Introduction

Educators are cognizant that theory driven by research directly related to practice is beneficial in any field of study. The methodical nature of theory is to provide an explanation of a problem, to portray the distinguishing features, and to provide data accordingly. In education, application of theory can inform practice and research to real life (classroom) situations considering social, cultural, and ethical issues. This paper will explore theory to practice through the lens of connectivism and the issues of translating theory into practice.

Connectivism refers to a theory of learning that stresses the contribution of cultural and social context in the learning process. Connectivism is closely linked to activity theory proposed by Engeström (Dunaway, 2011). The association between knowledge, education, and experience is an important aspect of connectivism. In the digital era, connectivism refers to a learning theory that stresses technology and communication and their effects on a student's education.

A teacher plays several roles within the conventional classroom. These include support, guidance, encouragement, and role model (Kaufman & Mann, 2007). Of these responsibilities, the traditional teacher role may involve choosing a textbook, organizing lesson plans, and developing curriculum. The basic connectivist theory is grounded on social and technological networks that act to challenge the role of the teacher within the classroom (Pearl & Knight, 1999). It acts to eliminate geographical limitations by introducing educational and technological experts directly into the classroom. In practice, learners can interact directly with other students and resources through discussion boards and other online applications. An important aspect of connectivism is on-going conversation and aggregation of information. Conversations are limitless across the different networks while course content is diverging from the traditional

textbook into other channels.

In the past two decades, many new theories have been developed to describe the acceptance of technology into learning. One such theory is connectivism. This theory has been praised as an effort in the digital era to produce a relevant learning theory (Kaufman & Mann, 2007). The crux of proponents of the connectivist theory is that currently, learning takes a lifetime, it is mostly informal, and that earlier human-centered pedagogical functions and processes can be easily accommodated by technology (Dunaway, 2011). From this viewpoint, connectivism can be perceived as introducing a distinctive perception to learning theory, in addition to creating thought-provoking inquiries, such as the meaning of the terms knowledge and learning. According to George Siemens (2011) and other proponents, connectivism starts with the individual learner. The path to realizing true knowledge originates from an individual, conceivably with the help of others, creating a knowledge network of pertinent information resources such as academic web sites, journals, and periodicals (Kaufman & Mann, 2007). While colleges and universities may offer connectivist courses, some of these opportunities may be obtainable in other online platforms, such as social media. With the maturity and growth of the individual's personal knowledge network, the superiority of the learning process also improves, thus increasing its value over the long term.

Literature Review

Learning is a crucial activity in the lives of humans and its forms the basis of the educational process (Isman, 2011). Consequently, a lot of attention has been paid to the understanding of how learning takes place, leading to the formulation of numerous theories of learning and instruction. These theories have evolved over the years as developments in other areas of education continue to happen. There is no one theory that can be described as the

perfect theory that fits in all learning situations. This means that different theories are applied to different learning situations. The various theories of education and learning describe how learning occurs, the factors that shape learning, the importance of memory in learning, and how knowledge is transferred (Ravenscroft, 2011).

According to Thomas (2010), the emergence and development of diverse communication tools and the subsequent deployment of these tools in the discharge of education has resulted in the alteration of the learning environment. This comes from the fact that education is changing from the traditional perspective where it was delivered in specific learning environments that were largely confined in nature to the development of a virtual learning environment where content is not only guided by the teachers, but is also discharged by students who use technology to advance learning between and among themselves. This literature review contains the discussion of how the theory of connectivism has been applied in the field of education. Siemens (2011) argues that information technology has transformed the traditional learning environment in a significant way that necessitates a new learning theory. One rationale for the creation of a new theory of learning is that in the digital age, most learning environments are intertwined, technological, and social in nature (Kaufman & Mann, 2007). Kaufman and Mann (2007) further observe that the different connection points in learning have been developed in learning where the use of technology, especially Web 2.0 tools are used to create learning groups by students. This is done in both formal literacy and informal literacy within the wide learning environment that is becoming wider due to the prevalence of diverse technology platforms for discharging learning activities.

Dunaway (2011) observes that connectivism is one of the foundational theories that provide a critical framework on which learning on the part of the students is characterized in the

contemporary learning environment where information and communication technology is taking center stage in the learning environment. The contemporary application of information and communication tools and technologies in learning is slowly but surely resulting in limiting the role and actual influence of teachers as the moderators of learning and is promoting scenes where students are taking the center stage in the contemporary learning environment. At this juncture, it is imperative to revisit the observation by Thomas (2010), whose argument about the application of the connectivism learning theory in the modern learning environment that is technology driven, reiterates on change in the manner in which literacy instruction is discharged. The connectivist approach to learning can be better informed by looking at the real attributes of learning and literacy as fostered by both the learners and the educators (Dunaway, 2011).

In a case study of blogging and its use in the connectivist learning theory, Garcia, Brown, and Elbeltagi (2013) found that connectivism has influenced the way blogs are used in teaching and learning. The change may not only be from the acceptance of blogging as a part of the instructional process, but also in how teachers and students have embraced the connectivist learning style (Garcia et al., 2013). Blogging provided collaborative opportunities for students to communicate online (Richardson, 2010). Another component of blogging that supported the connectivist learning theory is the manner content or remotely located experts could become involved in the learning environment. Blogging also represents an essential aspect of the connectivist principle that students can make associations for learning, while being associated within a network (Boitshwarelo, 2011). Technology has facilitated learners to access a wealth of information resources; for instance, online libraries, peer-reviewed journals, and book reference services along with social media, blogging, and Web 2.0 tools (Lemke, Coughlin, Garcia, Reifsneider, & Baas, 2009). The availability of content and the fact that leaners can access

information through these tools is a positive indicator of using technology in facilitating learning. With the availability of information, the use of teachers as the source of information as embraced in traditional learning environment is quite limited. This is in line with the observation by London and Hall (2011), who noted that the intense deployment of Web 2.0 tools in learning in the contemporary learning environment denotes a shift from the teacher-controlled models of learning to the learner controlled model of learning.

The emergence of digital literacies (print to paperless) has also intensified the need for connectivism. Lee, Messom, and Yau (2013) studied one school's e-book implementation and determined that many surveyed students preferred e-books due to the Web 2.0 component. In the case study, students could post information on discussion boards and join to e-books so that their fellow students and educators could react and remark on posts that were freely accessible by course participants. As theory-guided practice in this case study, cooperation among students empowered them to interpret e-book content and to impart information among other learners (Lee et al., 2013). This indicates the ease with which collaboration and networking in learning can be attained in social and technological networks that are developed courtesy of the availability of technology. Tu et al. (2012) applauds the fact that learning is broadened because of the fact that learners can easily connect and establish learning networks on the technology platform. Collaborating on discussion boards facilitated many of the features in a connectivist learning model; for example, allowing communication between students, (Ferdig & Trammell, 2004) elevating peer groups to assist in learning (Glogoff, 2005), and the evolution of discussion groups (Macduff, 2009). With the use of technology, students can now easily establish and sustain important learning networks, with only limited support from teachers (Boitshwarelo, 2011).

Another important aspect captured in the new paradigm is the emerging collaborative nature of education (Dunaway, 2011). Williams, Karousou, and Mackness (2011) studied Connectivism and Connective Knowledge (CCK08) at the University of Manitoba. With a rolling enrollment, students were able to plan their own path through the course content that was available on the course website. Students agreed that all knowledge would be created collaboratively and openly shared among all course members. Williams et al. (2011) remarked that CCK08 fulfilled key conditions for a connectivist course, such as asynchronous and synchronous learning events, daily aggregation of knowledge, content experts, discussion boards, and student responsibility for their own learning goals. Williams et al. (2011) noted that many of the students in CCK08 withdrew from the course. Consequently, the authors concluded that connectedness alone does not guarantee collaboration, let alone connectivist learning. CCK08 was a failed attempt to illustrate the application of theory, where the learning process has shifted from a one-sided and impersonal process into a dynamic one characterized by interpersonal communication, distant support, and increased platforms for information besides the teacher, such as access to world-class resources and experts (Kaufman & Mann, 2007).

Connectivism has informed the practice of librarians seeking greater student engagement in information literacy. Dunaway (2011) proposed that the learning theory of connectivism be merged with the framework of metaliteracy. In so doing, librarians can promote the development of personal learning networks for students. Mackey and Jacobson (2011) defined metaliteracy as a framework that integrates emergent technologies with various literacies, such as cyber, digital, media, and information literacy. Here, connectivism learning theory is embedded in the fact that many students are engaged on social networks supported by the emergent technologies that support these networks. Therefore, different locus of knowledge

sharing and dissemination emerges, thereby challenging the traditional culture of learning that emphasized on a single dimension of learning; the use of teachers in discharging learning activities. Friesen and Lowe (2012) observed that the social media, which is part of Web 2.0 tools, is promoting connective learning in the sense that it promotes the creation of engaged learning environments. New forms of leaning environments that are more engaging keep coming up as educators embrace the use of social media in communication.

Discussion

The connection between theory and practice has formed the central argument and has consequences both for the manner of educating teachers and in the way they execute that teaching in the classroom. Understanding the definitions of both theory and practice will provide an understanding of the central argument. A theory refers to an ideal, or set of premises or suppositions, concerning reality (Kaufman & Mann, 2007). Theories can take on a descriptive shape, in that they are efforts by human beings to make sense of daily experiences (Dunaway, 2011). This sense introduces an element of prediction. Theories are used to assist individuals to expect the outcomes of their actions and to coordinate effective choices. In contrast, practice refers to the actual deed, even though it also refers to the mannerisms of conducting a career or profession (Kaufman & Mann, 2007). Practice can also be comprehended as trials or training for performance. There is a manner in which both theory and practice converge when one practices education from a technological viewpoint. Theories can inform practice by offering the course for action and basis for decision-making (Dunaway, 2011). However, practice can also guide theory. The actions of an individual can also furnish a researcher with valuable information on the way human beings reason. This understanding represents a classical reversal of the roles of theory and practice.

Within education, theory has managed to change several views of learning that have been successfully implemented in different settings. With the development of different methodologies and models, such as the connectivist learning theory, there is a gradual acknowledgment that a different image of learning exists and that this places a greater relevance on the important of research to practice (Kaufman & Mann, 2007). For instance, learning has been gradually accepted as a way of acquiring responses mainly because of the learning theories provided by Skinner (operant conditioning) and Pavlov (classical conditioning). Both theories shifted the role of learning into that of acquiring knowledge. Both theories claimed that learners received and interpreted information relayed by textbooks or teachers. Focus shifted into enhanced curriculum design as well as the organized presentation of information. Lastly, theory has also influenced the role of learning to that of interpreting knowledge. Learners have been found to have a major influence on the material they interpret on their own. These three examples illustrate the wide application of learning theories in the education sector (Kaufman & Mann, 2007).

Translating Theory into Practice

Theories that act to guide the practice among teachers offer an overall theoretical context for education. Some of these theories include development, cognitive, and behavioral theories (Kaufman & Mann, 2007). Specific theories may be more applicable in unique settings and groups when understanding a particular activity or set of actions. Some models can be easily incorporated into practice frameworks (Kaufman & Mann, 2007). An aspect in applying a theory is the convenience of the theory. Some concepts can be implemented to tackle widely occurring phenomena. For instance, Vgotsky's models of proximal development may be implemented in a broad variety of learning environments and in various teaching environments

(Dunaway, 2011). Theory can furnish a setting for interpreting behaviors, and for creating different approaches for new settings or cohorts.

Connectivism may have been the inspiration for addressing the shortcomings that many higher education institutions faced in the management of online courses, with its natural pairing of technology and pedagogy. In recent, and unprecedented, collaborations between Stanford, Princeton, and Yale Universities (Coursera), as well as Harvard University and the Massachusetts Institute of Technology (edX), these MOOC providers have reported student enrollments in the millions (Yeager, Hurley-Dasgupta, & Bliss, 2013). In the practical application of connectivist learning theory, knowledge that existed in the network had to be linked with the appropriate people and in the correct setting for it to be accurately used (Kaufman & Mann, 2007). The expansion of rich site summary and related technologies; for example, Twitter, was characteristic of a move toward aggregation from numerous sources and made it accessible for educational needs (Hilton, 2006). Lindner (2006) noted that *micro content* and was being aggregated to produce new understandings. According to Fini (2009), in a MOOC named Connectivism and Connective Knowledge, regardless of the wealth of technologies that were proposed by the course instructors, it appeared that the daily aggregation of information of course materials was favored by students, rather than the multi-faceted, tedious option of using the other course software options.

Learning in the modernized world is currently contextualized within a fundamentally technological setting, where the application of digital media is significant. The current technology-rich education setting is categorized by a continuous use of digital media, the incorporation of online settings, and change toward a more personalized approach of learning (Kaufman & Mann, 2007). Nevertheless, Siemens and Downes (2008) did not propose that

connectivism is constrained to the online environment. According to Siemens and Downes, the online environment is one application that has been critical for the growth of connectivism, yet the theory applied to a larger environment served to advise comprehension, connection to the larger world, and how to learn from it. These aspects of connectivist learning theory have driven education stakeholders to question the relevance of conventional learning theories (Dunaway, 2011).

Problems with the Application of Connectivism

While connectivism has proven to be a useful theory in introducing elements of technology into the learning process, its adoption has had significant implications on social interactions. Kop and Hill (2011) focused on three vital limitations of connectivism, including power relations, critical literacies, and learner independence, as well as presence levels. To be successful in today's schools, practitioners of connectivism need to ensure that all students feel empowered, accepted, and acknowledged. Not unlike a traditional classroom where student a student would raise a hand, in an online environment, a student must feel empowered to suggest thoughts on discussion boards and other applications freely (Barabási, 2014). Next, the level of learner independence is another significant subject (Dunaway, 2011). In a MOOC or other type of online learning environment, students need critical literacies or 21st Century skills (Partnership for 21st Century Skills, 2009) to direct themselves (Dunaway, 2011). Some students may be fearful of or unable to be independent learners. Connectivism is grounded on the dynamic participation of self-directed students, and consequently, clarifying how to cultivate self-direction with high-needs students will be a significant aspect of its failure or success (Dunaway, 2011). Lastly, presence levels are an important aspect that should be addressed within connectivism. Achieving a balance between social presence and teacher presence in the

connectivist learning theory requires a certain level of planning. Koutropoulos et al. (2012) found students with a higher success rate in course completion had higher rates of social interactions with classmates and teachers on discussion boards. These forms of presence can be challenging in online course delivery (Dunaway, 2011).

While the introduction of technology in the delivery of education represents a development in teaching methods, it has not been without its own problems and challenges (Dunaway, 2011). Consequently, it is important to address the social, cultural, and ethical issues that emerge from the application of connectivism within the education field. Socially speaking, one cannot ignore the serious issues presented by connectivism. In almost all societies, the differences in capital manifest themselves through class. Consequently, in the same society, there is a group with access to technology, information, and funds on one end and another group without such access (Kaufman & Mann, 2007). In analyzing the effect of connectivism in the social context, it is important to ask the question: what is the impact of technology on the disadvantaged group in society? It is clear that economic conditions largely determine the extent of access to technology, and consequently, the disadvantaged may not be able to apply connectivism according to its true manner (Dunaway, 2011). Therefore, connectivism has a major flaw because it is largely dictated by the economic status of an individual, society, or nation. On a large scale, the phrase *digital divide* aptly describes the division that exists, based on level of access to technology. Research by Reinhart, Thomas, and Torskie (2011) suggested the presence of a second-level digital divide, where schools with higher socioeconomic standing were more likely to provide students with technology that encouraged critical thinking skills. Currently, a digital divide exists between the developed and developing world, and this presents an obstacle towards the realization of uniform connectivism at a global level (Dunaway, 2011).

Cultural factors, such as gender and race, also take center stage within the education context. In settings where gender imbalances have pervaded the education system, especially in technology, female students may not benefit as much as male students. Yau and Cheng (2012) noted that male students displayed a more positive attitude toward computers and technology education than do female students. Special education students are also another factor that stands in the way of efficient application of technology in the classroom setting (Dunaway, 2011). Physically and mentally disabled students end up being less technology-oriented, and may need assistive technology to realize the same level of digital expertise (Dunaway, 2011). Ethical issues in the usage of technology, especially among children, presented the last complication that could bring to question the application of the theory. Concerns exist over multimedia content, harmful websites, and cyber safety (Dunaway, 2011). While educators have taught cyber safety for many years, new challenges are raised by the evolution of marketing campaigns aimed directly at children, cyber bullying, and inappropriate social media exposure (Snyder, Jevons, Henderson, Gabbott, & Beale, 2011). Privacy concerns around the safety and confidentiality of student information and data are also pertinent in all educational settings. These factors serve to determine the extent of efficacy of application of the connectivism theory (Kaufman & Mann, 2007). It is clear that the introduction of technological aspects into the learning process brings with it a great amount of responsibilities and tasks not covered in the conceptualization of the connectivist learning theory (Kop & Hill, 2011).

Criticism of the Connectivism Theory

The notion that connectivism is a fresh theory of learning is not extensively acknowledged. Verhagen (2006) contended that connectivism is an instructive view. Conventional theories of cognition (i.e., activity theory), suggested that humans are embedded

actors, with learning revolving around three key aspects—the learner (subject), the task (the object), and instrument or facilitating artifacts (Kaufman & Mann, 2007). Kerr (2007) argued that even though technology has a significant effect on different learning environments, present learning theories are adequate. Kop and Hill (2011) concluded that while it remains unclear regarding the position held by connectivism as an independent learning theory, it nonetheless plays a significant role in the construction and development of new pedagogies, where control is relocating from the teacher to a progressively more independent learner. Most of the critics of connectivism acknowledge that society has evolved into a highly networked entity (Dunaway, 2011). Consequently, learning theories constructed "pre-Internet" may be less pertinent. Nevertheless, many scholars agree that in education, it was necessary to assimilate a learning theory, which incorporated technology and reflected the digital era (Dunaway, 2011).

Recommendations

Rodriguez (2012) studied the application of the connectivist learning theory, the claims of the theory, and the reason linking application and theory in a study on the Stanford University artificial intelligence MOOC. Although the MOOC retained some of the principles of a connectivist course, such as the daily aggregation of information, the weekly course content employed the constructive learning theory in a traditional distance-learning environment. One can speculate that connectivist theory was not chosen because schools have not embraced connectivism as a means to deliver curricula. Colleges and universities are built on educational values with traditions that have developed for over hundreds of years. Moreover, there may have been a fear that not all students are autonomous learners. Connectivism requires adaptability and decision-making in students to assume ownership over interpreting and connecting their learning encounters to the knowledge network. This implies less emphasis on standard coursework. In a

later study, Rodriguez (2013) explained that Siemens and Downes subsequently created

constructive massive open online courses that solely employed the learning theory of

connectivism.

Extensive adoption of connectivist methods to formal learning will unavoidably meet

resistance. Possibly the most contentious aspects of connectivist learning theory are the

persistence that the network holds equal significance when compared to the content, that

information is a process instead of an object, and that knowledge can exist in devices or other

individuals, and recovered whenever required rather than integrated into an individual's memory

(Kaufman & Mann, 2007).

Conclusion

The subject of technology makes it necessary to study previous pedagogical approaches

as well as to provide a rationale for the creation of a new learning theory. In the process of

analyzing the extent of applicability of the connectivist learning theory, the need for a new

learning theory has been assessed. This analysis is especially pertinent against the backdrop of

previous conventional learning theories such as behavioral, developmental, constructivist, and

cognitive theories. The development of constructivist theory was before the onset of the

information technology era that introduced the Internet (Dunaway, 2011; Kaufman & Mann,

2007).

In summary, it is imperative to acknowledge that connectivism as a theory of learning

changed the way modern education is perceived (Dunaway, 2011). The theory has enabled

contemporary educators to get a grasp on the integration of technology into the education system

with minimal resistance. Connectivism has facilitated the conversation beyond technology to the

current meaning of what good teaching is and how technology can expedite it.

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