Enhancing Virtual Teaching and Learning through *Connectivism* in University Classrooms

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Received: April 14, 2023 Accepted: May 12, 2023 Online Published: August 15, 2023

doi:10.5430/jct.v12n4p116 URL: https://doi.org/10.5430/jct.v12n4p116

Abstract

It is argued that teaching and learning in the 21st century rely heavily on technology, especially in university classrooms. This theoretical paper contends that for students to be successful in university classrooms in the 21st century, both lecturers and students should effectively resonate with technology. This paradigm shift is not without one or two challenges which must be addressed since teaching and learning through technology has come to stay. Therefore, this study presents the proponent of connectivism theory to enhance virtual teaching and learning in university classrooms. The study is located within a transformative worldview and derives its argument from a theoretical viewpoint by positioning connectivism as a tool to enhance teaching and learning in 21st-century university classrooms. Conceptual analysis was employed to argue the place of connectivism as a tool to enhance virtual classrooms in universities. The connectivism theory was presented, and its assumptions were argued in relation to how it could be integrated into university classrooms. The study concludes that the diversity of nodes' interconnections, coherence of things and adaptation to constant change are dimensions that could enhance virtual classrooms. Therefore, concerted efforts of both lecturers and students in universities to improve these dimensions to transform virtual space in university classrooms.

Keywords: teaching and learning, virtual learning, virtual teaching, connectivism, university classrooms

1. Introduction

It is undeniable that technology has revolutionised the education sector. In the past, pupils were required to be physically present in classrooms in order to gain access to information and interact with their teachers. However, with the advent of online learning platforms, students can now receive instruction from anywhere in the world. This has been especially beneficial for working adults who wish to further their education without having to sacrifice their careers (Abrami et al., 2011; Weidlich & Bastiaens, 2018). The 21st century has seen a dramatic shift in how education is delivered. Technology has become an increasingly important part of the learning process, with higher education classrooms now incorporating a range of digital tools and resources (Hora & Holden, 2013; Genova, 2019). The COVID-19 pandemic has accelerated this trend, with many institutions moving to a relatively total virtual teaching and learning model (Emmanuel, 2021; Opstad & Pettersen, 2022). However, technology in teaching and learning processes cannot be taken for granted as it comes with its advantages and disadvantages.

The advantages of using technology in the teaching process are many and varied. To start with, using technology in a classroom setting can make learning more fun and engaging for students (Fung 2017; Downes & Bishop, 2012). It can also make it easier for teachers to deliver their lectures as they can use visual aids such as PowerPoint slides and videos (Umar et al., 2010). In addition, teachers can also make use of online platforms such as Blackboard, Teams, Google Classroom or Zoom to interact with their students even when they are not physically present in the classroom (Kaup et al., 2020). This was particularly important and adopted during the hike of the COVID-19 pandemic when physical distancing is necessary to prevent transmission of the virus. This time has increased the human's belief that technology is the way to cope with the changing world (Yamani et al., 2020). Even with all these advantages, there

are still some challenges associated with using technology for teaching and learning in universities. One of the key challenges is that some students do not have access to the necessary gadgets or platforms due to financial constraints (Hermanto & Srimulyani, 2021). Also, some systems are prone to technical hitches, which could disrupt the learning process altogether (AlTameemy & Alrefaee, 2021). Additionally, there is a risk that students will become disengaged if they are not given the opportunity to interact directly with their classmates and teachers (Mushtaque et al., 2014). Therefore, while technology plays a major role in making the teaching and learning process easier, faster, and more fun, its challenges should not be ignored, and the usage of technology needs to be enhanced to make sure that the virtual classroom also achieves its aims and objectives and fulfil curriculum prescription.

The university sector has long been known as a leader in virtual teaching. With the advent of new technologies, universities have been able to offer more courses and programs online. However, as the demand for online education has grown, so has the need for qualified lecturers who can teach in this new format. While this is a burning issue, there are some questions that need to be considered. For example, how can university lecturers ensure their students are engaged and motivated when they are not physically present in the classroom? Additionally, how can universities make sure that the curriculum is being effectively implemented when it is being delivered virtually? These are important questions that need to be addressed to ensure that online education quality remains high. In particular, lecturers need to ensure that their online lectures are engaging and informative, while students must be proactive in seeking information and participating in discussions. In order to achieve this, the place of connectivism as a practice among classroom stakeholders is not negotiable. However, through connectivism it could be possible to overcome challenges associated with virtual teaching and learning and ensure that university students still receive a high-quality education with or without contact sessions. In order to make an informed argument, as promised by this study, the following research was raised:

• How can connectivism be positioned to enhance teaching and learning in 21st-century university classrooms?

In order to answer the above research question, the following two research objectives were formulated to guide the study:

• The study explored the assumptions of connectivism theory based on the available literature.

• The study also argues how connectivism can enhance virtual teaching and learning.

2. Methodology

This study is a theoretical paper located in a transformative paradigm and derives its argument from a theoretical viewpoint. The transformative paradigm is a popular worldview for many studies, as it offers the potential to drastically change the way university classrooms are run (Mertens, 2007). In terms of epistemology, this paradigm believes that truths are multiple and socially constructed (Hurtado, 2023). In other words, what is considered knowledge is based on power relations (Freeman, 2017). For ontology, the transformative paradigm takes a constructivist stance, which means that reality is socially constructed, and in terms of methodology, this paradigm takes a critical approach where knowledge is used to challenge and change existing structures and practices (Romm, 2015). Lastly, this paradigm emphasises the ethic of care, which advocates for social justice (Romm, 2015). By using the transformative paradigm as the worldview for this study, it will be easier to present the argument for transforming the university classroom. In making the argument through this paradigm, lecturers and students are empowered to engage with technology in their classrooms to improve the learning experience. This type of engagement has been shown to improve student learning outcomes (Miedema, 2014). Therefore, the transformative paradigm is ideal for this study, as it can transform university classrooms from virtual learning challenges into engaging and effective learning environments.

In order to make sense of the augment, critical reasoning as an art of argumentation (Finocchiaro, 2010) was employed. This method is relevant because it allows the researcher to place points side by side and engages based on facts emanating from the concepts at stake. In other words, this particular way of thinking critically permits an individual to see both sides of an argument equally and objectively in order to make a sound judgement (Spurrett, 2005). Furthermore, by engaging in critical reasoning, coming to conclusions will be easier and more just because it will be done based on evidence collected by looking at all angles (Cottrell, 2017). In short, critical reasoning is a valuable tool at one's disposal because it allows for a more thorough understanding of an issue and a greater opportunity to find feasible and agreeable solutions for all parties involved. In this paper, the researcher used this approach to critically analyse the arguments for the need to emancipate university teaching and learning space through connectivism. This was done by presenting the theory of connectivism, its assumptions and how its

assumptions could be used to enhance virtual classrooms. Findings, conclusion and recommendations were also made based on the concepts of concern.

3. Theory of Connectivism as Data for this Study

Connectivism is a learning theory that emphasises technology's role in forming and developing knowledge (Thota, 2015; Goldie, 2016). According to connectivism, knowledge is distributed across a network of interconnected nodes, and learning occurs as learners interact with and add to this network (Kop & Hill, 2020). Proponents of this theory argue that knowledge is created and distributed through networks of connected individuals rather than being stored within individuals (Thota, 2015; Goldie, 2016; Kop & Hill, 2020). This theory has been influential in the fields of education and instructional design, and it has been used to explain how people learn in online environments (Siemens & Conole, 2011). Connectivism also has potential implications for the way we think about knowledge itself. In a connectivist view, knowledge is not contained within an individual; rather, it emerges from the interactions between individuals and their environment (Martínez & de Frutos, 2018). This perspective challenges traditional ideas about knowledge and learning and offers a new way of understanding how we form and use knowledge. It also challenges traditional ideas about how knowledge is acquired and transmitted. For example, suppose knowledge is seen as being distributed across a network. In that case, students may be more successful if they are able to tap into existing networks rather than trying to learn in isolation. In addition, if knowledge is constantly changing and evolving, educators need to pay close attention to developments in their field to ensure that their students receive accurate and up-to-date information.

In the 21st century, knowledge is changing at an unprecedented rate. New breakthroughs in science and technology are made daily (Elliott, 2019), and people's understanding of the world around them constantly evolves. To keep up with this rapidly changing landscape, classroom stakeholders need to rethink the way teaching, learning and knowledge are stored and acquired. The theory of connectivism provides a useful lens for understanding the changing nature of knowledge in the 21st century (Strong & Hutchins, 2009). As such, learning is not about acquiring new information but about connecting to existing networks of knowledge. This is particularly relevant in today's connected world, where people, most especially students, have access to vast amounts of information at their fingertips. Based on this, one can argue that to be successful in the 21st century, people need to be able to tap into these networks and make connections between different pieces of information to improve humanity. Therefore, by practising the theory of connectivism, classroom stakeholders can better adapt to the ever-changing landscape of knowledge and learn how to effectively navigate the 21st-century knowledge trend.

Based on the presentation of the theory in the preceding paragraphs, I argue that there are three main factors that contribute to the theory of connectivism. According to this study, these are regarded as the assumptions of connectivism: diversity of nodes' interconnections, coherence, and constant change.

3.1 Assumptions of Connectivism

This section presents the assumptions of connectivism, such as the diversity of nodes' interconnections (refers to the fact that there are many different types of devices and people that can be connected), coherence of things (refers to the fact that the connected nodes form a cohesive network), and constant change (refers to the fact that the world is constantly changing and evolving).

3.1.1 The Diversity of Nodes' Interconnections

Based on the above theoretical presentation, one can argue that connectivism is founded on the belief that knowledge is created through the interaction of nodes in a network. These nodes can be people, devices, or even ideas. The diversity of nodes in a connectivist system refers to the fact that many different types of devices and people can be connected (AlDahdouh et al., 2015). This means that there is a greater potential for information and knowledge to be shared. The diversity of nodes also makes it possible for connectivism to adapt and evolve over time (Kropf, 2013). As new technologies and ideas emerge, they can be quickly incorporated into the network, ensuring that the system remains relevant and responsive to the needs of its users. However, the diversity is not only about the different types of nodes that can be connected but also about the different ways in which they can be connected. This flexibility allows for a greater potential for information and knowledge to be shared between nodes. For example, a person may be connected to a computer, which is in turn, connected to a printer. The printer may then be connected to a fax machine. In this way, the diversity of nodes makes it possible for the information to flow between different devices and people (Siemens, 2007). The potential for information and knowledge sharing increases as more nodes are connected. This makes connectivism an important tool for promoting learning and knowledge transfer because it

forms the idea that knowledge is not simply confined to an individual brain but is distributed across a network of nodes. This network can be as small as a group of friends or as large as the entire internet, allowing for a greater flow of information and knowledge. When one person learns something new, they can share it with others in the network, and vice versa. This makes it possible for connectivism to be an incredibly powerful tool for learning.

3.1.2 Coherence of Things

In connectivism, coherence refers to the connected nodes forming a cohesive network (Downes, 2019). This network can then be used to share information and knowledge more effectively. Connectivism is based on the premise that knowledge is distributed across a network of connected nodes, and that learning occurs when new connections are made between nodes. The concept of coherence is important because it helps ensure that the network effectively shares information and knowledge. Without coherence, the network would be composed of disconnected nodes, which would make it difficult for information and knowledge to be shared effectively. Therefore, coherence is essential for connectivism to achieve its goal of facilitating learning through the sharing of information and knowledge (Mattar, 2018). Consequently, connectivism provides a more effective means of sharing and exchanging information than traditional methods because it offers an important advantage in terms of scalability, relies on networks of connected nodes, and makes it an ideal platform for applications such as social networking and online learning.

3.1.3 Constant Change

The constant change in connectivism refers to the fact that the world is constantly changing and evolving (Siemens, 2007). This means that the way people connect and share information also needs to evolve constantly to keep up with the changes. Staying on top of the latest changes can ensure that connections are as strong and effective as possible. In addition, continually adapting to new methods will enable academics to stay ahead of the curve and anticipate future changes. Therefore, as presented above, one can argue that it is essential to constantly update new communication methods to keep up with the latest changes. This means that people need to quickly adapt to new technologies and ways of sharing information and connecting with people worldwide to share knowledge and ideas. Therefore, there is a need for a constant update in the way people connect and share information also needs to keep up with the changes.

4. The Connectivism Assumptions and Virtual Teaching and Learning

This section presents the relationships between the assumption of connectivism and virtual teaching and learning in university classrooms. This is done under the following sub-headings: diversity of nodes' interconnections and virtual teaching and learning, Coherence of things virtual teaching and learning, and Constant change and virtual teaching and learning.

4.1 Diversity of Nodes' Interconnections and Virtual Teaching and Learning

There has been an increasing trend towards virtual teaching and learning in university classrooms. This shift has been driven partly by the advent of new technologies, which have made it easier for students and teachers to connect online (Criollo-C et al., 2021). However, the effectiveness of virtual teaching and learning depends in large part on the diversity of nodes' interconnections. In other words, it is important for students and teachers to be able to connect with each other in a variety of ways. For example, they should be able to share files, participate in discussion forums, and join video conferences. Based on this, one can then argue that the more diverse the nodes' interconnections are, the more effective virtual teaching and learning will be. This is in consonance with the argument of (Shikuku, 2019) that students with adequate knowledge of the internet of things are more exposed to knowledge in their own space. Therefore, the diversity of nodes' interconnections can enhance virtual teaching and learning in university classrooms by providing more opportunities for interaction and collaboration. By connecting students with different backgrounds and perspectives, nodes create a rich learning environment where students can learn from each other as well as from the teacher (Lund & Eiliv-Hauge, 2011). In addition, nodes can also be used to connect university classrooms with outside experts, providing students with access to a wealth of knowledge and experience. The diversity of nodes' interconnections thus enhances virtual teaching and learning in university classrooms by expanding the possibilities for interaction and collaboration.

4.2 Coherence of Things and Virtual Teaching and Learning

Coherence has been defined in various ways, but a common thread throughout the literature is that coherence contributes to the organisation and structure of something (Locke & Golden-Biddle, 1997, Gang et al., 2014). In the context of virtual teaching and learning, coherence refers to the synchronisation of different elements within the

online environment (Downes, 2019). This might include ensuring that instructional materials are aligned with learning objectives, that assessment items accurately measure student progress, and that students clearly understand how they are expected to interact with their peers and instructors. The literature on coherence is clear: when virtual teaching and learning environments are coherent, students are more likely to engage with the material and make progress toward their learning goals. Therefore, it is essential for educators to consider coherence when designing and delivering online instruction. This means using technology in a consistent and understandable way for students. For example, if you are using a virtual whiteboard to explain a concept, make sure that the board is easy to read and that the buttons are intuitive to use. Lecturers should also avoid using too many types of technology in a single lesson, as this can confuse students. Instead, focus on mastering a few key tools and using them in a variety of ways. Creating a coherent virtual learning environment can give students the structure they need to succeed.

While the internet and various digital devices have enhanced communication and collaboration among students and teachers, there is still a need for coherence in order to optimise virtual teaching and learning. Literature supports that coherence among participants in a virtual setting helps to create a cohesive learning environment (Rogers, 2000). Indeed, research has shown that coherence plays an important role in online problem-solving tasks, with students who displayed higher levels of coherence outperforming their less coherent peers (Cammarata et al., 1988). Similarly, teacher coherence has been found to facilitate student engagement in online courses (Cai et al., 2014). Thus, it is clear that creating a sense of coherence among students and teachers is essential for effective virtual teaching and learning.

4.3 Constant Change and Virtual Teaching and Learning

The landscape of higher education is in a state of flux, with the constant change becoming the new norm. This can be seen in the way universities increasingly rely on technology to deliver lectures and course materials virtually. While this shift has brought many benefits, it has also presented challenges for both students and lecturers. In order to adapt to this new landscape, it is essential that both groups are open to change and willing to embrace new technologies. To support this argument, a growing body of literature supports the use of internet-based tools to enhance virtual teaching and learning in universities (Weidlich & Bastiaens, 2018; Yamani et al., 2020; Kaup et al., 2020). This literature provides valuable insights into how best to utilise these tools to maximise their potential and overcome any challenges. As such, it is an essential resource for anyone involved in higher education today, which must be updated from time to time. This means that both students and lecturers must be open to change to ensure that the quality of virtual education remains high. By embracing constant change, universities hope to maintain their position at the forefront of this rapidly growing field.

5. Discussion of Arguments

In the current technology-driven world, virtual teaching and learning have become more prevalent than ever before. Though some may argue that face-to-face instruction is superior, it is undeniable that virtual learning has its own advantages, particularly regarding student performance. One key factor that contributes to students' success in a virtual setting is the interconnectedness of nodes, which allows for adequate knowledge sharing and exchange (Alsharo et al., 2017). This interconnectedness also results in increased exposure to a variety of perspectives and ideas, ultimately leading to improved critical thinking skills (Shikuku, 2019). In addition, the argument shows that virtual learning environments often allow for more personalised instruction, as teachers are able to tailor their lessons to individual students' needs.

The study also argues that students who used a consistent or coherent set of tools and resources for their virtual learning may experience better academic results than those who did not. This is in consonant with the finding that consistent use of internet-based tools and resources helps to create a cohesive learning environment for students (Englert et al., 2007; Jeong et al., 2010). In other words, students who use the same tools and resources across different class sessions are more likely to feel comfortable and confident in their learning ability. This finding underscores the importance of coherence in virtual teaching and learning. When educators are able to create a cohesive learning environment for their students, they are more likely to see positive academic outcomes. This is one more reason why it is so important for educators to carefully select the internet-based tools and resources they use in their classrooms.

Lastly, the study shows that adaptation to constant change may enhance virtual teaching and learning towards academic performance. This is supported by the study that revealed that academic success is attributed to the effective use of information and communication technology, instructional design, and teachers' pedagogical practices (Nwosu et al., 2018; Nguyen et al., 2018). The finding is instructive in that they underscore the importance of

adaptation in times of change and how virtual teaching and learning can be used to improve academic performance. In an ever-changing world, it is essential that updated methods of teaching and learning are adopted to keep up with the times. Virtual teaching and learning are one such method that has the potential to greatly improve academic performance. With the right tools and techniques, lecturers can ensure that students receive a high-quality education that will prepare them for success in the 21st century.

6. Conclusion and Recommendations

This study highlights the importance of promoting interconnectivity, coherence, and adaptability in virtual classrooms for optimal student engagement and learning outcomes, with a conclusion that the diversity of nodes' interconnections, coherence of things, and adaptation to constant change are dimensions that could enhance virtual classrooms. Therefore, concerted efforts of both lecturers and students in universities to promote nodes' interconnections, maintain the coherence of course material, and adapt to constant change are necessary to transform the virtual space in university classrooms. Based on the conclusion that the diversity of nodes' interconnections, coherence of course material, and adaptation to constant change could enhance virtual classrooms, the following recommendations are proposed:

- Encourage interactive learning: Lecturers should encourage interactive learning by incorporating various tools, such as discussion forums, group projects, and online polls, to facilitate nodes' interconnections. This can encourage students to actively engage with each other and develop connections that will enhance their virtual learning experience.
- Create a flexible and adaptive curriculum: Universities should aim to maintain the coherence of course material while being flexible and adaptive to changes in the virtual environment. This can be achieved by regularly updating the course content to reflect current trends, using diverse teaching methods, and offering various resources that can adapt to the evolving needs of students and the virtual classroom.
- Provide adequate resources: Universities should ensure that students have access to the necessary technological resources to support their virtual learning experience. This includes providing access to reliable and fast internet, providing technical support, and ensuring that students have access to relevant software and hardware. This will enable students to fully participate in virtual classrooms and engage with the material in a meaningful way.

7. Limitations

While the study's findings are significant, they are also limited in scope. Future research should aim to expand the study's conclusions by investigating other potential dimensions that could improve the virtual classroom experience empirically. Only through continued research and effort will universities be able to provide an optimal learning environment for all students. Secondly, the study only focuses on three dimensions that could enhance virtual classrooms. Other potential dimensions that could improve the virtual classroom experience may have been overlooked, and further research is necessary to explore those dimensions. Thirdly, the study does not account for the varying technological resources that may be available to students and lecturers in different institutions. Thus, the study's conclusions may not be applicable in universities with limited technological resources, such as those in developing countries. And finally, the study does not consider the impact of individual differences, such as learning styles and preferences, on the virtual classroom experience. Therefore, further research is necessary to explore how individual differences could affect the dimensions that enhance the virtual classroom experience.

Data availability: The manuscript has no associated data.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Consideration: The article is a theoretical argument; hence no ethical approval or consideration is needed. All ideas are based on theoretical and argumentative inference.

Funding/Support: Not applicable.

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