A Novel Framework for Technology-Assisted Learning

Samuel Oludare Bamgbose, Christianah Aderonke Bamgbose & Jie Zhang

Abstract

The rapid advancement in digital technology has made the use of technology an essential component of contemporary education. In order to keep up with the pace of advancement in any field of endeavour, students and teachers alike must take advantage of emerging applications of technology to ensure effective teaching and learning. One of such applications is in lecture capture, which is the use of lecture recordings as a tool to support learning. Digital devices such as computers, laptops, tablets, smart phones, etc are now used to support learning in ways that were hitherto unimaginable. This article develops a new framework for a more effective integration and utilization of current technologies in ways that take advantage of its unique capabilities to transform the learning experience. We explored the extant literature on the current use of technology to enable and enhance learning. Then, we designed a learning practice based on the proactive use of pre-recorded lectures, motivational schemes to ensure its usage and creative procedure to stimulate active participation in classrooms and entrench deeper understanding of the subject matter, thereby providing a platform for effective and efficient knowledge transfer.

Keywords: *digital technology, technology-assisted learning, lecture capture, pre-recorded lectures, teaching method, framework*

Introduction

The dynamics and fast growing access to technology has opened a lot of interesting research areas. It is now being regarded by many researchers and educators as one of the indispensable components of future education (Chen, Dai & Zhou, 2013).

According to Merriam-Webster's online dictionary, technology encompasses these three features: (i) the practical application of knowledge especially in a particular area or a capability given by the practical application of knowledge (ii) a manner of accomplishing a task especially using technical processes or methods and (iii) the specialized aspects of a particular field of endeavour. Definition (ii) is the most relevant to this paper.

Furthermore, Information and Communication Technology (ICT) in general refers to communication devices or the application of such devices e.g. radio, television, computer, phone etc. ICT in Education is the application of technology or communication devices into teaching and learning in order to get a better learning outcome. For example, Computer Aided Instruction (CAI) is an individualized instruction which is used to aid tutorials and exercises after teaching a topic. It can be used to know if the students really have an understanding of such topic. Another example is Computer Assisted Language Learning (CALL) which provides access to materials on the internet to facilitate language learning especially foreign languages. Others are the use of slides, recorded lectures etc.

There has been growing use of technology nowadays to enhance the teaching and learning process. The employment of technology- assisted classes foster interactive students' involvement in the learning process, thereby making learning more fun and attractive for the students (Smaldino, Rusell, Heinich & Molenda, 2005). It has also been severally reported in the literature that both students and teachers derive benefits from the use of technology (Alessi & Trollip, 2001; Ashburn &

Floden, 2006; Bitter & Pierson, 2005; Egbert, 2009, Januszweski & Molenda, 2008; Jonassen, Howland, Marra, & Crismond, 2008; Kent, 2008; Lever-Duffy, McDonald, & Mizell, 2005; Wiske, Franz & Breit, 2005).

Smaldino, Rusell, Heinich & Molenda (2005) and Barron, Ivers, Lilavois, & Wells (2006) also reported that technology is an excellent platform for student motivation, exploration, and instruction. It was stated in Bitter and Pierson (2005) that a recent meta-analysis demonstrated that the use of technology yielded modest but positive gains in learning outcomes for students who use it over those who do not. Bates and Poole (2003) also observed that technology increases the need for imaginative, creative thinking rather than reduce it. Baek, Jung and Kim (2008) pointed out that there is a consensus among many researchers that using technology is an efficient cognitive tool and instructional media. It can be realized from the fore-going that introducing and integrating technology in teaching provides a better learning environment and broadens students' perspectives. One of the emerging technology-assisted learning is the use of recorded lectures. Traphagan, Kucsera, & Kishi (2009) and Phillips, Maor, Cummin-Portvin, Roberts, Herrington, Preston, & Moore (2011) suggested that more frequent access to recorded lectures lead to better learning behaviours. However, the complexity of students' behaviour makes it difficult to make a conclusion as to whether access to recorded lectures does reduce attendance. Von Konsky, Ivins & Gribble (2009) and Holbrook & Dupont (2009) state that access to recorded lectures has little to no effect on student's attendance at live lectures. However, academics are still concerned about the impact of recorded lectures on students' attendance, interactions and review of lecture formats deemed an anti-thesis to the current teaching practices (Chang 2007).

In this paper, a new framework for the efficient utilization of lecture capture is developed. New directions and possibilities are identified and a novel procedure to optimize the use of existing technology is presented.

Recorded Lectures

Traditionally, teaching has been done with little or no time for students to ask questions on the topic taught, which does not give room for adequate interaction between the teacher and the students. Hence, a more student-centered method of teaching has been advocated by researchers, where the classroom is more of a discussion forum. This is the reason why the use of technology is increasingly prevalent in education. It is widely accepted that technology has great potential for enhancing the efficiency and quality of education.

Lecture capture is the process of recording lecture for future use which can be accessed via a link on the internet or on a storage device such as a Compact Disk (CD). It can be audio or audio-visual. Slides and other teaching aids could be used as well. This use of technology is indeed popular among institutions in the developed countries (Woo, Gosper, McNeil, Preston, Green, & Phillip, 2008), and students have found it to be a useful learning tool (Soong, Chan, & Cheers, 2006; Williams & Fardon 2007; Gosper, Green, McNeil, Phillip, Preston, & Woo, 2008). It allows student greater flexibility and focus such as, not necessarily taking notes in class, watch certain parts of the lecture which was not understood in class, watch the lecture when class could not be attended due to illness, etc.

In spite of numerous benefits of lecture capture with respect to efficient and effective teaching and learning, there are concerns among researchers that recorded lectures could have a slight negative impact on lecture attendance. This and other ways of maximizing the use of lecture capture are addressed in the next section.

Methodology

The developed scheme constitutes a paradigm shift in that recorded lectures are made available in advance, and students are given preliminary review assignment before each class.

At the beginning of each semester, pre-recorded lectures are made available via links, or storage device. They are provided in audio-visual format; the effectiveness of which can be explained by the cognitive theory of multimedia learning experience. That is, information concurrently presented in visual and auditory form reduces the students' cognitive load.

Students are required to watch the lectures prior to class, and write a review on what has been learnt, including questions about concepts that were not properly understood. The length of the review is to be determined by the teacher depending on the frequency of class schedule, and students are required to turn in the homework prior to class. This approach allows the students to learn at their own pace as it gives them the opportunity to watch and listen to lectures for as many times as necessary to have a grasp of the content. It also affords the teacher the opportunity to go through the submitted report, focus on the important concepts in class and in addition, only go through uncomprehended concepts based on students' feedback. Although, there remain concern among educators that access to lecture recordings could lead to fewer students attending lectures (Chang 2007); on the contrary, Schreiber, Fukuta & Gordon (2010) found that students recognized the importance of attending lectures, and perceived recorded lectures as supplementary to class attendance. Hence, the traditional practice of making class attendance an integral component of grading should be retained in order to address the possibility of absenteeism. Invariably, recorded lectures are seen as useful tools to enhance and reinforce learning and not a substitute for live lectures.

Going by the procedure, students were able to engage more in active learning, such as engaging in perspective sharing and problem solving activities, since the topic is not new to them at lecture time as they would already have had a basic understanding of the lecture content. This fosters interactive student involvement in the learning process and makes it more fun and attractive to them. There was ample opportunity to ask questions and reinforce understanding of the class material. This learning scheme is illustrated in Figure 1.

Equipment

It is important to note that adequate infrastructure is required to implement the developed scheme. Where conventional power supply is not reliable, alternative or complementary power supply is required to support the learning environment. Recording equipment is also a basic infrastructure for the implementation of this scheme. Computers with installed spreadsheet application or more advanced software are required to analyse students' feedback, plan lectures, and assess students' performances. Several years back, the prohibitively high cost has made the integration of technology in learning impractical. However, recent decrease in the costs of computers and recording equipment has made accessibility nearly universal.

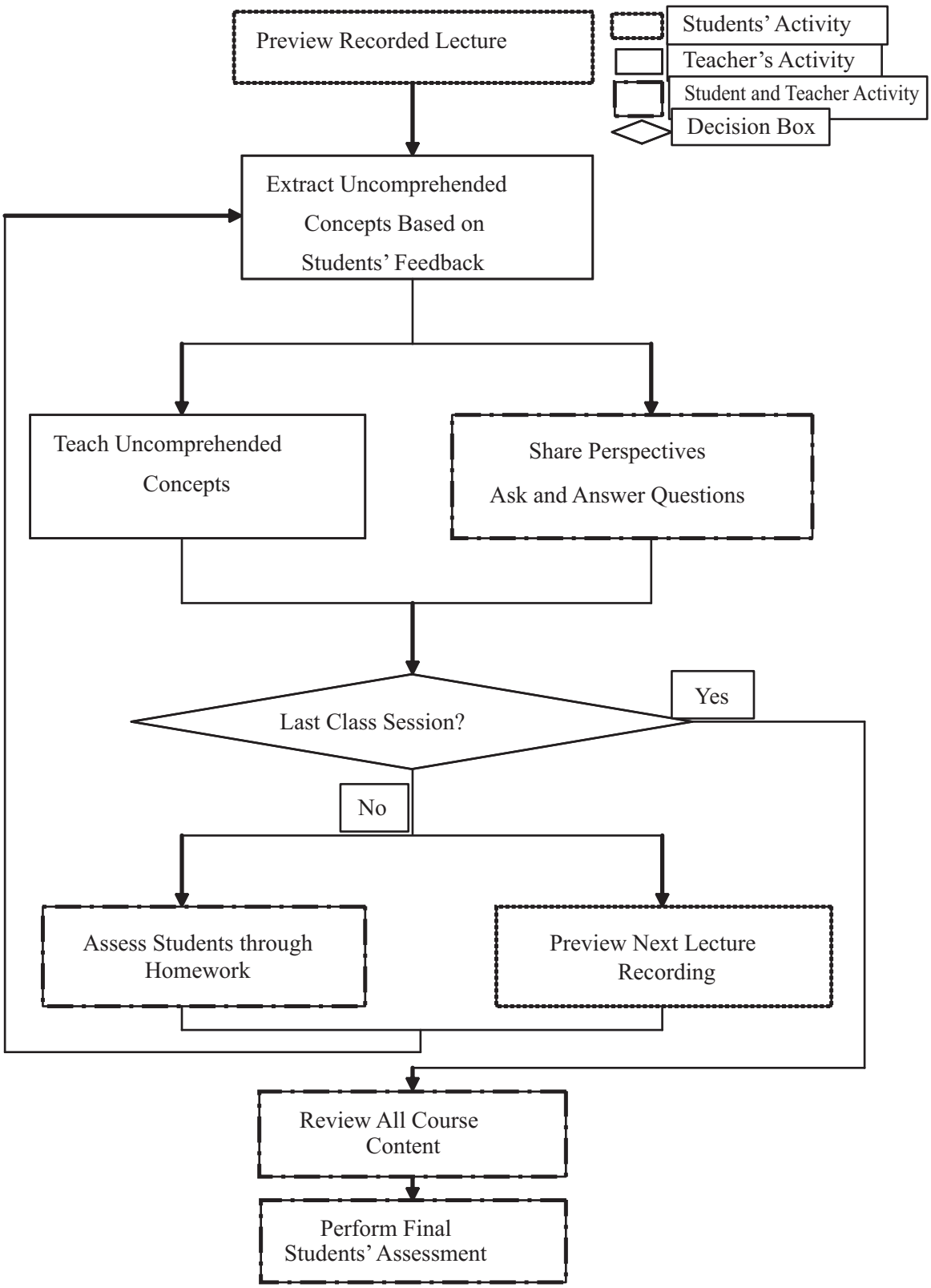

Fig. 1. Learning scheme chart

Conclusion

The traditional method of teaching requires the teacher to talk and write while the student listen and copy what the teacher is writing. However, with the application of technology to modern teaching methods, teachers are able to improve their efficiency and effectiveness. With this technology-assisted learning procedure, we have been able to device a framework that optimizes the current use of technology. The method gives both students and teachers more opportunities for feedback, reflection and revision.

The use of technology as described above also comes with the added advantage of equipping students with the technological and productive skills necessary to live and work in an increasingly complex and information-rich society, of which technology is an enormous part.

Recommendations

We recommend that after each class session, students are provided access to recorded class session to review perspectives on the lecture content and for revision before assessment or examination. A school website is recommended but optional, where student can download lectures and other class materials. In lieu of this, storage devices can be utilized. Basic in-service training should also be provided to the teachers who are co-users of the technology.

References

Alessi, S. M., & Trollip, S. R. (2001).Multimedia for learning: Methods and development (3rd ed.). Needham Heights, MA: Allyn & Bacon.

Ashburn, E. A.,& Floden, R. E. (2006). Meaningful learning using technology: What educators need to know and do. New York: Teachers' College Press.

Baek, Y., Jung, J., & Kim, B. (2008). What makes teachers use technology in the classroom?

Exploring the factors affecting facilitation of technology with a Korean sample.Computers &Education, 50, 224-234.

Barron, A. E., Ivers, K. S., Lilavois, N., & Wells, J. A. (2006). Technologies for education: A practicalguide (5th ed.). Santa Barbara, CA: Libraries Unlimited.

Bates, A. W., & Poole, G. (2003). Effective teaching with technology in higher education: Foundations for success. San Francisco, CA: Jossey-Bass.

Bitter, G. G., & Pierson, M. E. (2005). Using technology in the classroom (6th ed.). New York: Pearson Education.

Chang, S.(2007). Academic perceptions of the use of Lectopia: A University of Melbourne example. In "ICT: Providing choices for learners and learning". Proceedings ascilite,Singapore.135–144. Retrieved fromhttp://www.ascilite.org.au/conferences/singapore07/procs/chang.pdf. [Accessed February 13, 2016].

Chen J., Zhou Y. &Dai, D. Y. (2013). Enable, enhance and transform: How technology use can improve gifted education.Roeper Review, June 2013, 166-176. ISSN: 0278-3193 print/1940-865X online. DOI: 10.1080/02783193.2013.794892.

Egbert, J. L. (2009). Supporting learning with technology: Essentials of classroom practice. UpperSaddle River, NJ: Pearson Education.

Gosper, M., Green, D., McNeil, M., Phillip, R. A., Preston, G., & Woo, K.(2008). Final report: The impact of web-based lecture technologies on current and future practices in learning and teaching, Sydney: Australian Learning and Teaching Council.

Holbrook, J. & Dupont, C.(2009). ProfCasts and class attendance – Does year in program matter?Bioscience Education, 13. Retrieved from www.bioscience.heacademy.ac.uk/ journal/ vol13 /beej-13-c2.pdf.[Accessed February11, 2016].

Januszweski, A., & Molenda, M. (2008). Educational technology: A definition with commentary.New York: Routledge, Taylor & Francis Group.

Jonassen, D. H., Howland, J., Marra, R. M., & Crismond, D. (2008). Meaningful learning with technology (3rd ed.). Upper Saddle River, NJ: Pearson Education.

Kent, L. (2008). 6 steps to success in teaching with technology: A guide to using technology in theclassroom. Bloomington, IN: iUniverse.

Lever-Duffy, J., McDonald, J. B., & Mizell, A. P. (2005). Teaching and learning with technology (2nd Ed.). New York: Pearson Education.

Phillips, R., Maor, D., Cummin-Portvin, W., Roberts, P., Herrington, J., Preston, G., & Moore, E. (2011). Learning analytics and study behaviour : A pilot study. In G. Williams, P. Statham, N. Brown & B. Cleland, Changing demands, changing directions. Proceedings ascilite Hobart, 2011.997–1007. Retrieved fromhttp://www.ascilite.org.au/conferences/ hobart11/procs/Phillips-concise.pdf. [Accessed February11, 2016].

Schreiber, B.E., Fukuta, J. & Gordon, F.(2010). Live lecture versus video podcast in undergraduate medical education: A randomised controlled trial. BMC Medical Education, 10, 68. Retrieved from http://www.bmcmededuc.biomedcentral.com/articles/10.1186/1472-6920-10-68 [Accessed February 13, 2016].

Smaldino, S. E., Rusell, J. D., Heinich, R., & Molenda, M. (2005). Instructional technology and media for learning (8th ed.). Upper Saddle River, NJ: Pearson Education.

Soong, S.K.A., Chan, L.K. & Cheers, C.(2006). Impact of video recorded lectures among students. In Proceedings of the 23rd annual ascilite conference: Who's learning? Whose technology? The University of Sydney, Sydney. 789–793.

Technology. (2016). In Merriam-Webster.com. Retrieved from http://mw1.merriam-webster.com/dictionary/technology. [Accessed February 12, 2016].

Traphagan, T., Kucsera, J. V & Kishi, K. (2009). Impact of class lecture webcasting on attendance and learning. Educational Technology Research & Development, 58(1), 19–37. Retrieved fromhttp://link.springer.com/article/10.1007/s11423-009-9128-7. [Accessed February 20, 2016].

Von Konsky, B.R., Ivins, J. & Gribble, S.J.(2009). Lecture attendance and web based lecture technologies : A comparison of student perceptions and usage patterns. Australasian Journal of Educational Technology, 25(4), 581–595.

Williams, J. & Fardon, M.(2007). Lecture recordings: extending access for students with disabilities. In Research paper for ALT-C: Beyond Control 2007, University of Nottingham. Nottingham.

Wiske, M. S., Franz, K. R., & Breit, L. (2005). Teaching for understanding with technology. San Francisco, CA: Jossey-Bass.

Woo, K., Gosper, M., McNeil, M., Preston, G., Green, D., & Phillip, D.(2008). Web- based lecture technologies: blurring the boundaries between face- to- face and distance learning. Alt-J, Research in Learning Technology, 16(2), pp.81–93. Retrieved from http://files.eric.ed.gov/fulltex/EJ809980.pdf. [Accessed March 2, 2016].