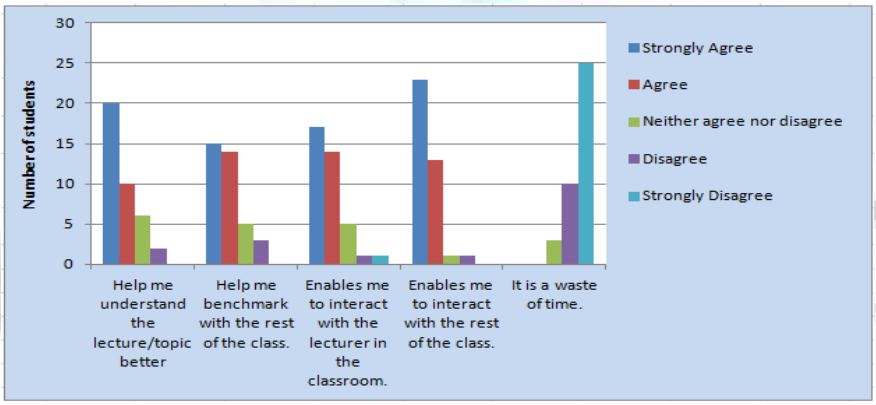
QUESTIONNAIRE

To collect feedback from students regarding the effectiveness of the animated slides, a questionnaire was used. All thirty eight (38) progression students responded. Due to such a small number, the researchers used qualitative feedback as the primary measure of effectiveness. Learners' feedback was collected in two ways: (a) a survey specific to the use of animation in the Mathematics for computing courses; (b) learners' view of the animation as a tool for collecting feedback at the end the 11th week. The details of the survey are summarised in Appendix A. The key points in the survey are: Qualitative feedback was used as the primary measure of effectiveness of animation since the sample group is small and most of the judgement relied on literature. All students that took the C1-MAT course responded to the survey.

SURVEY RESULTS FOR LEARNERS' FEEDBACK ON THE USE OF ANIMATION

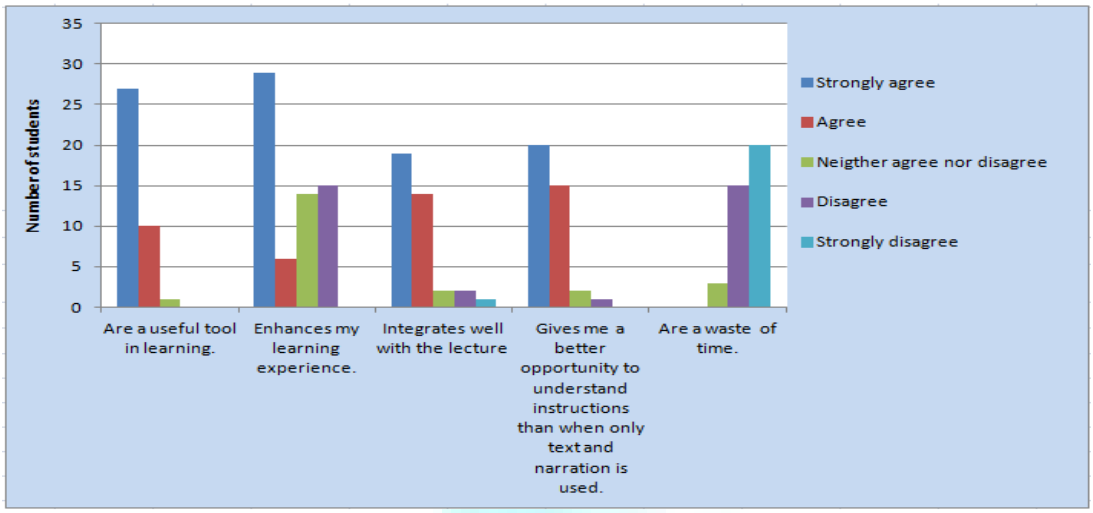
In this section, we present the views of the 38 participants collected via the questionnaires distributed amongst them after the 11th week of the experiment. The survey sought to establish four pedagogical elements crucial for the learning and teaching which are; (a) the participants' general experiences as they were exposed to animated slides, (b) influence of animated slides in their learning experiences, and (c) impact of animated slides and preferred learning styles of the participants. The diagrams that follow summarise this:

FIGURE 2: STUDENTS VIEWS ON THE USEFULNESS OF ANIMATED SLIDES AFTER THE EXPERIMENT



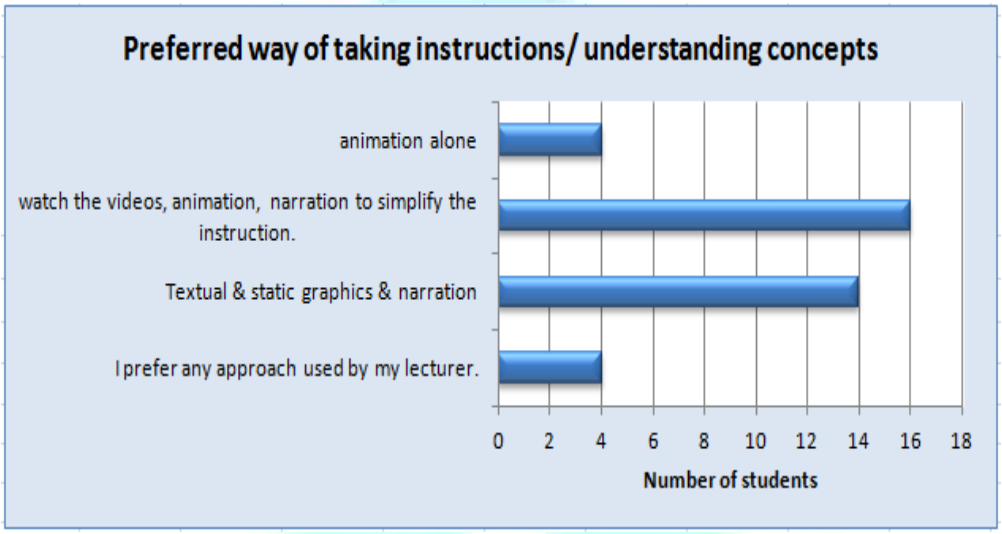
When figure 2 is examined, it is seen that 30 out of the 38 (79%) students either "strongly agreed" or "agreed" with the suggestion that slides animation is a useful tool in enhancing interactions in class and increasing the ability of students' understanding of the concepts. Only 6 out of 38 students are not sure of their views and the remaining 2 students disagree with the suggestion. None of the students strongly disagree with the suggestion. Similarly, all students disagree or strongly disagree with the suggestion that the use of animation is a waste of time.

FIGURE 3: STUDENTS' VIEWS ON THE INFLUENCE OF ANIMATION IN THEIR LEARNING EXPERIENCES



When figure 3 is examined, it is seen that there is a high number of students who strongly agree that animation improved their learning experiences, gave better opportunities to grasp concepts than if textual-narration presentation was used and also they strongly agree that it exposed them to a better integration method they prefer.

FIGURE 4: PREFERRED WAY ENHANCING COMPREHENSION OF INSTRUCTIONAL MATERIALS



When figure 4 is examined, it is seen that 16 out of 38 (42%) of the students prefer watching videos, motion and narration of the instruction *(textual-animation-narration*) to comprehend an instruction. A port of 37% of the students favour *textual-static-graphics-narration* instructional mode Eleven percent (11%) is fine with *animation* alone and the remaining 11% are fine with any approach.

SELECTION OF STUDENTS FEEDBACK COMMENTS

The following is a sample of some comments made by the progression students in the CP-MAT-B1 batch doing mathematics for computing. The comments were considered to reflect students' views about the use of animation and their experiences of learning during the course.

Student 1: *"Use of animation made me realise that mathematics is not as difficult as I thought. I enjoyed it very much. It was must first time to stand up and contribute in class, which I never did at high school…"*

Student 2: *"I did not know that analysis of sets can be made so easy using the diagrams. It was so difficult at high school, now it's clear…"*

Student 3: *"It's my first time to use this, but well I have no problems with it. But me I like the oral discussions in class."*

Student 4: *"That was magical, I can forget something but, tree traversal and exponents are there in my heard. I have pictured how you can traverse in-order, post-order and pre-order it."*

Student 5: *"This is a wonderful approach; I will use it with my child who is doing grade 4. I think he will find it great too."*

SUMMARY OF FINDINGS

We can deduce the following findings from the presentation of results above:

- Animated slides (computer-based instruction) boost learner's attention and enthusiasm to learn,
- Most students (79%) agree or strongly agree that animation increased their cognitive achievement,
- More than 70% of the students agree or strongly agree that they enjoyed lecture sessions where animation is used as part of the presentation, and
- A good number of students prefer lectures where the teacher talks less and animation is used more.

DISCUSSION AND IMPLICATION OF FINDINGS

The findings of this study showed that use of multimedia (animation) in an instructional interface could yield positive results in enabling a better learning/teaching environment for mathematics. The results concur with that of Chuang (1999) and Adegoke (2010) who found that students' learning outcomes can improve significantly when animation, narration and on-screen text are used concurrently in an instructional interface.

In this study it is important to note that the main focus was to investigate animated slides as an alternative strategy to improve instructional presentation in mathematics. The nature of the survey reflects this and so we do not have sufficient evidence to quantify pedagogical effects of the strategy (animation) about its influence on academic scores/achievements of the learner. However, independent studies by Mayer (2001) and Lipeikiene & Lipeika (2006) show that successful integration of instructional information in the form of written words on screen, animation and good narration of these is likely to benefit to students. It can be proven that the abovementioned instruction presentation modes can have balancing roles/effects. For example, if the three modes are combined,

students' are captivated. Secondly, the use of narrated animation and text tends to give students more opportunities to take quality notes. Paivio (1990) observed that animation offers visual and auditory models and these are vital for what the student remembers during the learning process. This observation is in agreement with the findings of the current study.

In a nutshell, this study has revealed that students are captivated by animated presentation of complex mathematical concepts and algorithms. Furthermore, learners' comprehension of mathematical instructions is likely to improve significantly if animation is used. However this was not within the scope of this study but, it is has been proved in Adegoke (2011) study of the "Effects of multimedia instruction on senior secondary school students' achievement in physics". The present study therefore suggests that animated instructions are a way of reducing negative perception that mathematics is difficult and can improve cognitive off- loading (Paivio, 1990). More so, students who are exposed to computer-based multimedia (dynamic lecture presentations via animated demonstrations) environment are likely to achieve better learning outcomes than those who are not (Adegoke, 2011).

CONCLUSIONS

Animated slides are very useful for demonstrating complex concepts and enhancing the quality of presentations especially for the technical courses. The idea is not new but, it has been more popular with kindergarten and secondary schools in the UK. In this study we observed that animation is applicable at higher education where it can be used as a spur the learners' attention by making them anticipate and want to see more. More so, it supports both verbal and visual modes of mental representation (Mayer & Anderson, 1991) and hence it caters for different accessories via which learners can intercept and absorb instructions (through eyes and ears). Computer-mediated instructions arouse the interest of students (Adegoke, 2011) and encourage them to explore more in mathematics than the lecturer-mediated instruction. The present study established that animation boost students' interest to pay attention, conduct experiment that would not be feasible without I and make them want to explore further. Also, it enables lecturers to demonstrate concepts with ease. This study is in consonance with Adegoke (2011), Adegoke (2010), Chuang (1999) and Mayer & Anderson (1991) who concluded that computer-mediated instruction can improve learning. Since learners use both verbal and visual systems in cognitive processing, we argue that blending text, graphics and motion pictures are the best ingredients for a vibrant and purposefully decorated learning environment for effective dual-coding.

LIMITATIONS

Animated slides are a useful innovation albeit some challenges may not be avoided. In the present study the following issues arose;

- The need for multiliteracies amongst the progression students: Progression classes consist of students who are mature and/or who have been away from school for a long time. Computer-based/digitized instructions are multimodal (presented in the form of text, pictures, icons, hypertext and motion). These proved to be very difficult to interpret amongst the participants. Therefore for the technology brought some issues such as; poor lesson flow, communication gaps and reduced comprehension of concepts.
- Milestone versus the new presentation strategies (animation): It may be impossible to cope with the demands of the milestone if the infusion of animation forces the lecture sessions to exceed the maximum time scheduled for the classes. In the present study, it was necessary to conduct extra classes on Fridays in order to make demonstration and presentations with animation. This was necessitated by the fact that these classes were not compulsory and students were not forced to attend.
- Time to prepare the animated slides: The process of adding animation is not easy and needs to be well designed to enable intended learning outcomes to be accomplished. The task may take several hours outside working hours of the teacher's time; therefore the teacher needs to be dedicated to develop quality slides for improving learning/teaching all the time.

SCOPE FOR FURTHER RESEARCH

Although the present study is purely experimental, qualitative and captures a few participants (n=38), the results seem to be in consonance with conclusions made by other researchers elsewhere (Adegoke, 2010; Chuang, 1999; Lipeikiene & Lipeika, 2006; McClean, et al., 2005). However, further research is imperative to investigate the relevance of animation in improving academic achievement of the learners. A more sound statistical analysis will be to compare the cognitive achievement amongst learners in the experimental group (where animation is used) and the control group (where the conventional lecture method is used). Basically, this must be a quantitative investigation with an increased sample size.

REFERENCES

1. Adegoke, B. A., 2010. Integrated Animations, narratives and textual information for improving physics leaarning. Electronic Journal of research in Education Psychology, 8(2), pp. 725-748.
2. Adegoke, B. A., 2011. Effect of multimedia Instruction on Senior Secondary School Students' Achievement in Physics. European Journal of Educational Studies, 3(3), pp. 537-550.
3. Biggs, J., 1991. Approaches to learning in secondary and tertiary students in Hong Kong: Some comparative studies.. Educational research, Volume 6, pp. 27-39.
4. Biggs, J., 2003. Teaching for Quality Learning at University. 2 ed. UK: Open University Press.
5. Cadwell, J. E., 2007. Clickers in the Large Classroom: Current Research and Best - Practice Tips. CBE- Life Science Education, 6(1), pp. 9-20.
6. Caine, R. N. & Caine, G., 1994. Making connections: Teaching and the human brain. New York: Addison-Wesley.
7. Chuang, Y.-R., 1999. Teaching in a multimedia computer environment: A study of the effects of learning style, gender and math achievment.. Interactive Multimedia Electronic Journal of Computer, 4(6), pp. 456-467.
8. Duman, B., 2010. The Effects of Brain-Based Learning on the Academic Achievement of Students with Different Learning Styles. Educational Sciences: Theory & Practice, 10(4), pp. 2077-2103.
9. Dunn, R. & Dunn, K., 1992. Teaching elementary students through their individual learning styles: Practical approaches for grades 3-6. Needham Heights: Allyn and Bacon.
10. Dyson, J. B., 2008. Assessing small-scale intervention in large-scale teaching: A general methodolgy and preliminary data. Active Learning in Higher Education, 9(3), pp. 265-282.
11. EduMECCA, 2011. EduMECCA SRS. [Online] Available at: http://srs.hud.ac.uk/srs/ [Accessed 5 July 2012].
12. Eric, M., 2005. Interactive 'clickers' transform classrooms. [Online] Available at: https://uwm.courses.wisconsin.edu/content/enforced/46141-srs_fac_devel/CNN%20Class... 01/24/2006 [Accessed 24 September 2012].
13. Hart, L. A., 2002. Human Brain and Human Learning. 3 ed. s.l.:Books for Educators.
14. Horowitz, H. M., 2006. Students Response Systems: Interactivity in a Classroom Environment, New York: IBM Corporate Education Center.
15. Houghton, W., March 2004. Learning and Teaching Theory for Engineering Academics, Exeter: Engineering Subject Centre.
16. Knight, J. & Wood, W., 2005. Teaching More by Lecturing Less. 4 ed. Colorado: Cell Biology Education.
17. Kolb, A. Y. & Kold, D. A., 2005. Learning styles and Learning spaces: Enhancing learning in Higher Education. Academic of Management Learning and Education, 4(2), pp. 193-212.
18. Lipeikiene, J. & Lipeika, A., 2006. Animation Tools of CAS for Dynamic Exploration of Mathematics. Information in Education, 5(1), pp. 87-96.
19. Mayer, R. E. & Anderson, R. B., 1991. Animations need narrations: An experimental test of a dual-coding hypothesis.. Journal of Educational Psychology, Volume 83, pp. 484-490.

20. McClean, P., Johnson, C., Rogers, R. & Daniels, L., 2005. Molecular and Cellular Biology Animations: Development and Impact on Students Learning. Cell Biology Education, Volume 4, pp. 169-179.
21. Myungsook, K., 2006. Visual Approach for Teaching Programming Concepts. Issue 9.
22. Nkomo, W., Samsom-Zulu, B. & Chirau, R., 2014. An Exporatory Study of the Potential of "KatSRS system" as an Educational Technology in Facilitating Learners' engagement and Feedback: A Case Study of Botho University.. International Journal of Research in Commerce, IT & Management;May2014, Vol. 4 Issue 5, p1, 1(1), pp. 1-20.
23. Nkomo, W. & Samson-Zulu, B. E., 2012. AN EXPLORATORY INVESTIGATION OF THE EMERGENT REQUIREMENTS FOR VISUAL TEACHING TOOLS FOR SUPPORTING INTRODUCTORY PROGRAMMING IN C SHARP: A CASE STUDY OF BOTHO COLLEGE, FRANCISTOWN. Gaborone, Unpublished.
24. Nkomo, W. & Samson-Zulu, B. E., 2014. THE EMERGENT REQUIREMENTS FOR VISUAL TEACHING TOOLS FOR SUPPORTING INTRODUCTORY PROGRAMMING: A CASE STUDY OF BOTHO UNIVERSITY. Barcelona, Spain, International Conference on Education and New Learning Technologies.
25. Paivio, A., 1990. Mental Representations: A dual-coding approach. 1 ed. New York : Oxford University Press.
26. Ronit, B.-B. L., Mordechai, B.-A. & Pekka, A., 2003. The Jeliot 2000 program animationsystem. Computers and Education, 40(1), pp. 1-15.
27. Sellahewa, H., 2011. Using an Online Student Respnse System in Small Group Teaching: A pilot Study. Small Scale interventions in Teaching-Learning, 10(3).
28. Tumkaya, S. & Songul, 2012. The Investigation of the Epistemological Beliefs of University Students According to Gender, Grade, Fields of Study, Academic Success and Their Learning Styles. Educational Sciences: Theory & Practice, 12(1).
29. Turugare, R. et al., 2012. A Frame Signnature Matrix for Analysis & Comparing Interaction Design Behaviour. HCI Conference, Volume 136.
30. Webopedia, 2012. Terms in Aninmation. [Online] Available at: http://www.webopedia.com/TERM/A/animation [Accessed 21 November 2012].
31. Wikipedia, 2009. Animation. [Online] Available at: http://en.wikipedia.org/wiki/Animation [Accessed 20 November 2012].
32. Zull, J. E., 2002. The art of changing the brain: Enriching teaching by exploring the biology of learning. s.l.:Stylus.

APPENDIX

FIGURE 5: USE OF ANIMATION SURVEY FORM

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
A) Review/Summary questionnaires before/after the course:					
1. Help me understand the lecture/topic better	20	10	6	2	0
2. Help me benchmark with the rest of the class.	15	14	5	3	0
3. Enables me to interact with the lecturer in the classroom.	17	14	5	1	1
4. Enables me to interact with the rest of the class.	23	13	1	1	0
5. It is a waste of time.	0	0	3	10	25
B) The animated slides					
1. Are a useful tool in learning.	27	10	1	0	0
2. Enhances my learning experience.	29	6	1	1	1
3. Integrates well with the lecture	19	14	2	2	1
4. Gives me a better opportunity to understand instructions than when only text and narration is used.	20	15	2	1	0
5. Are a waste of time.	0	0	3	15	20
C) Effective way of influencing my understanding – which of the following statement you agree with most?					
1. I prefer any approach used by my lecturer.	4				
2. I want the lecturer to write down instructions/draw diagrams (textual & static graphics)	14				
3. I want to watch the videos, pictures and hear the narration to simplify the instruction.	16				
4. If I only visualise I understand	4				
D) Preferred mode of instructions – which of the following statement you agree with most?					
1. I am happy with textual-narration presentation	16				
2. I prefer the mixture of text, graphics and videos/animations	20				
3. Only narrated videos and animations work well for me	2				
E) The use of animation system					
1. I have used the animation in one course	10				
2. I have used animation in two courses	5				
3. I have used animation in more than two courses	9				
4. I have never been exposed to animation at all (although it was available to me)	14				

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