The Rise of Educational Technology: How Now Should We Teach?

Benson K. Kamary, Ph.D. (Assistant Professor, Tongmyong University)

Abstract

The rise of educational technology in recent years has been inspired by the advances in digital technologies and online resources. When instructional technology seems unescapable and demand for integration of technology into teaching and learning rapidly increasing, how are educators to respond? This paper explores the growth of education technology, the scope of educational technology and technology integration into teaching and learning processes. A discussion on how educators are to understand, approach, and engage technology in education from a reformational worldview perspective has been provided.

Key words: educational technology, technology integration, reformational worldview

INTRODUCTION

Educational technology, also termed as instructional technology, has a long history. According to the Bible, Moses used chiseled stone to convey the Ten Commandments, probably around the 7th century BC (Bates, 2014). The modern theoretical and methodological basics of the modern audiovisual, radio, television, programmed teaching and learning frameworks have been deliberated by educational theorists from the Elder Sophists of the fifth century B.C., to the medieval scholars who taught in the monastic or cathedral schools, to the reformers of 1700-1900, to the psychologists of the 20th century (Saettler, 1968). In his book, *The Evolution of American Educational Technology*, Paul Saettler (1990) provides one of the most extensive historical accounts of educational technology in America up to 1989. Saettler argues that “If technology is to be completely understood, in their ancient or modern terms, it should be seen as a system or practical knowledge not necessarily reflected in things or hardware” (p.3).

According to Reiser (2001), a rational for using instructional design and technology in teaching and learning became prominent in the early 1900s during the birth of school museums. Visual and audiovisual instruction tools, the use of media during World War II, the interest in instructional television, computers, and the Internet create a context in which instructional technology thrived. Since the World War II, school systems have borrowed wartime advances in areas such as instructional film, television, and radio. From 1945 to 1965, research on instructional media was inspired by a concern with education as a response to forces of technological change particularly in America (Reiser, 2001).

Boss (2011) notes that Seymour Papert, a professor at the Massachusetts Institute of Technology, was among the first to recognize the transformative capacity of technology to reshape the modern teaching and learning enterprise. Parpert’s collaboration with Jean Piaget in 1960s led to the development of the *Logo* programming language that enabled students to use the computer to engage in learning environment with minimal instruction. Students were able to write and debug programs that controlled the movements of a turtle robot. It was observed that students gained deeper understanding of geometry concepts and were also actively engaged in learning.

Papert's groundbreaking work led to a wider exploration of technological tools for learning. Today's teaching and learning landscape includes array of technological tools—personal computers, school computer labs, interactive whiteboards, digital video cameras, suite of Web 2.0 tools, mobile learning apps, Google for education apps, and more recently social media.

THE SCOPE OF EDUCATIONAL TECHNOLOGY

Technology integration, technology immersion and technology-enabled learning are terms usually applied by teachers and administrators in the context of incorporating technology into teaching and learning. Most often, the concepts default into issues of hardware, tools and things. In the common jargon, technology is understood as a tool (Hlynka & Jacobsen, 2009).

The phrase “scope of educational technology” is used to mean the jurisdiction, the boundaries or the limits within which educational technology is developed and applied. Educational technology is a fast growing modern discipline shaped by the dynamicity of emerging technology in general and the demand for integrating technology into pedagogy in particular. In regard to the scope of instructional technology, educational technology should not be perceived narrowly to mean the use of computers in the classroom. Lever-Duffy, McDonald, and Mizell, 2005) argue that educators sometime take a narrower view and are likely to “confine educational technology primarily to computers, computer peripherals and related software used for teaching and learning” (p.4, 5).

A broader view of educational technology avoids the isolation of technology from pedagogical processes it is intended to support or the experience it is intended to create. Such a view depicts the necessary connection between instructional technology and the learning objectives, methods of instruction, learning styles, assessment approaches, and feedback procedures. Educational technology pervades audio-visual aids, mechanical and electronic gadgets and can be applied at home setting, in educational environments and in corporate contexts.

For educators, the goal of utilizing technology in schools using a variety of teaching methods is to expand learning experience and promote understanding for learners. Emerging technologies are therefore to be explored, learned and the newly acquired knowledge and skill be critically evaluated for effective application or improvement of learning. Since educational technology carries collaborative component in its framework, instructors should be able to engage students in an exploratory learning experience which is designed to inspire innovative thinking. As Bruner (1996) suggests, the essence of teaching and learning is to enable learners to acquire knowledge and apply the knowledge they attained to create other knowledge.

> To instruct someone ... is not a matter of getting him to commit results to mind. Rather, it is to teach him to participate in the process that makes possible the establishment of knowledge. We teach a subject not to produce little living libraries on that subject, but rather to get a student to think mathematically for himself, to consider matters as an historian does, to take part in the process of knowledge-getting. Knowing is a process not a product. (p. 72).

Regarding the scope of educational technology, The U.S. National Policy on Education (1986), recommends that:

> Educational Technology will be employed in the spread of useful, information, the training and retraining of teachers, to improve quality, sharpen awareness of art and culture, inculcate abiding values etc., both in the formal and non-formal sectors. Maximum use will be made of the available infrastructure."

The policy recognizes that appropriate technology applied in education should be aimed at improving the quality of teaching and learning and promote accepted values.

According to Kumar (n.d.) the scope of educational technology can be assessed from the following points: 1. Determination of Objectives, 2. Improvement in Teaching Learning Process, 3. Development of Teaching Learning Material, 4. Improvement in Teaching Training, 5. Development of Teaching Learning Strategies, 6. Proper Use of Audio Visual Aids, 7. Utilization of the Sub-System of Education, 8. Development of Curriculum, 9. Proper Use of Hardware and Software, and 10. Provision of Feedback.

The scope of the educational technology is therefore broad and continually expanding as new technology emerges. It extends to all resources (human and non-human) for the augmentation and development of teaching and learning.

INTEGRATING TECHNOLOGY INTO TEACHING AND LEARNING

Broadly, technology integration can be understood as a process of using existing tools, equipment and materials, including the use of digital media, for the purpose of enhancing learning. Specifically, technology integration combines the technological skill and ability to use pedagogical knowledge as a basis for technology integration into teaching and learning environment (Lever-Duffy, McDonald, and Mizell (2005). This suggests that school administrators and instructors develop or promote approaches and policies which advance students' understanding, keep them focused, and enable them to have a greater learning experience as they use education technology. When determining technology integration into teaching and learning, different students learning styles should be considered to ensure success of all students.

Technology integration is also understood as the use of technology resources—computers, mobile devices like smart phones and tablets, digital cameras, social media platforms and networks, software applications, the Internet—in daily classroom practices, and in the management of a school. Successful technology integration can be achieved when the utilization of technology is routine and transparent, accessible, readily obtainable for teaching and learning, supports the curricular goals, and enables the students to successfully reach their goals (Boss, 2011).

In addition, technology integration involves managing and coordinating available instructional tools and resources in order to facilitate learning in the classroom. Incorporating technology into teaching also involves the selection of appropriate technology based on the learning needs of the students as well as the ability of instructors to use such technology for various teaching and learning activities. International Society for Technology in Education (ISTE, 2015) standards for students states that:

> "Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and

synthesize the information, and present it professionally. The technology should become an integral part of how the classroom functions—as accessible as all other classroom tools."

Technology integration into the curriculum involves the infusion of technology as a tool to promote the learning. For effective integration of technology into the classroom to be achieved students should be able to select digital tools to help them obtain information readily, analyze the information, and present it professionally. As ISTE Standard for teachers states, technology should become an integral part of how the classroom functions — as accessible as all other classroom tools. The focus in each lesson or unit is the curriculum outcome, not the technology (ISTE, 2015).

ISSUES IN EDUCATIONAL TECHNOLOGY

Although digital innovations can inspire greater learning experience, it can also be a source of challenges for learning institutions and individual learners. Despite increasingly widespread adoption of technologies in many aspects of teaching and learning, significant challenges have been known to prevent effective implementation and thus hinder true learning.

Some of the challenges include pace of change since not all learning can keep up with the rapidly changing technology. Also, because of different social dynamics, online learning for instance does not offer the same social benefits of a regular school. Teaching and learning are relational activities and can be more fulfilling when human interactions are involved. In addition, some critics have pointed out that technology can be a distraction. Smartphones and tablets, with internet connectivity and text messaging services, can merely be a source of distraction for students as opposed to a learning tool. Another challenge in educational technology is the lack of adequate ongoing professional development for teachers who are required to integrate educational technology into their teaching activities. The failure to use technology to deliver effective formative assessments is a significant challenge in educational technology. There is an assessment gap in how changes in curricula and new skill demands in integrating technology into education (Nagel, 2013).

Legal issues related to technology in education may also result to challenges in using digital tools and resources. Copyright violations, for instance, apply to software, and most software publishers provide various licenses to save schools money when buying their products but rarely do End-User-License- Agreements give an individual permission to install software on more than one or two computers. Further, ethical issues pertaining to plagiarism and privacy arise with the use of digital resources. The Internet and other new technologies can easily provide the means for students to plagiarize. In addition, the digital divide is another significant social issue related to technology in the schools. Digital divides can either be the gap between those students who have access to computers at home and those students who do not, or the gap between those students who have high speed access to the Internet, those students who have slower (dial-up) access, and those students who do not have any access to the Internet (Issues in Educational Technology, n.d).

HOW NOW SHOULD WE TEACH?

i. How now should we see the world?

A worldview is a way of seeing and being in the world (Edlin, 2009), a way of describing how an individual or a society views the context in which it finds itself. Kraft (2008) defines worldview as "the totality of the culturally structured images and assumptions (including value and commitment or allegiance assumptions) in terms of which a people both perceive and respond to reality" (p. 12). Wilson (2007) notes that worldview is inescapable—every tribe, nation, people group or religion has always had a worldview, though people did not start talking about it until the late 18th century. When worldview is defined as a way of seeing and being in the world, the concept embraces a broader context—including the mind, heart and cultural practice.

Christian educators are to see the world from a reformational worldview perspective, that is, a biblically informed worldview which begins from an acknowledgement that there is no neutrality in all of life because at the core of every worldview is religion or a faith commitment. This scripturally informed worldview is also referred to as "reformational," (Wolters 2005 p.1) after the Protestant Reformation which discovered the biblical teaching vis-à-vis the depth and scope of sin (fall) and redemption. Reformed Christianity views the world as belonging to God, its creator, and that God loves the whole world, not only human souls in the world. The entire cosmos was created by God and there is no spot on this earth that is outside of God's reign or exterior of God's grace. God created humanity with the potential and ability to form cultural institutions such as schools, businesses, politics, economics and media. From a reformed view, humanity is free to engage the world and engage human culture responsibly as stewards.

Philosophically, reformed critical realism approach to reality can inspire development of a biblical worldview. According to Edlin and Ireland (2006), reformed critical realism is a philosophical and hermeneutic paradigm that declares the existence of absolute truth but limits human understanding of that truth because of our fallen capacity to "see through a glass darkly"; it urges a proactive, humble engagement with the secular culture that starts from (i) a declared Christian prepositional stance (thetical-critical method); (ii) a high place of Scripture as the inspired, infallible unfolding drama of God's plan for the world. Reformed critical realism is distinctive from critical realism in that it is reformed in a theological and foundational sense—not merely a reformulation critical realist theory (Edlin and Ireland, 2006).

Christian worldview is consistent with a holistic approach of technology where fundamental human technics are seen as the totality of human formative process and cultural entities—a perspective shared by Schuurman (1995) and Carey (1989).

ii. How now should we approach technology?

More often than not, technology is explained from different perspectives; anthropologically, epistemologically and sociologically as identified by Mitcham and Macky (1983, p.1–7 cited in Monsma, 1986, p.13 and Atwood, 1998. p. 4–5):

> Anthropological approach: technology as a making activity intrinsically linked to the nature of humankind.
>
> Epistemological approach: technology consists of certain procedures and knowledge of the making process.
>
> Sociological approach: technology and its pervasive effects are the defining mark of thought and action in modern society.

Whereas these approaches appropriately identify some key aspects of technology, they do so characteristically by emphasizing only one dimension of the created order while minimizing other dimensions. They thus present a reductionist, biased picture of the complex whole of a cultural formative process (Atwood, 1998). These condensed views, therefore, do not offer much help in understanding a holistic nature of new media technology.

More recently, Carr (2010) and Hipps (2009) have based their description of technology on Marshall Mcluhan's book Understanding Media. For instance Hipps states that "Every medium is an extension of our humanity. All forms of media (any human invention or technology) extend or amplify some part of ourselves" (p. 34). For Carr, "Every technology is an expression of human will" (p. 44) including those that extend our physical strength, our senses (for example binoculars extend human eyesight), our intellect, or ones that reshape nature. These definitions provide additional clarity both from an epistemic viewpoint and also from a practical perspective.

Originally, McLuhan's (1967) explanation assumed that technology helps one understand the intended purpose of technology. McLuhan suggests that a medium affects the society in which it plays a role not by the content delivered through it, but by the characteristics of the medium itself. McLuhan pointed to the light bulb as an example. A light bulb does not have content in the way that a newspaper has articles or a television has programs, yet it is a medium that has a social effect; that is, a light bulb enables people to create spaces during nighttime that would otherwise be enveloped by darkness. For Carey (1989) the media and cultural contexts should be properly regarded (and not only the content they carry), for a better understanding of the communication process.

This paper takes a holistic approach where technology is seen as a totality of human formative process and entities which explore cultural advancement. Schuurman (1995) and Ellul (1980) explore the same view of technology by avoiding reductionism and asserting that technology is a complex human process. For example, Schuurman defines technology as "the human formation of nature with the help of tools for human purposes" (p. 5) while Ellul sees technology as a method, or "la technique," that is, the totality of methods and skills employed to maximize human efficiency.

iii. How now should we understand educational technology?

Christian Educators can use educational technology faithfully and have their students achieve their educational goals. The educator can do this by understanding that technology is not merely a tool as a common myth tends to purport. The myth states that, "it's not the technology itself; it's what you do with technology that counts". This idea fails to recognize that technology itself embeds a message as McLuhan also suggested technology plays a role not by the content conveyed through it, but by the characteristics of the medium itself.

Christian educators are to recognize the underlying potential of educational technology and see it is a gift from God for humanity. However, technology often changes things in subtle manner thus it requires discernment in the part of the educator in selecting the technology tool, resources and integrating them into teaching and learning in a biblically faithful ways. In his book *Responsible Technology: A Christian Perspective*, Monsma (1986) describes technology as "A distinct cultural activity in which human beings exercise freedom and responsibility in response to God by forming and transforming the natural creation, with the aid of tools and procedures, for practical ends or purposes"(p.19). Monsma's view of technology recognizes that technology is a human cultural activity; it is more than just devices. It also holds a notion that technology is a response to God, one in

which educators have both freedom and responsibility.

The notion that technology is merely a tool misses the significant point that technology also embodies values. The worldview and values of the designers, proponents and even users of technology influence both the "structure" and also the "direction." Worldview is directional, it either submits to God the Creator or points away from Him (Wolters, 1985, p. 49). Postman (1993) asserted that "embedded in every tool is an ideological bias, a predisposition to construct the world as one thing rather than another, to value one thing over another, to amplify one sense or skill or attitude more loudly than another" (p. 13). Technology is value-laden. Any claimed neutrality in media technology can only be a reflection of an incorrect understanding of the entire media context (Taylor and Harris, 2008). Values embedded in technology involve variety of modalities including economic, legal, aesthetic, social, and cultural aspects. Educational technology has a capacity to transform certain ways of thinking and knowing. Indeed, as Marshall McLuhan once said, "We shape our tools, and thereafter our tools shape us" (p. xxi).

Human interaction with technology does not occur in a vacuum but in a cultural context full of competing assumptions. Within a culture, people practice cultural "liturgies," a term Smith uses to mean valued and repeated activities that take place anywhere: at the shopping mall, the sports arena and the academy. Smith argues that immersion into these liturgies forms one's cultural desires and communicates what "the good life" looks like and shape human identities by forming the most fundamental desires and the most basic attunement to the world (Smith, 2009, p. 25). Technology in Education tend to "legitimize certain ways of thinking, imagining, and enacting the most basic aspects of life" (Song, 2001, p. 8).

This calls for discernment. Instructors are to use educational technology as God-given gift. From a reformational perspective educational technology can either serve good or evil. Non-neutral media are therefore to be created and used with discerning wisdom and redeeming stewardship.

iv. How now should we engage educational technology?

When technology is understood as a totality of human formative process and entities which explore cultural advancement (Schuurman, 2013), engaging the 'tech culture' becomes a significant role of educators. Cultural engagement involves deliberate, thought-out, philosophically-consistent actions aimed at reflecting a biblical perspective on cultural issues (including educational technology) people encounter (Edlin, 2011). Christians are called to engage cultures by acting as agents of redemption seeking to subject everything under the Lordship of Christ. Cultural engagement is a crucial process of life-long learning and enables one to love God by knowing and loving God's work (Platinga, 2000). Cultural engagement can also be said to be an involvement in a local culture in order to reach out to the community to share the truth of the Gospel. Though cultural engagement may improve relationships between individuals and groups of people, Christians must reject and abandon any evil cultural practices that contradict the Gospel.

The rise of educational technology presents Christian educators with competing worldviews some of which may be inconsistent with their core beliefs. Increased interactions with technology with its characteristic of repetition and abundance have lasting effects on users' lives. Human life as a religious practice involves a heart commitment embedded in certain life views (Edlin, 2009), and powerfully shapes people's cultural desires and heart commitment to certain ways of life. According to Smith (2013), it is who we are that influences what we do, that is, our identities drive our actions,

from soul to body. Identities include not only thoughts and ideas, but also visions and passions, motives and wills shaped by culture. Engaging 'tech culture' therefore, calls for attentiveness to the existing presuppositions, persistence and willingness to transform because educational technology, like the educational process itself, is not neutral and always carry values (Brummelen, 2009).

The ever increasing technology inventions, the socioeconomic and political milieus are radically altering educational approaches. Without a discerning wisdom that offer guiding values, frantic competition between technological innovators will continue making lives cleverly entertaining—what Postman (1985) describes in *Amusing Ourselves to Death: Public Discourse in the Age of Show Business* as amusing ourselves to death. Postman (1985) argues persuasively hidden dangers exist in our freedoms, our prosperity, and ubiquitous technological innovations. Kirkpatrick Sales (1996) also notes that technology is never neutral because it carries out its exclusively lucid and rational intent to its completion. This, calls for a reflective lifestyles where human interaction and use of technology are examined and bold cultural engagement—and this is best carried out from a Biblical presuppositions which admonish humans to be steward of created world, including educational technology .

When educational technology is viewed from a reformational perspective, believers are encouraged to engage in not only education and technology, but all of culture, subjecting every idea, theory, invention and technology to the lordship of Christ. To engage educational technology, educators and learners should be ready to face the challenge of bringing the Gospel to bear on the digital environment.

Despite being over 80 years old, the former leader of Roman Catholic, Pope Benedict, recognized the digital world for what it is: a ripe mission field for the believers.

> Without fear we must set sail on the digital sea, facing into the deep with the same passion that has governed the ship of the Church for two thousand years. . . .We want to qualify ourselves by living in the digital world with a believer's heart, helping to give a soul to the Internet's incessant flow of communication. (Vogt, 2011, p. 22).

It is human nature to desire, and God created man with a conscience so that man would be a seeker of fulfillment. As the Creator, God orders the affairs of men so that they seek Him and find him.

An article published in The Christian Post suggests that value of the digital relationships cannot simply be dismissed since that is where many people are—in the digital age (The Christian Post, December 4, 2009). Jesus' command in the Great Commission entails going and making disciples, and thus, committed Christians ought to act within contemporary cultures and influence then as light and salt. Hunter (2010) refers to this influence as "faithful presence" (p. 35). It is a faithful extension of the Great Commission mandate to understand the calling "make disciples of all nations" to extend beyond nations in geographic sense, and to encompass occupational communities, social communities, and digital communities as well.

CONCLUSION

This paper has briefly explored the development of education technology and integration of technology into teaching and learning. It has also discussed issues of educational technology and how Christians are to understand, approach, and engage technology in education. The rise of educational technology in recent years has been driven by the developments and innovative advancement in

online education services, software, apps and increasing awareness towards collaborative learning, digital communication, data sharing, and the ability to collaborate on projects remotely. It can be concluded that technological innovation is unescapable and therefore, educators must comprehend the nature and transforming abilities of educational technology in shaping minds and souls of learners.

When instructional technology is understood broadly, it encompasses pedagogical processes which it is envisioned to support or the experience it is designed to produce. The scope of instructional technology is determined by a variety of factors including learning objectives, methods of instruction, learning styles, assessment approaches, and response mechanisms.

For Christian educators, integrating educational technology into teaching and learning means seeing technology from a worldview consistent to biblical principles and values. A holistic approach of technology holds that human technics are the totality of human formative process and cultural entities to be subjected under the lordship of Christ.

Since technology is value-laden and sometimes shape culture subtly, educators must seek Godly discernment as they explore, learn and apply technology in teaching and learning. Technology is a gift to humanity; however, it can be misused or glorified sinfully. It is possible that technology can be regarded as a deity in contemporary culture due to its increased presence and demand. Roy (2002) suggests that "Technology is, without any doubt, the world's most powerful and fastest growing religion" (p. 667). All technologies are part of the creation impacted by sin and in need of redemption and restoration to the original state in which they were created.

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