

CROSS-CULTURAL MODEL FOR DESIGNING EDUCATIONAL TECHNOLOGY SYSTEM

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ABSTRACT

Current trends in the field of distance education indicate a shift in pedagogical perspectives and theoretical frameworks, with student interaction at the heart of learner-centered constructivist environments. In order to meet the estimated 414 million students expected to be in higher education in the world by 2030, Students and Teachers must acquire a certain level of competency with these available technologies and designers must ensure correct deployment of indigenous tools whether in synchronous and asynchronous environments. The first part of this paper enumerates and promotes the available open EdTechs and other social educational accessories which support an effective online and distance education program around the globe. The second part of this paper identifies the challenges facing the penetration of EdTechs and further presents a model for designing a proper EdTech tool which must leveraged on HCI Standards and differences in cultural tacit requirements.

Keywords: EdTech, Pedagogy, Learning, Education, Toolbox, Human Computer Interaction (HCI), E-Learning, m-learning,

1.0 INTRODUCTION

Educators and researchers all over the world have agreed that Educational Technology (EdTech) tools increases motivation and engagement of learners, cater for different learning styles and improve learning outcomes (Eady, &Lockyer,2013); some of the tools which are free (open) or sold (closed) brings equity of opportunity by increasing the availability of knowledge.

Most of these open resources in education if promoted will allow for more personalized learning, a better learning experience, and an improved use of resources where all individuals may learn anytime, anywhere, with of anyone, and with any device (mobile learning).

1.1 EDUCATIONAL TECHNOLOGY

Technology in education is more than computers and networks, it can be inform of writing instruments, printed books, or audiovisual media. The Association for Educational Communications and Technology(2013) defined Educational technology as the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources. Education Technology also known as Electronic Learning (E-Learning) can be explained as a concept, as it concerns an array of tools, such as media, machines and networking

hardware, as well as considering underlying theoretical perspectives for their effective application. Several delivery methods exist such as Electronic learning, Internet Learning, Mobile learning (m-learning). Some literature further has broken the Educational technology System down into two: “**Technology in Education**”– which refers to all application of machines, gadgets or equipment to improve the quality of education and “**Technology of education**”- which is a component of educational technology that is involved in the use of systems approach to promote high quality education. See figure 1.

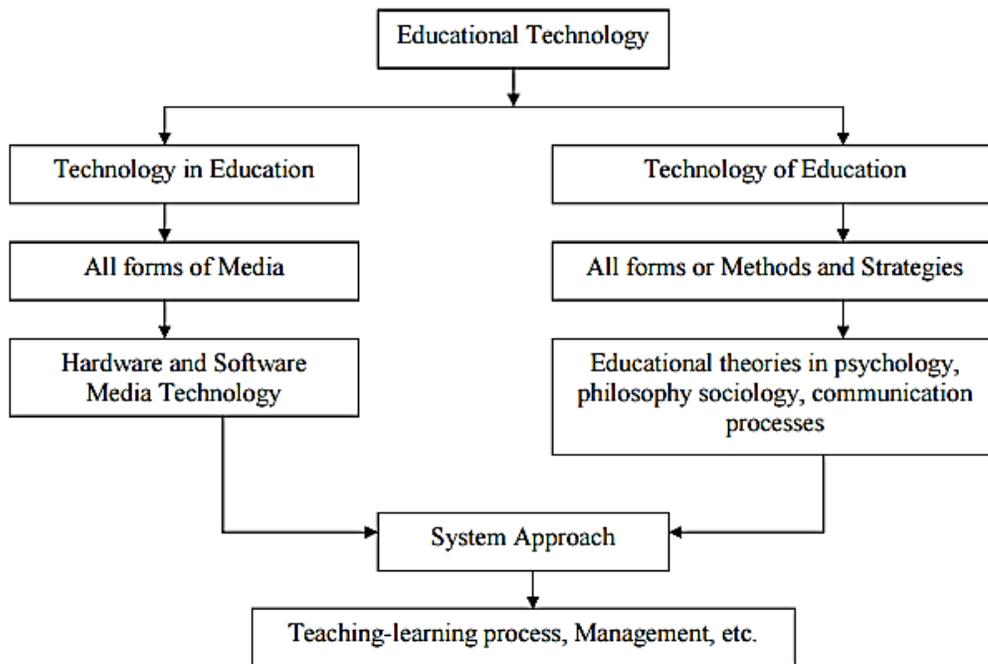


Figure 1: The Technology of Education (source: Balogun, T.A. and Abimbade, A. (2002)

1.2 MOBILE LEARNING

The introduction of smart and mobile devices such as phones, ipads, netbooks, palmtops, and laptops and so on has extended both the facet of knowledge exchange and learning environment. Since these devices are portable and can easily get connected to the internet, anyone can now learn at anytime, at anywhere, with anyone and on any device (Chet Hosmer, Carlton Jeffcoat, Matthew Davis, Thomas McGibbon, 2011, Rick Oller, 2012). These devices has shifted the learning paradigm from electronic-learning (e-learning) to mobile-learning (m-learning) and now to ubiquitous-learning (u-learning) (Yeonjeong Park, 2011; Van't Hooft, Swan, Cook, & Lin, 2007, p. 6).

With a recent shift in the Electronic learning paradigm (online learning, hybrid learning, and collaborative models), the initiative has experienced a slow penetration around the globe due to several challenges of which one of the basic challenge still remains availability and a deficit in technological competence of the users.

Following the recent trend in digital computing, European Commission estimated that by 2030, 414 million students expected to be in higher education in the world and 90% of the jobs will require computer skills as a major for recruitment. As an initiative to broadening pedagogical practices and bridging the digital divide, our schools and

learning institutions must adopt, encourage and promote the use of open and closed EdTech tools and resources which has been enumerated in this paper (European Commission 2015). According to a research carried out by Silentnight in March 2015, an average person now spends more time on their phone and laptop than sleeping; the study claims **the average person spends 8 hours and 41 minutes on electronic devices**. According to a CNN report, an average teenager spends 9hrs per day (Kelly Wallace, 2015) of his or her time on mobile phone and other devices.

1.3 THE NEED FOR TECHNOLOGICAL PROFICIENCY AMONGST STUDENTS AND TEACHERS

Thomas Edison had in 1910 affirmed about that film would transform education, making books obsolete (Israel, 1998, p. 442). Several benefits of mobile learning and openness of Internet for instructional purposes while of integrating technology into education (edTech) cannot be lauded enough. EdTech has been proven to help adult learners and young learners in a lot of ways. Below is summarized list of benefits:

1. Technology Improves Student academic performance and quality of work

Several studies and researches such that Gulek, 2005 show that there is a significant growth in performances of students who participate or are introduced to edTechs

learning techniques especially from primary or secondary schools.

2. Support for Information Processing

Technology used in any teaching or learning process enhances communication flow and information assimilation capabilities of these students. Techniques such as simulation games, gesture enabled edtechs, self-tutors, assessment tools, computer aided instructions, (CAI), virtual rooms, presentation backdrops and so on help in communicating better to learners who have special information processing, psycho motive and cognitive needs

3. Support for Experiential learning and Self-Engagement

According to a CNN report, an average teenager spends 9hrs per day (Kelly, 2015) of his or her time on mobile phone and other devices. The 63hours per week spent on these devices and technologies can be harnessed and redirected into making experiential learning experience more interactive and very engaging. For example, my final year class assessment report shows that my Database students in Babcock University pay more attention to the practical session of the class order than the theory periods. Even the score in final semester exam show that most questions answered correctly by 89% of the students came from practical section.

4. Improves attitude to abstract-base topics or classes

Abstract courses or subjects such as Mathematics are normally disliked by so many students but Morgan, 2002 and Lowther, 2007 reported that edTechs made it easier for students to enjoy doing home works and practicing exercises.

5. Collaborative Models on Lesson Plan Design and Content Delivery

Teachers and Educators who make use of edTechs in preparing their content and lesson plan enjoy doing so. Several tools saves you time by allowing you to use or modify existing templates in a particular course and you can even share some of your ideas and opinion on lesson design, presentation and content delivery. (UNESCO, 2008)

6. Saves Time and Cost

Some of these toolboxes are can be shared via several add-ons techniques such as cast screen, online community, wireless services, tap-on Gestures and so on. Materials which would have taken hours or days to process and shared among students or teachers can easily be transferred and shared with just a tap on the screen saving you time and cost

7. Distant Learning and Hybrid Classes

The ability for people to gain admission into online courses, institutions and colleges

promises a feasibility of 414million students estimated enrollment figure into university by the European Commission on before 2030. The outburst of many open universities courses of study and online programs fits the needs of students who and teachers and students who although physically separated, can see and hear each other through two-way audio and video communications thus providing a real-time

teaching/learning environment. (Carter, 1996; Cochenour & Rezabek 1995).

1.4 DIFFERENT CATEGORIES OF TOOLS

The table below has a summary of the different categories and some of the open EdTech tools in use (EdTech Team, 2015, Carolyn, 2013, Kelly Welsh, 2013)

Category	Description	Examples	Links
Teaching Resources	This category has open and closed resources that can be used as supplements to curriculum designs, teaching resources and teaching aids in various fields. Mostly used by teachers, the areas covered include (but not limited to) Classroom management, Gaming and	21st Century Teaching Skills	http://www.educatorstechnology.com/search/label/21st%20century%20teaching%20skills?&max-results=9
		Global Resources African Modules	https://oerknowledgecloud.org/ http://oer.avu.org/
		Blooms Taxonomy(tips, tools, and apps)	http://www.educatorstechnology.com/search/label/blooms%20taxonomy
		Critical Thinking	http://www.educatorstechnology.com/search/label/critical%20thinking
		Teacher Guides	http://www.educatorstechnology.com/search/label/guides
	Open Classroom Management, student evaluation	https://www.schology.com www.edmondo.com https://moodle.org/ http://www.educatorstechnology.com/search/label/web%20evaluation http://www.educatorstechnology.com/search/label/grading%20tools	

	simulation, Critical thinking, Lesson plans, research and web evaluation and grading tools	Lesson Plan, Research and resource sharing	https://www.researchgate.net/ http://www.educatorstechnology.com/search/label/free%20lesson%20plans https://www.academia.edu http://www.educatorstechnology.com/search/label/learning%20tools
		Gaming and Simulation in Education	http://www.educatorstechnology.com/search/label/Gaming%20in%20education
Open Web Tools	These web tools are very useful for presentations, content anti-plagiarisms tools, time-lined and task management tools, survey creation and data collection and image creators. Mostly the tools that will help keep your class presentations lively and interesting	Audio Tools	http://www.educatorstechnology.com/search/label/audio%20tools?&max-results=9
		Citation Tools	http://www.educatorstechnology.com/search/label/citation%20tools
		Coding tools	http://www.educatorstechnology.com/search/label/coding%20tools
		Presentation tools	http://www.educatorstechnology.com/search/label/free%20presentation%20tools
		Drawing Tools Image making tools	http://www.educatorstechnology.com/search/label/drawing%20tools http://www.educatorstechnology.com/search/label/diagram%20making%20tools
		Anti-Plagiarisms Tools	http://www.educatorstechnology.com/search/label/plagiarism%20tools
		Task and Time Management Tools	http://www.educatorstechnology.com/search/label/task%20management%20tools http://www.educatorstechnology.com/search/label/timelines%20creation%20tools

		Quiz Tools	http://www.educatorstechnology.com/search/label/quiz%20tools
		Survey tools	http://www.educatorstechnology.com/search/label/survey%20creation%20tools
Content Area Resources	This category contains some of the mostly used open EdTech for content designs, ideas sharing, curriculum expansions and other open resources	Art Resources	http://www.educatorstechnology.com/2012/11/free-art-teaching-resources.html
		Literature resources	http://www.educatorstechnology.com/search/label/literature%20resources
		Computer Programming	http://www.w3schools.com/sql/
		Economics tools	http://www.educatorstechnology.com/2012/08/economics-web-resources.html
		Mathematics Resources	http://www.educatorstechnology.com/search/label/math%20resources
		Science Portal for teaching	http://www.educatorstechnology.com/search/label/Science%20resources
		History teaching tools	http://www.educatorstechnology.com/2012/09/look-back-at-history-sites.html
Educational Social	These resources will help get familiar with most social network whose features extends into helping educators keep in touch with	Podcasting for Education	http://www.educatorstechnology.com/search/label/podcasting
		Blogging in Education	http://www.educatorstechnology.com/search/label/blogging%20in%20education
		Classroom and Personal Networks	http://www.educatorstechnology.com/search/label/PLN

	their students, especially in a distant, online education. Web techs such as Blogs, harsh tags, Podcasting, Webinars, and Video Conferencing tools are the most used	Wikis	http://www.educatorstechnology.com/search/label/wikis%20in%20education
		Online Channels	http://www.educatorstechnology.com/search/label/YouTube%20Channels%20for%20Teachers
		Google Plus	http://www.educatorstechnology.com/search/label/Google%20plus
		Skype in education	http://www.educatorstechnology.com/search/label/skype%20in%20education
Open Databases	Teachers can use the tools mentioned here to check-mate intellectual property issues, bullying issues and even academic thefts	Databases	http://oedb.org/ http://www.academicearth.org/ https://openeducationalresources.pbworks.com/w/page/27045418/Finding%20OERs
		Bullying	http://www.educatorstechnology.com/search/label/Bullying%20resources
		Educational Search Engines And Copyrights	http://www.educatorstechnology.com/search/label/educational%20search%20engines http://www.educatorstechnology.com/search/label/copyright%20resources

1.5 RATED CHALLENGES FACING THE PENETRATION OF EDTECH TOOLS

a). Lack of Cross-cultural and Organizational Modelling

According to works done by Human Computer Interaction and Design experts such as Hoft (1996) Edward (1989), Trompenaars (1993), and Bourges-Waldegg and Scrivener, (1998) there is huge concern for Human Computer Interaction (HCI) on having a globalized and yet an indigenous

model for teaching and learning. Most tools and techniques which are developed in Western countries have not been the most effective tools in developing countries. Therefore correct cultural models must be represented in other to design and appropriate tools which must be compatibility to learning environment and meet cross-cultural concerns EdTech and other apps for education (Andy and Lynne 2013).

b). Manual Compilations (External and Internal Documentation)

Most compiled manuals or handbooks (soft or hard) that come with these EdTech sare written in ambiguous language thus spelling thin chances between success and failure in self-training. In other to achieve maximum result, there musta link and consistency between the inherent explicit knowledge (know-how's based on academic/textbooks) and your tacit knowledge (know-how's based on practical, action-oriented knowledge) (Elizabeth 2001, Bill (2012) David (2007)).

c). Low awareness, accessibility and availability of Internet and Tools

In most developing countries, availability of internet, Personal Computers and mobiles devices are rarely accessed and so the availability of steady EdTech tools is limited (Joel and Roope, 2014).

d). Technophobia

The fear of technology is mostly due to an increase in demand for blended learning, online-learning, and technology-driven collaborative learning. Most educators play ignorant to appropriately integrate technology in curriculum design and lesson plan (GCD Team, 2014)

e). Lack of Modular Curriculum and Poor IT Integration Planning

EdTech designers must incorporate a state-of- the-art curriculum and content in their models. This is a costly mistake which has made some Edtech Toolboxes to remain dormant and useless. There must be a vetted integration of academic curriculum committee with model of used by EdTech designers. An understanding of the UNECSO (2008) IT integration continuum approach (which includes: Emerging, Applying, Infusing and Transforming Stages) will allow education authorities to select appropriate elements and tools to meet their objectives at the phase of development reached in their countries. In as much as technology enhances experiential learning and education, integrating EdTechs must be well planned and timed. The Local teachers must be carried along to avoid a disjoint in focus of integration of IT in teaching and learning (Kevin, 2015)

f). Low investment in Education

The work of Abidoye and Fatoki (2014) encourages the Government of the need to provide the necessary infrastructure and training for the integration of instructional

technology at all levels of the education system. This as small it may seem has become one of the commonest problems facing EdTech deployment in education. Some countries have very little budget set aside for education and this makes it very difficult for schools and educators to buy the idea of EdTechs. It may be reasonable to talk about open source tools to a head teacher who can barely afford a PC.

1.6 A Cross Cultural Model for EdTech Designers and Open Initiatives

Following the trends of emerging technologies in EdTech and the eminent challenges as stated in this paper, below is a model check-mated with Toad modeler to curb the challenges listed above especially number 1 to 5. **Model KEY:** OR= Open Resource, GC= Global Curriculum Bodies, PE= Present Environment, DS= Computer/Tool Design Standards, L= Local Curriculum Bodies, S= Students and Learners, D= Designers, E= Educators and Teachers, C= Content

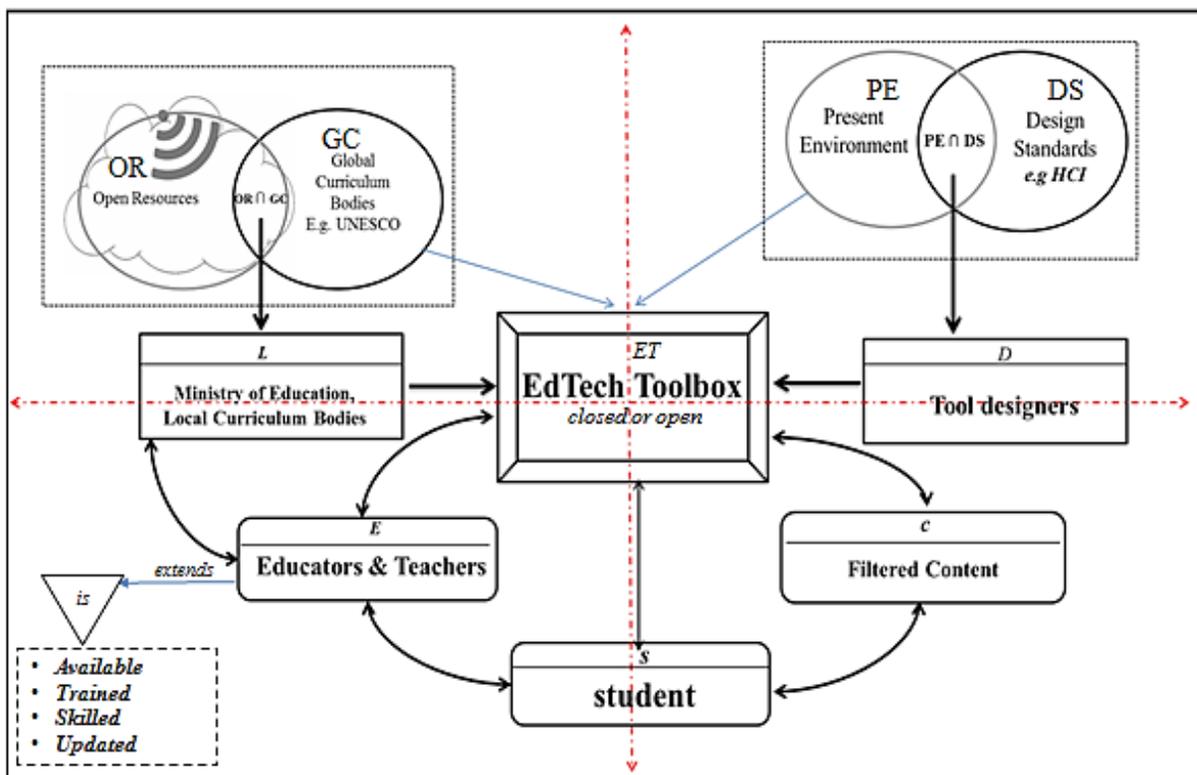


Fig 1: A cross-cultural Model for EdTech Toolboxes and open Initiatives

1.7 MODEL EXPLAINED

Consider the above square to be a cross section of the educational sector and integration of technology containing the major components of Educational technology system namely: the students, the teachers, the content and the tool/technology. Let $OR \cap GC$ be the filtered outcome of the resolutions arrived at between the open web resources and the Global curriculum standards bodies. Assume that digital divide may be one of the factors used to filter resolutions and then assigned to different regions and cultures of the world (developed and underdeveloped countries). In order to meet Educational objectives at the phase of development reached in different countries, $OR \cap GC$ should be further be vetted by L (Local Curriculum Committees and organizations) which are mostly made of the board members composed of ministry of education officers and representatives from National Education Strata.

On the other side of the square, let $PE \cap DS$ be the functional and non-functional resolutions reached between Human Computer/Tool Designers and Present Environment. Instead adopting a tool that is meant for western and developed countries, Designers D must use indigenous modifications in order to deploy a constructor toolbox ET that is useful. Standards such as Usability, Knowledge Consistency, Manual Definitions, interim solutions, and so on; when these tools are

made available and accessible, teachers must be available for trainings, skill-ready and up-to-date in using the EdTechs. Scan enjoy a worthy learning environment either via the filtered contents from the L and GC or directly interacting with ET which maybe free (open) or sold (Closed). Feedbacks from, S, D, E is periodically collated and modernized to meet the level of development in the environment.

1.8 CONCLUSION

Other than traditional classrooms, edTech facilitate the efficient use of precious learning time, sustain the motivation of learners, and reach many different types of learners in the ways they learn best. The increasing variety and accessibility of technology has expanded the toolbox and the opportunities teachers have to use technology in teaching. For EdTech tools to play an important role in improving and sustaining education, it must be designed with the uniqueness of the environment in which it is to be deployed. Hitherto to EdTech integrations, Learning Institution must know not just when to integrate but what Educational Tool to integrate. Teachers and educator must be available for training and anti-technophobic. The cross-cultural model here presented will help designers deploy an Educational technology which will meet individual and cooperate needs of student and teachers.

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