A Review of Connectivism Theory as a Benchmark for 21ST Century Teachers and Students

Muhammad Adamu Jebba (Ph.D) and Nathaniel N. Umaru

Department of Electrical/Electronics,
School of Technical Education, College of Education, Minna
Email: adamujebba@gmail.com

Abstract

The paper highlights the features of "Learning Theory for the Digital Age". Commonly referred to as connectivism theory, it is a theory developed to meet up with the requirements of the 21st century teaching- learning environment. The paper discussed the principles of the theory vis-à-vis its implication for the 21st century teachers in teaching 21st century students. The paper also discussed the unique characteristics of the 21st century teachers and student and indicated that the connectivism theory could reflect the type of learning that occurs in digital age in order to meet the needs of today's students. The paper therefore, affirms that the connectivism theory allows instructors to step back from controlling course content, bypass textbooks and traditional lecture presentations and bring learners to the forefront in locating, presenting and making sense of relevant knowledge. Consequently, the paper stressed that if the connectivism learning theory is properly applied, it would significantly improve the teaching and learning process through the revision of educational perspectives to generate a greater shift to learner-centered education. Conclusively, it was recommended that the school authorities should create teaching-learning environment that are digital friendly while the teachers should be given opportunity for in-service training on current digital technology to enhance their capacity in producing digital oriented students.

Keywords: *Connectivism, Learning theories, Digital age, 21st century teachers, 21st century students.*

Introduction

Scholars' search for theories that befit 21st century learning led to renew interest in exploring Information and Communication Technology's potential in order to transform teaching -learning environment. One of the most celebrated theories that met the requirements of the 21[st]century teaching – learning environment which is also essential to teachers for effective production of competent students is the Connectivism learning theory. Adamu (2016) recognized connectivism learning theory as one of the most relatively new theory of learning propounded by George Siemens at the University of Manitoba in December, 2004. It is known as the "Learning Theory for the Digital Age" (Darrow, 2009). Connectivism learning theory explains how Internet technologies have created new opportunities for people to learn and share information across the World Wide Web (WWW). These technologies, according to Downes (2010) includes Web browsers, email, wikis, online discussion forums, social networks, YouTube, and any other tool which enables the users to learn and share information with other people online.

A key feature of connectivism is that much learning can happen across peer networks that take place online. Siemens (2005) observed that in connectivist learning, the teacher principally act as a facilitator whose major task is to guide students to required

information or answers. Students are also encouraged to seek for information on their own online and express what they find, consequently, a connected community around this shared information often results. Thus, connectivism as a concept is generally concern with the integration of pedagogical principles explored by chaos, network, complexity and self-organization (Siemens, 2006). In connectivism theory, learning is considered to be a process in which, the role of informal information exchange, organized into networks and supported with electronic tools, becomes more and more significant. Learning becomes a continuous, lifelong system of network activities, embedded into other digital activities (Bessenyei, 2007).

According to the propounder, connectivism learning theory has the potential to transform the teaching and learning environment through e-learning platform. Siemens felt the need to develop connectivist learning theory to adequately match modern day, digital learning environments. The propounder described learning as messy, chaotic, social, collaborative tasks which are connected with other activities and interests. Another promoter of Connectivism theory is Stephen Downes who explained that existing learning theories did not provide for the changing nature of learning and learners due to the influence of technological advances.

Principles of Connectivism

With reference to connectivism learning theory, Siemens (2004) outlined the following principles:

1. Learning and knowledge rests in diversity of opinions
2. Learning is a process of connecting specialized nodes or information sources.
3. Learning may reside in non-human appliances like computers and its related peripherals
4. The capacity to know more is more critical than what is currently known

5. Nurturing and maintaining connections is needed to facilitate continual learning
6. Currency (accurate, up-to-date knowledge) is the intent of all connectivists learning activities.
7. Decision-making is it a learning process. Thus, choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

Connectivism therefore helps to ensure that students remain current by facilitating the building of active connections, utilizing intelligent social networking and encouraging student-generated curricula. Darrow (2009) stated that connectivism allows the future of education to be viewed in an optimistic, utopian perspective, as individuals co-create knowledge in a global, networked environment. According to Prensky (2005), if the connectivism learning theory is properly applied, it significantly improves the revision of educational perspectives to generate a greater shift to learner-centered education. Siemens (2004) opined that the theory allows for instructors to step back from controlling course content, bypassing textbooks and traditional lecture presentations and bring learners to the forefront in locating, presenting relevant knowledge. While the author held to the validity of the three leading learning theories of behaviorism, cognitivism, and constructivism, it was argued that these theories have inherent limitations thus did not reflect the type of learning that occurs in today's digital age nor, did they meet the needs of today's students (Siemens, 2004). The author agrees that the established theories and techniques should not be summarily dismissed as their value is still

appropriate for certain learning tasks that require a more formal and structured environment. Siemens acknowledges that no one concept or theory is universal in its application.

Marc Prensky is a supporter for revitalizing education through the effective use of technology and connectivism practices. Prensky is a speaker, author and consultant in education and has focused on digital game-based learning as a solution to the issue of declining in students' engagement in learning. Prensky (2005) in his article, *Engage Me or Enrage Me*, explained that today's learners are no longer interested in or even capable of learning in environments that do not reflect their real-world experiences. Students enter the class with a myriad of devices such as cell phones, laptops and iPads. They are constantly in touch, motivated by and responding to the changing world with spontaneous exchange of knowledge. According to Prensky (2005), Instructors that teach with the conventional, old-fashion "chalk and talk" approach will have difficulty in significantly reaching their target students in this current digital age. Prensky further explained that students' lives are rich in media, communication and creative opportunities outside of school.

Rather than being empowered to choose what they want, see what interests them to create their own personalized identity as they are in the rest of their lives—in school, they are confronted with stale, bland, and outdated stuff. Darrow (2009) described this situation as "delivering yesterday's education for tomorrow's kids" while others observed that today's learners have short attention spans, but Prensky (2005) pointed out that students have short attention spans for the old ways of learning but are interested and attentive for their games, movies, music or Internet surfing (Siemens, 2005). Prensky (2005) coined the term- digital Natives-which refer to today's students as native speakers of the digital world while others not born into this digital world can be considered as "Digital Immigrants". Prensky (2005) explains: As Digital Immigrants learn to adapt to their environment, they always retain their "accent," that is, their foot in the past. Thus, according to Darrow (2009), the single biggest problem facing education today is digital immigrant instructors, who speak outdated language and struggle to teach a population that speaks an entirely new language. Digital Natives are fast in receiving information. They like parallel process with multi-task and prefer graphics rather than the opposite. They prefer random access and so function best when networked. They thrive on instant gratification and frequent rewards; prefer games to "serious" work. Thus, the connectivism theory is most appropriate for the present generation of teachers and students because major emphasis of the theory is not just the questions of "how" and "what" to learn, but also that of "where and when to learn". Thus, learning is made flexible, innovative and self-paced.

In today's digital age, information is continually being developed, distributed and acquired. Connectivism theory takes this fact into consideration. For learners, the ability to draw distinctions between important and unimportant information is vital. The ability to recognize when new information alters the landscape based on decisions made yesterday is also critical. Individuals are constantly making connections to ever changing and evolving networks. Conclusively, it can be inferred that the established theories of behaviorism, cognitivism and constructivism are inadequate to fit present learning environments, thus reflecting the need for the development of new learning theories like the connectivism.

Implications of Connectivism theory in creating 21st century learning environments

The implications of the connectivism theory which is applicable to e-learning and of particular interest to this paper can be summed up as follows:

- e-learning materials uploaded on the web should be organized into groups or categories to facilitate retention;
- mode of presentation of the e-learning materials uploaded in the web should be in different styles in order to facilitate transfer to long term memory;
- teachers should not overload short term memory by presenting too much material on the web;

These characteristics are required when using innovative teaching platforms that are ICT based in order to make the learning environment authentic, the teaching and learning process student-centred, collaborative, well guided, active and flexible.

The 21st century teachers

The 21st century teachers have greater advantage than teachers of earlier centuries. At their disposal are wide ranges of powerful teaching and learning ICT tools that never exist for teachers of even the immediate past century. For instance, some 20 years ago, a teacher cannot imagine that from the comfort of his bedroom, his office or even on transit, he can effectively communicate with his students and deliver instruction conveniently. The 21st century teacher is therefore always in pace with the rapid changes in the world of ICT. Perhaps, it in support of this assertion that Cox (2016) revealed that the 21st century teachers are aware of the ever-changing trends in technology and are in tune of what the future may bring to education. They eagerly look forward for innovations and are very concern with ICT tools that can help their students learn better and faster, indeed, they are concern with how to transform the teaching and learning environment. They know the best ICT tools and how, when and where to use them. Thus, it becomes obvious that teaching in the 21-century is an altogether different phenomenon; never before could learning be happening the way it is now everywhere, all the time, on any possible topic, supporting any possible learning style or preference. Indeed, teaching and learning is done at ease as any information the teacher may wish to pass to his students are at his fingertips. However, it is not every teacher of the present generation that qualifies to be addressed as the 21st century teacher, thus it is not every teacher of the present generation that can produce the 21st century student. To qualify as a 21st century teacher capable of producing a 21st century student, the following ICT attributes as listed by Palmer (2015) have to be demonstrated:

1. *Adaptive and innovative*
A 21st century teacher is ready to adapt to whatever comes their way. Teaching is a career that has pretty much stayed the same over the past few decades. The tools have changed over the years (Chalkboard has been replaced by white boards then Smartboards and then no boards (virtual classrooms). Textbooks have been replaced with tablets, but the traditional teaching and learning practice has not.
The 21st century teacher should be able to look at their practice and adapt based on the needs of their students. According to Bashir (2017) they must be able to adapt their teaching style to include different modes of learning, and adapt to new technology. They must be able to adapt to the curriculum and the requirements and be able to use their imagination to teach in creative ways.

2. *Lifelong Learner*
As new technology keeps emerging, learning becomes imperative for the teachers, thus the 21st century educator is a lifelong learner. They must remain abreast with modern innovations in ICT

especially as it affects teaching and learning environment. Even though they may still use the same course content vis-à-vis curriculum from years before, they are expected to know how to change it to keep up-to-date with what is current. A great educator will not only embrace technology, but willing to learn more about it, therefore they must keep learning.

3. Collaborate with others

Technology allows collaboration between teachers & students. Creating digital resources, presentations, and projects together with other educators and students will make classroom activities resemble the real world. Collaboration is expected to go beyond sharing documents via e-mail or creating PowerPoint presentations. Other platforms like the social media should be explored to ensure adequate collaboration. Thus, learning is deemed to be more effective when ideas and knowledge are shared with others. Sharing expertise and experiences, communicating and learning from others, and been able to reflect is an important part of the learning and teaching process. Consequently, an effective 21st century educator must be able to collaborate and work well in a team. Working with others is an important 21st century skill.

4. Use the social media

In the present 21st century, the use of social media like Facebook, WhatsApp, Twitter, Youtube, Skype, Imo, Instagram, Blogs, Palmchart, Google+, LinkedIn, Reddit among others offer the most cheapest, easiest and user friendly platforms of exchanging information on a wide range of subjects. They are therefore avenues that teachers can use to organize, share, communicate, announce and even assign test/assessment for students. To colleagues, they are platforms that can be used to share ideas, research and stay current with issues and updates in your field. Teachers can grow professionally and expand their knowledge as there is a great conversation happening every day, and going to conferences is no longer the only way to meet others and build professional learning networks.

5. Go Digital

Another important attribute is to go digital (paperless) -- organizing teaching resources and activities on one's own website and integrating technology bring students learning experience to a different level. Sharing links and offering digital discussions as opposed to a constant paper flow allows students to access and share class resources in a more organized fashion. Thus, the 21st century teacher should always learn to connect with like-minded individuals. Again, today's tools allow us to connect anyone, anywhere, anytime. Have a question for an expert or colleague? Simply connect via social media: follow, join, ask, or tell.

6. Learner-Centered Classroom for Personalized Instructions

As students have access to any information possible, there is no need to "spoon-feed" the knowledge or teach "one-size fits all" content. As students have different personalities, goals, and needs, offering personalized instructions is not just possible but also desirable. When students are allowed to make their own choices, they own their learning, increase intrinsic motivation, and put in more effort - an ideal recipe for better learning outcomes.

Thus, to produce the 21st century students, the teacher must not only possess the attributes listed above but must also guard against resisting change. Perhaps, it is in this regard that Obinna (2016) opined that the crop of the present teachers are failing to produce the desired students of digital age because of their

strict adherence to the age long talk and chalk method of teaching and learning which in most cases succeeded in confining the teaching and learning process to the conventional four corners of the classroom thus, producing mere listeners and sleepy students in the class.

The 21st century student

The current generation of students, otherwise referred to as the 21st century students, were born between 1980to 2000. On average, according to International Educational Advisory Board (IEAB) (2015) these students spend 5 to 6 hours each day saturated in social media, print, electronic, digital, broadcast and news media. They listen to and record music; view, create and publish Internet content; play video games; watch television; talk on mobile phones and instant message every day. Indeed, they are more concern with how to download, upload, share files and take selfie pictures.

Generally, these young people share the following characteristics as highlighted by IEAB (2015) and Cox (2016):

1. Their generation is the first to be surrounded by digital media. ICT has always been part of their lives, and because of this access, they are naturally incline to it. They are very much at home with digital technology and use it at ease. They expect it to support their learning and do what they need socially and academically. Indeed, the 21st century student can perform more functions with mobile phones, handheld devices and other wireless equipment than they can with traditional computers such as desktop. They often prefer computer-mediated communication and have developed their own language, which consists of acronyms like "LOL" ("Laughing out loud"), "ATM" ("At the moment"), "BTW" ("By the way") and other Internet slang. Today's technology allows the current generation of students to voice their opinions in ways that were not available in the past.

2. They are social and group-oriented. Relentlessly exposed to the world via the internet, they constantly network socially. In person, they travel in packs, shopping and playing together. Online, they seek opportunities to identify with other individuals on a smaller scale, joining communities and associating with peers around the world. They are highly collaborative; sharing what they learn with others actually helps them create their own personal identities.

3. They like to be in control. They pay little attention to traditional schedules, and they want to sit in a digital classroom to learn or in an office to work. This means that they prefer to use technology to study at any time of the day or night they prefer to telecommute from anywhere in the world.

4. They prefer to use the Internet to search for information worldwide and use hypertext links to divert from original searches and learn about new subjects. They prefer to "Google" or "Yahoo it".

5. They think differently. Technology itself is amazing to the older generation of students because whereas the previous generations first try to understand how a new technology works, the present generation of the 21st century student simply accept technology, adapt to it and manipulate it expertly. A student seeking for information simply "Googles" it. What Google is and how it works does not concern them; they use the tool to find the information they need.

These inherent characteristics exhibited by the current generation of students therefore make it imperative for the teachers of the present generation to seek for innovative ways with which they can serve them. Thus, the need to understand, adopt and abide by learning theories that best serve and meets the need and aspirations of the 21st century students.

Conclusion

The 21st century students are interested in learning environments that reflects their real-world experiences. They come to class equipped with a myriad of wired devices such as cell phones, laptops and iPads. They are constantly in touch, motivated by and responding to their changing world with the spontaneous exchange of knowledge. Thus, teachers that restrict teaching to the conventional, old-fashion "chalk and talk" approach will have difficulty in significantly reaching their target students and the teachers' impact will be significantly minimal in this current digital age. Thus, to keep abreast and meet up with the requirements of the present generation of students, the teacher be innovative and ready to learn new digital technology and how best to use it by abiding with digital learning principles such as the connectivism learning theory. This is against the backdrop that the existing established theories requires adequately match to modern day, digital learning environments to help provide for the changing nature of learning and learners due to the influence of technological advances.

Recommendations

On the basis of the unique characteristics of the 21st century students, the paper recommends that:

- ✓ School authorities should create teaching- learning environment that are digital friendly.
- ✓ The teachers should be given continuous training and re-training on current digital technology and how to manipulate them for enhancing their job.
- ✓ The teachers should abide by and implement the connectivism principles because of its potentials to significantly improve the teaching - learning process.
- ✓ Students should be encouraged to use ICT tools for research, assignment and other day-to-day academics tasks.

References

Adamu, M. J.(2016). *Comparative Effects of Synchronous and Asynchronous Instructional Approaches on College of Education Students' Achievement, Interest and Retention in Electrical Technology*, Unpublished PhD thesis, Federal University of Technology, Minna, Nigeria

Bashir, M. (2017 January, 5th). How to address e-learning deficiencies. *Daily Trust, Newspaper*, Pp32

Bessenyei, I. (2007). Learning and teaching in the information society. *E-learning 2.0 and Connectivism.* Retrieved November 8, 2014 from http://www.ittk.hu

Cox, J. (2016).Teaching Strategies: What a 21st Century Educator Looks Like. Retrieved January, 15th 2017, from https://www.teachHub.com

Darrow, S. (2009). *Connectivism learning theory: Instructional tools for college courses*. A thesis submitted in partial fulfillment for Master's Degree in Education. Western Connecticut State University Danbury.

Downes, S. (2010). New technology supporting informal learning. *Journal of Emerging Technologies in Web Intelligence*, 2(1), 27-33.

International Educational Advisory Board (IEAB) (2015). Learning in the 21st Century: Teaching Today's Students on Their Terms. Retrieved January, 15th

2017, from http://www.IEAB-WHITEPAPER040808

Obinna, O. W. (2016). Quality teaching and learning in Nigeria: the role of educational technology, *The Belt Journal of Education in Nigeria (BELJIN)*, 2(1), 127-131

Palmer, T. (2015). 15 Characteristics of a 21st-Century Teacher. Retrieved January, 15th 2017, fromhttps://www.edutopia.org/sites/

Prensky, M. (2005). Engage Me or Enrage Me: What Today's Learners Demand. *Educause Review, 40* (5), 1-6.

Siemens, G. (2004). *Connectivism: A Learning Theory for the Digital Age*. Retrieved November 8, 2014, from http://www.elearnspace.org

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3-10.

Siemens, G. (2006). Knowing knowledge. Retrieved November 8, 2014, from http://ltc.umanitoba