



Role of Technology in Enhancing Teaching and Learning in Cambodian Higher Institutions: Implication for Stakeholders

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ABSTRACT

This paper examined the role of technology in enhancing teaching and learning in Cambodian higher institutions and its implication for stakeholders. Evaluation of ICT models, emerging technologies and the learning theories related to technology were systematically reviewed. An overview of teaching and learning before the digital age with a particular reference to history of education and technology in Cambodia was examined while historical theories of educational technology such as constructivism, complexity theory, the pedagogy of nearness, heutagogy, and connectivism were highlighted. Furthermore, emerging technology integration models such as SAMR, TPACK, UDL models were examined including the multiple roles of the learner, educator and the audience in a connected age. Several strategies in which technological tools that can be used to enhance students' learning were provided. Part of the Implication of the study includes adequate provision of power supply, computer laboratories and internet connectivity in Cambodian higher institutions should be paramount to government, private firms, philanthropists and NGOs so that students can appreciate technology and learn fast. Aside that, adequate fund should be given to the institutions to procure other necessary technology gadgets that can be used to promote learning.

Keywords: ICT Models, Teaching and Learning, Higher Institutions, Stakeholders, Cambodia

INTRODUCTION

The human society and educational systems worldwide are going through transformations and major shifts due to political, economical, demographical and technological changes (Munte, 2017; Van den Daele, 2017). Attention to changing demographics, global economies and new social mores, has made it increasingly difficult for education "to operate in insular ways." It is suggested that the modern era has provided opportunities to transform education and as a consequence to transform learning and teaching via emerging technologies and practices. These technologies and practices are being discussed and evaluated by modern educators, users, innovators and thinkers in the hope and enthusiasm that they will find

solution to various educational problems. Yet, it seems that like any other notion that requires a deeper thought the way these new innovations and practices are used are much more complex and elusive (Ivlev, Barkova, Ivleva & Buzskaya, 2016; Keller, 2008; Potvin, Rehn & Peat, 2014).

There are clearly new demands and roles for today's learners and educators. There are skills that are constantly mentioned in articles, school division goals and policies such as creativity, collaborative skills, critical thinking and knowledge that need to be accomplished in schools and other educational institutions. These skills that describe 21st-century learner showcase that learning in general, has stopped being considered as a trivial pursuit for credit. Learning in a new era means making connections in new contexts

and as a process, it turns into an active, strategic and very personal experience. Teaching in the new era means designing insight-generating courses and programs that would emphasize inquiry and collaborative learning and technology is one of the best-suited mediums to deliver the aforementioned objectives (Cipolla-Ficarra, Ficarra, Cipolla-Ficarra, Quiroga, Alma & Carre, 2017; Crowley & Heyer, 2015).

Cambodia, as a member of ASEAN (Association of South-East Asian Nations), and as any other country with a big young population that is actively engaged in the Web platforms, is striving to address its various educational problems, where ICT integration in higher institutions is an area that needs extra attention, care and governmental budgeting and planning to bring out a different level of quality to learning and teaching. According to Williams, Kitamura and Keng (2014), higher education in Cambodia is expected to play three cardinal roles, they are: supporting intellectual innovation by generating new knowledge, accessing global storages of knowledge, and adapting knowledge to local usage; contributing to the creation of human capital by training a qualified and adaptable labor force, and providing the foundation of democracy, nation-building, and social cohesion. Cambodia's education system has experienced historical turmoil and challenges and has been recovering from the destructive effects of the Khmer Rouge period. According to Dionys (2012), during the Khmer Rouge period (1975-1979), educational institutions were abandoned and closed, some of the institutions were changed into prisons where massive executions and tortures took place, books and libraries were destroyed and teachers and intellectuals were the first one to be targeted by the Khmer Rouge army. After the Peace agreement in Paris in October 1991, public and governmental institutions started to be renovated and revised; progress has been

considered stable and promising for the future young generation.

However, the area of ICT and technology integration in schools or higher institutions is an area of recent developments that needs further support due to various factors such as a lack of digital learning materials, a lack of teaching and academic staff training and a lack of infrastructure in the country. Higher institutions in Cambodia, with very few exceptions, offer traditional face-to-face delivery. Due to the limitation of virtual learning services, virtually all Cambodian higher institutions run a conventional system of education (Richardson, 2008; Sumethea, 2017). It is in view of the foregoing that the current study examined how technology can be used to enhance teaching and learning in Cambodian higher institutions.

RESULT AND DISCUSSION

Teaching and Learning before the Digital Age

Cleveland-Innes and Garrison (2010) suggests that models for teaching and learning in the digital age are usually extensions of the previous theories about the relationship between teaching and learning. These theories developed with further implications for contemporary education that is delivered with the help of technological tools. As far back as the ancient Greeks and Romans, it was commonly accepted that young students should learn with the help of private tutors and attend schools, while adults learned through private studies and then shared their ideas, thoughts and insights in public discussions. The learning during those times meant - an ability to quote extensively from all major classical writers and to debate the meanings and arguments. In addition, scholars exchanged their views and ideas through letters. This remained as the main tool of the Western correspondence education until the mid-20th century (Cleveland-Innes & Garrison, 2010). It is interesting to mention that

ancient China, known for its complex and rich civilization, had a similar system, with the addition and a special focus on the examination. Any man could obtain a civil service position by becoming successful in a series of government examinations based on the works of classical Chinese philosophers. An impressive interview that I find mind-blowing in terms of its power to generate insights, happened between a well-known journalist Pozner (2016) and Russian scientist in the field of neuroscience and psycholinguistics Chernigovskaya, where she says that there were two state examinations that Chinese high-rank officials had to take in order to prove their intellectual level, those were Chinese calligraphy and poetry writing. Both of those skills are believed to be vital in developing deeper levels of learning according to her findings from historical scriptures.

For a long time through the Middle Ages and into the Renaissance, the sign of the educated man was his ability to discuss ideas and recall from classical writings. Unfortunately, girls were left out from public debates and in many societies were not given a proper representation as active learners. Most probably, since the ancient time, we would see young girls, and women in general suffering from biased attitude and unequal opportunities in education that could still be traced in the percentage of women represented in the issue of the digital divide. Meanwhile, coming back to a previous idea, learning was expressed through an impressive memory and the ability to recite from classics, it praised argument, disquisition and oratory skills. With the development of the printing press, books and other publications gradually became available for a broader society and knowledge was no longer a commodity for the elite. In a cause of time, knowledge became more specialized, the sciences and mathematics become more important. After the Industrial Revolution, students and adults went to work in factories and a similar approach to meet the industrial needs of

the society were applied to transform education. In the 19th century, the tutor was replaced by the school and the classical curriculum was replaced by a public curriculum monitored by the local authorities. Roblyer and Doering (2014) suggests that educational technology is not a new thing and is not limited to the usage of certain devices. Educational technology is seen as both processes and tools that are framed in four different views such as: (1) *educational technology as media* view that developed from AV movement in the 1930s where the educational technology was perceived “as delivery media. (2) *educational technology as instructional systems* view that originated after post-World War 2 needs where humans and media could be used as a part of an efficient system to meet instructional needs. (3) *educational technology as vocational training* view that originated with vocational educators in the 1980s where main ideas were, first of all, students had to be prepared for the world of work and second, they had to be taught content areas with the help of technology. (4) *educational technology as computer sciences* view that started in the 1950s with a presence and distribution of computers for instructional and administrative purposes (Roblyer & Doering, 2014).

The historical phases of the digital technologies could be described as (1) the pre-microcomputer era (2) the microcomputer era (3) the Internet era and (4) mobile technologies.

Theories of Educational Technology

As it was mentioned earlier, present theories are actually based on past ones that bothered minds of researchers and educators at particular times. Veletsianos (2010) suggest that visionary concerns that many current educators state as new actually have a past one whose themes signal both continuities and ruptures. According to Veletsianos (2010), there are three views that drive educational technology development forward such as following: the presentational view, the

performance-tutoring view and the epistemic-engagement view. Visualizations and theories of multimedia usage are main focuses in the presentational view. The view is based on the studies of the brain activity and a complex process of internalizing various images. Theory of behavioural psychology and its reinforcement along with the feedback give roots to the performance tutoring view.

a) *Constructivism and Complex Theory*

The recent educational vision that drives educational technology is the epistemic engagement view that is known as constructivism. According to Veletsianos (2010), after a long history of philosophical and pedagogical transformations, the theory of constructivism has emerged that has been influenced by the works of John Dewey, George Mead and Jean Piaget. It has been defined and characterized by many educators and researchers, yet it has a shared understanding that knowledge is constructed based on individual and collective understandings. Constructivists believe that active engagement is vital; moreover, effective learning takes place when there is a platform for multiple perspectives and a sustained dialogue. They also believe that task and the context should be authentic and hold meaning for the learners. Learning activities usually focus on problems, in addition, these problems better be ill-structured, open-ended, forcing learners to develop their problem-solving skills in multiple contexts (Veletsianos, 2010).

According to Veletsianos (2010), complex theory emerged from the study of living systems, examples of this theory are taken from the evolutionary study, where a complex system is created with a help of highly adaptive organisms. In such a system all variables are taken into a consideration along with the context and the total environment. Theorists that study complexity, try to research features of the environment and social and structural norms. Implications of this theory for

learning are as the following: first, learners can articulate and achieve personal goals, second, this theory invites learners to take into consideration learning contexts such classrooms and online cohorts. The teachings and learning theories derived from these three pre-Web visions for technology add value for researchers and educators.

b) *Web-Aware Theories of Learning*

Theories give us a context where we can deeply look at big-picture issues and study reasons why certain technology use will assist in enhancing teaching and learning. Anderson and Whitelock (2014) provided 'three affordances of the Web', where the authors explained its value for teaching and learning. According to Anderson and Whitelock (2014), the first affordance is the capacity of the Web for powerful yet low-cost communications. Communications can be expressed through voice, text, video and different interactive modes. This capacity is available at affordable cost, yet it is important to keep in mind that there are some places in this world where this capacity might be expensive (Burkina Faso, Western African countries, the USA, Canada based on statistical data from McCarthy (2017)). Thus, communication has transformed from being expensive, geographically restricted and privileged. In addition, net communications extended learning possibilities for learners with special needs. The emergence of social software sites gives plenty of room for learners to interact with each other, ask and share questions, understandings and resources.

The second affordance is that the Web creates a platform where there is an abundance of information and there is no content scarcity. In addition, it is believed that this second affordance offers limitless possibilities for motivated learners to enhance their learning. There are many courses and lessons that are professionally produced and made available for free by top universities and institutions. Using pre-produced courses and presentations would

allow to “flip” the classroom with high-quality media (Potvin, Rehn& Peat, 2014). The best places to start enhancing learning could be TED and TedEd where short talks on technology, entertainment, and design and an ever-expanding video library of lessons on a variety of subjects are being presented. There are other resourceful platforms that people personally use and enjoy as a learner: Khan Academy where short explanations related to high-school subjects are being provided, Coursera is a platform where full courses from top universities are being provided and similar platforms that could be found in the Web are Udacity, EdX,iTunesU. Finally, one more interesting platform that offers animated visual note-taking of existing famous speeches is RSA Animate. The last affordance that was identified by Anderson and Whitelock (2014) is of active and autonomous agents that gather data from the Web and filter the content that is related to individuals or groups of learners. These agents or bots monitor the Web and produce data on people’s preferences and choices that is being used by researchers and marketing teams to tailor and offer products according to users’ preferences.

c) **The Pedagogy of Nearness and Heutagogy**

According to Mejias (2005), there is a “pedagogy of nearness” in which online interaction, collaboration and learning are neither valued nor devalued as compared to face-face interactions. Individuals are seen to function and adapt well between online and offline mediums. Mejias also suggests that not only nearness of face-to-face interaction gives opportunities for teaching and learning, but also online experiences bring insights that cannot be gained through unmediated perception (2005). He advocates for blended options where learners and teachers would be equipped with the necessary skills to interact efficiently in both online and offline mediums. According to Veletsianos (2010), the second theory was developed in Australia and named after its authors, Hase

and Kenyon (2000). A Heutagogy stand for ‘self’ in Greek and it is rooted in self-directed learning. According to Veletsianos (2010), heutagogy puts the focus on the learner who is the main control agent in the process of learning. Hase and Kenyon (2000) state that in the ongoing time of constant changes and emergent technologies the most important skill that is needed is knowing how to learn. The future requires that education would shift from focusing on learner’s competencies to developing the learner’s capacity. Capacity would allow learning in new and unfamiliar contexts (Veletsianos, 2010).

d) **Connectivism**

Siemens (2005) combined the term connectivism and introduced principles that describe ‘connected learning’. He states that individuals develop competence from forming connections and that “capacity to know more is more critical than what is currently known”. Learning takes place when individuals discover and build connections between nodes that consist of learning resources that in their own terms store data. Learning experiences are created by learners as they access that data with the help of machines and peers in their learning networks (Veletsianos, 2010). In the process of learning, individuals expand their learning networks by creating a personalized knowledge that connects to other ideas of other people. Siemens (2005) also suggests that learning as a process can exist outside of the individual- “in the databases, devices and tools within which a learner acts and lives”(Kerr, 2007; Veletsianos, 2010). On the other hand, connectivism seems to have a problem with relation to formal, traditional education, components like the lack of a role for an educator, primarily focus on the learner and small classrooms would provide a small context for building meaningful connections (Kop & Hill, 2008). The brief overview of learning theories provided us with the basis for an analysis where old and emerging technologies gave a shared understanding

of value and affordances that the Net offers for its users.

An overview of Technology Integration Models

Theoretical models play an essential role in guiding meaningful technology integration practices in educational contexts. These models and frameworks have not been maturely explored, yet their effects on learning experiences and outcomes are an undeniable fact. According to Kimmons and Hall ((Peou & Lwin, 2011; Veletsianos, 2016), technological models were adopted at different levels. Some of the models are seen to be adopted across the globe, and others are adopted at a limited and isolated level. Kimmons and Hall (2016) suggest that there is no a clear explanation to why models are adopted in a certain way, in addition, it seems that some groups adopt certain models without clear reasons, sometimes based on the comfort of those who wanted to adopt them. Technology integration models empower researches to ask different questions, they have a practical value for improving perceptions, and each of them provides different opportunities for understanding and interpreting technology integration efforts. Some examples of such models are mentioned (Veletsianos, 2016), they are as follows: Technological Pedagogical and Content Knowledge (TPACK) model, Substitution Augmentation Modification Redefinition (SAMR) model, Replacement Amplification Transformation (RAT) model etc.

(a) SAMR Model, TPACK Model and Universal Design for Learning (UDL)

First, the SAMR model (Puentedura, 2006) is widely used due to the fact that the model is generally compatible with existing practices and guides through four levels of impact (Substitution, Augmentation, Modification and Redefinition). The author of the model maintains an active blog and encourages

people to adapt and share this model. Veletsianos (2016) assume that SAMR model will be liked by educators and designers who are looking for phased approaches to technology integration, however, innovators and leaders might find it in need of change due to their views. Secondly, TPACK model was proposed by Mishra and Koehler in 2006, since then it has been used to explain a complex relationship between content, pedagogy and technology knowledge (Ward & Benson, 2010). TPACK framework unfolds multifaceted nature of teacher knowledge where domains interact with each other and create subdomains, therefore, interaction and interdependence of these three main domains should be taken into consideration when considering technology integration into learning and teaching processes. Ward and Benson (2010) suggest TPACK model as a recommendation for the development of online learning in higher education, specifically, by developing new schemas for learning by understanding the TPACK model, paying attention to content and pedagogy and by assisting students becoming competent users of online environments. On UDL, Veletsianos (2016) argue that technology takes different forms and plays different roles in different models, 'it can be seen as means to an end or as an end itself'. Technology may assist in enhancing learning and teaching, or its sole integration may be seen as an ultimate goal. Universal Design for Learning (UDL) that was developed by CAST (2011) is an approach to technology integration that addresses learners' strengths, needs and uniqueness in curricular decision-making (Veletsianos, 2016,). UDL works best for its users to experience ways of learning that are more attuned to their strengths; to apply what is learned to their own experiences and to explore creative aspects of their thinking process, skills and personality.

Multiple Roles in a Connected Age

With the development of emerging technologies, social and online environments gave a very broad understanding for the role of the learner, educator or the audience. Users of the Web mitigate between numerous roles on a daily basis: someone might edit Wiki and bring his/her own expertise, same person might research an academic article on a Google Scholar, later at the evening he/she would be a part of the audience that streams TED lecture on a microbiology or women's rights issue, or spend a night on editing and adding special effects for a promising blogging entry. Individuals play a role of a source of information on different platforms through activities in blogs, social networks, YouTube and other video sharing sites and citizen journalism websites. The Web has opened up new avenues and doors both for those who want to share their expertise and who are qualified to do it and for those who lack formal qualifications but are knowledgeable on certain topics. However, it creates another concern when a data that is found on the Web might lack truth and authoritative weight. Therefore, it is crucial to learn strategies to search for a credible piece of information and render or use it in a proper manner (Ivlev, Barkova, Ivleva & Buzskaya, 2016; Keller, 2008; Munte, 2017).

Previously, people used to see a clear distinction between the audience and the author. The talented author would produce a product that would be of a high interest for his/her audience. For some talented authors, it would take several failures and challenges to publish their works, as in the example of famous J. K. Rowling, who wrote: "Harry Potter" and all of the following Potter series. It took the world some time to recognize her talent and later on this recognition allowed her to collaborate with the most famous publishing houses. Before recent advancements, authors had to have financial backing up if they were interested in publishing their works. On the other hand, today's technological advances allow

a university student or any other aspiring young person to sketch, draw and write a script 'mangas' and publish for free (Japanese style graphic novels or comics) that are later on are taken as a scenario for a movie. Therefore, it becomes evident that an existence of recent technologies allows us to generate and access a vast amount of various information that would turn us into a part of the audience or recognize us as contributing author.

To the role of the audience and the author, the role of the learner and the educator's, role in the participatory web is increasingly intertwined and intermingled. It is argued that nowadays learners and educators access similar type of resources and therefore, none of them is in a privileged position in front of another. If we would think about a symbolic representation of the educator prior to the Web, we imagine a person who is a vessel of knowledge and expertise who passes his knowledge to less knowledgeable students. On the other hand, nowadays students or learners access similar sets of resources along with their educators, they might be equipped with digital skills better than their professors and are involved and engaged in an informal type of learning. My first lecture from a Ted platform that I enjoyed watching happened somewhere 10 years ago, only because a smart 9th-grade Macedonian student offered to watch Ted lectures when I was an intern completing a practicum at his private high school. I was amazed at this child's interest towards sophisticated things and views, I heard about Ted lectures from my own professors only a few years later. Similarly, 10 years ago, came a YouTube video "A Vision of Students Today", where participants of the video criticized the structured environment at school and complained that what they learnt was irrelevant to their real life (Wesch, 2008). Many similar videos on YouTube were created by different students and different countries outlining the same concern. With the emergence of competency-based models and MOOCs, there is a chance that those concerns

showcased in the video might be eliminated.

Strategies for Using Technology to Enhance Teaching and Learning in Cambodian Higher Institutions

(a) Using Technology to extend the reach of critical question

A good critical question can foster reflection, uncover assumptions and cause things to be viewed from new perspectives. Technology can support questioning in several ways. An online forum is a very effective way of providing time and collaboration for students, where they can pose critical questions and share their experiences. In addition, students can use research tools to start further discussion, inquiry and insight-generating. This interaction can be easily collated in an e-portfolio or learning-management system. It is important to teach students to judge the validity of sources they find on the Web, which builds important-critical thinking skills.

(b) Using Technology to express what you have learnt

At the end of a major project, students are often required to create a finished product that would be presented professionally and with creativity in mind. Prior to present technological tools; students used word-processing, hand-drawn posters and oral presentations. Now, students have endless options to present their final products. They can produce digital posters, movies, music, games, comic strips, books, infographics, professional looking journals, blogs and etc. Most of them can be stored in the cloud, making them available for collaboration with peers and teachers. While using publishing software in class, it is good to remember to be clear about objectives, outline the standards and expectations and identify the audience. Some useful publishing softwares are

GoAnimate, Audacity, Pictochart and Audioboo and many others.

(c) Using Technology to reinforce long-term memory

Technology has different ways for teachers to provide options for students to reinforce their long-term memory with whiteboards, self-generated content, quiz-makers, mind-mapping tools and software for creative summarization. Some examples of such tools are Educreations, an interactive whiteboard that captures voice and handwriting on the iPad, Quizlet (<http://quizlet.com/>) a free quiz-making tool and ProProfs Quiz Maker, a test-making tool that is developed for post-secondary and business training.

(d) Using Social Media to reach participants

Imagining a student or a young person who is not involved in the social media platforms is hardly imaginable; therefore, one of the most convenient tools to engage nowadays learners could be different forms of the social media. A simple way to engage students in a course would be creating a Twitter (online social-networking and micro blogging service) account and ask students subscribes to follow it. This would allow introducing ideas, links and short comments to students on a regular basis. Another option is to have a class Facebook account (online social-networking service that allows sharing of photos, news, links and connections). This service allows more space in comparison to Twitter to write, post photo albums and set up events. Other options similar to Facebook are Schoology (a learning management system focused on collaboration that allows creating, sharing and Ning (an integrated social platform for launching for a class or organization). Yet, it is important to notice that after setting up a social media platform for students, it is important to regularly use it, or students are likely to stop checking it.

(e) Using Technology (online polls) to engage students

Collecting student responses is a convenient way to build community in a classroom. The simplest way to collect responses from the students is to ask to write them on a paper ballot. However, utilizing modern clickers (student-response devices) is a very engaging and fun way to invite student participation or to understand the depth of collective understanding or a misunderstanding of a concept from the class. Polls could be used as formative assessment tools or an anonymous poll could be used for peer assessment of projects and presentations. There are some free online applications that collect data from cell phones or other devices, such as Poll Everywhere. Also, there is a possibility to set up a survey in the cloud with a free platform, such as Survey Monkey (web-based survey tool) or Fluid Surveys (web-based survey tool with free subscription accounts).

Implication for Stakeholders

The successful integration of ICT into Higher institutions in Cambodia depends largely on how well stakeholders in the country are willing to understand and appreciate the dynamics of such process. As opined by Dionys (2012), successful integration of ICT in Cambodian institutions is “some way off”. Dionys mentioned challenges such as overall teaching quality with its focus on a lack of student-centered approaches, equipment and infrastructure are weak areas that are in need for development (electric power supply, faster Internet connection and computer labs) and overall attitude towards technology and its integration to classrooms. Therefore, adequate provision of power supply, computer laboratories and internet connection in Cambodian higher institutions should be paramount to government so that students can appreciate technology and learn fast. Aside that, adequate fund should be given to the institutions to procure other necessary

technology gadgets that can be used to promote learning.

In addition, school administrators (i.e. vice-chancellors and rectors) should make judicious use of facilities provided by the governments so that technology can be promoted in the institutions. Also, private companies in Cambodia should assist in promoting technology in higher institutions by donating facilities such as ICT laboratories, computers and other related facilities that can be used to enhance teaching and learning activities. More so, since nations with a low level of development that pursue higher levels of technological progress should invest in human capital, lower human distortions, respect intellectual property rights and sustain the environment of civil liberties, thus Non-Governmental Organizations should assist in providing ICT facilities to higher institutions, this should help in complementing the efforts of the government.

Furthermore, since learning nowadays turns into an active, strategic and a very personal experience. Therefore, stakeholders should strive to design learning experiences that are in tandem with emerging technologies, this as tools for enhancing teaching and learning. Lastly, other stakeholders, such as educators, researches, students and policy makers should initiate discussions on a local and national level on topics such as a deeper understanding of technology integration in education; exploring potential of the Internet and its social media platforms; exploring pedagogical content of ICT models; sharing and copying successful stories from other ASEAN countries and different parts of the world; and supporting local leadership in training and increasing ICT skills of general population so that the outcome of the discussions can help to improve the use of technology in Cambodian higher institutions.

CONCLUSION

Conclusively, it can be said that technological advances are rapid and emerging technological practices will have a significant positive impact on education and learning process in Cambodian higher institutions.

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