CONNECTIVISM IN THE METAVERSE AND ITS IMPLICATIONS FOR THAI EDUCATION*

ทฤษฎีการเชื่อมโยงความรู้กับการประยุกต์ใช้เมตาเวิร์ส ในระบบการศึกษาไทย

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Abstract

This academic article investigated the theory of connectivism and metaverse based learning in Thai education. Connectivism, or connected learning theory, argues that learning can take place in a technological environment as users access information stored in physical or virtual nodes and link this information together. The metaverse is an immersive virtual environment which enables learners to access and link information from a wide variety of notes. To date, there is not much firm evidence on the efficacy of multiverse-based virtual learning, but the theory of connected learning strongly suggests that it is a tool that could be used to improve learning outcomes. Thai education could gain a significant benefit from the adoption of connected learning through the metaverse, but there are a variety of challenges, particularly technological readiness, and teacher preparedness for the virtual learning environment.

Keywords: Connectivism; Metaverse; Thai Education

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บทคัดย่อ

บทความวิชาการฉบับนี้เป็นบทความที่วิเคราะห์ถึงทฤษฎีการเชื่อมโยงความรู้กับการเรียนรู้โดยใช้เมตาเวิร์สเป็นเครื่องมือในระบบการศึกษาของไทย การเชื่อมโยงความรู้หรือการเรียนรู้แบบเชื่อมต่อได้นิยามว่าการเรียนรู้สามารถเกิดขึ้นได้ในสภาพแวดล้อมที่มีการประยุกต์ใช้เครื่องมือทางเทคโนโลยี เมื่อผู้เรียนเข้าถึงข้อมูลก็จะมีการเชื่อมโยงความรู้ต่าง ๆ เข้าด้วยกัน เมตาเวิร์สเป็นการสร้างสภาพแวดล้อมทางการเรียนรู้ให้เสมือนจริง ช่วยให้ผู้เรียนสามารถเข้าถึงและเชื่อมโยงข้อมูลที่หลากหลาย แม้ในปัจจุบัน ยังไม่มีหลักฐานที่แน่ชัดเกี่ยวกับประสิทธิภาพของการเรียนรู้เสมือนจริงผ่านเมตาเวิร์ส แต่เมตาเวิร์สก็เป็นเครื่องมือในการเพิ่มผลลัพธ์ในการเรียนรู้ได้อย่างมีประสิทธิภาพตามทฤษฎีการเรียนรู้แบบเชื่อมต่อ ระบบการศึกษาในไทยมีแนวโน้มที่จะได้รับประโยชน์อย่างมากจากการนำเมตาเวิร์สมาประยุกต์ใช้เพื่อประโยชน์ในการสร้างการเรียนรู้ แต่ก็ยังมีความท้าทายหลายประการ โดยเฉพาะอย่างยิ่งความพร้อมทางเทคโนโลยีและการเตรียมความพร้อมของครูสำหรับสภาพแวดล้อมการเรียนรู้แบบเสมือนจริง

คำสำคัญ: ทฤษฎีการเชื่อมโยงความรู้; เมตาเวิร์ส; ระบบการศึกษาไทย

Introduction

This paper investigates the theory of connectivism and how it applies to modern network learning through tools such as the Metaverse. Like most countries around the world, Thailand experienced a rapid shift to online learning during 2020 and 2021, as the COVID-19 pandemic forced intermittent school closures and general lockdowns (Widyastari et al., 2022). This rapid change did have some observed negative effects on student educational outcomes and mental and physical health, due to the speed at which the changes were forced to occur, like effects observed around the world (Widyastari et al., 2022). However, the rapid shift to online learning has also accelerated a growing trend in online learning and social learning around the world. Most recently, research has begun into so-called 'metaverse' learning environments, in which learning takes place within an immersive technology-driven environment, which affords students many kinds of learning opportunities, such as collaborative and gamified learning in a virtual environment (Jovanović & Milosavljević, 2022). In Thailand, several new startup companies like Aniverse Metaverse have begun to develop tools and platforms for metaverse-based learning in Thai schools, seeking to develop communities of over one million learners (Tortermvasana, 2022). Thus, although social and online learning in Thailand had a difficult start during the COVID-19 pandemic, it is

increasingly likely that the connected learning and social learning model of the metaverse will become more embedded in learning at all levels soon.

In addition, The VUCA world has had a significant impact on Thai education as well. VUCA stands for Volatility – Uncertainty – Complexity – Ambiguity (Bennett & Lemoine, 2014). The VUCA environment necessitates that Thai education to be more adaptive and flexible. The Metaverse can help with this by offering adaptable virtual settings that let educators and students take advantage of new possibilities and difficulties. The Metaverse may provide Thai education a helpful and adaptable framework for coping with the possibilities and problems of the VUCA environment. The Thai education system may give students more relevant and interesting learning experiences that will better prepare them for the future by adopting the Metaverse.

The objective of this research is to evaluate the learning theory of connectivism and its application to learning within the metaverse and how this could affect education in Thailand. Using a literature review approach, the study focuses on current research into connected learning and how connected learning could be used in Thailand to improve student learning outcomes, as well as its potential dangers.

Connectivism

Connectivism is the theory of learning which acknowledges the role of technology in the learning process and outcomes of individuals (Aresta et al., 2011; Goldie, 2016). The theory of connectivism was first proposed in the early 2000s, toward the beginning of online education and the growth of the Internet (Siemens, 2005). Downes (2005) introduced the principle of distributed knowledge, or knowledge which exists ‘out there’ in a network of interconnected nodes which the individual can access via various routes. Connected knowledge is one form of distributed knowledge, in which knowledge is derived from perceiving and understanding the connections and relationships between different pieces of distributed knowledge, which are not independent but exist in relation to each other Downes (2005). Siemens (2005) extended this principle of connected knowledge, arguing the learning process itself can result from the learner accessing distributed knowledge, integrating it, and relating it. This principle of connected

learning is a fundamental rejection of social cognitive theory (SCT) and related social theories of learning, which argue that learning occurs predominantly through interactions between the learner and other individuals (Goldie, 2016). Thus, from its start connectivism was a fundamental change in the theory of knowledge and learning that had prevailed to date.

There are eight key principles of connectivism as set out by Downes (2005) and (Goldie, 2016). These principles can be stated as:

1. learning and knowledge rest in diversity of opinion. 2. Learning is a process of connecting specialized nodes or information sources. 3. Learning may reside in non- human appliances. 4. Capacity to know is more critical than what is currently known. 5. Nurturing and maintaining connections is needed to facilitate continual learning. 6. Ability to see connections between fields, ideas, and concepts is a core skill. 7. Accurate, up-to-date knowledge (currency) is the aim of all connectivist learning activities. 8. Decision-making is a learning process. (Goldie, 2016)

Knowledge within connectivism is conceptualized as a network of nodes including students, books, other people, websites, and other sources of knowledge (Goldie, 2016). The process of learning, therefore, is the process of creating links between these nodes through activities such as research, questioning, and interpretation (Aresta et al., 2011). In effect, therefore, the learning process of connectivism is not a process of observation and mimicry, as in SCT (Bandura, 2001), but a process of creation of the network of knowledge itself (Aresta et al., 2011). However, there are some differences between Connectivism and SCT, which are Connectivism places a strong emphasis on the value of networks and connections in learning. It implies that learning happens because of the development and application of links between experiences, information, and people. On the other hand, social cognitive theory places a strong emphasis on how social and cultural variables influence how people learn and behave. It asserts that seeing others and mimicking their behavior have an impact on learning.

To some extent, connectivism was relevant as a learning theory prior to the development of online and social learning, because knowledge has always been distributed in networks of sources such as books and people (Aresta et al.,

2011). However, this theory became much more relevant to learning with the onset of online learning and social learning, in which a core part of the learning practice became the use of networks of information and people to seek out, relate, and interpret knowledge (Aresta et al., 2011). This study is most concerned with connectivism in the context of the metaverse.

The Metaverse

Formally, a metaverse can be defined as an interconnected web of social, networked immersive environments in persistent multiuser platforms. It enables seamless embodied user communication in real-time and dynamic interactions with digital artifacts. (Mystakidis, 2022). These interconnected environments are based in technologies such as augmented reality (AR) and virtual reality (VR) (Mystakidis, 2022). Such technologies manipulate perception and provide users with affordances, which can be used to perform certain actions, access knowledge and information, and interact with other users (Sparkes, 2021; Mystakidis, 2022).

The concept of the metaverse is initially attributed to the cyberpunk science fiction writer Neal Stephenson, who coined the term in his 1992 novel Snow Crash to describe a fully immersive virtual social environment (Sparkes, 2021). This notion itself drew on older works in the same genre but was characterized in Stephenson's work by the democratization of space, compared to its limited access in earlier works (Sparkes, 2021). The first metaverse technologies emerged in the early 2000s (Mystakidis, 2022). These early metaverses were built on platforms such as Second Life, a two-dimensional (2D) immersive, avatar-based, and open virtual world which placed few restrictions on the users' interaction, physical presentation, or other aspects (Kemp & Livingstone, 2006). These early metaverses, while relatively open compared to earlier technologies, were limited in several ways, particularly in the sensory and perception affordances offered to users (Mystakidis, 2022). The development of three-dimensional (3D) AR and VR technologies beginning in the early 2010s increased the immersion and interaction capabilities of metaverse platforms, along with their optical fidelity, improving the overall usability and experience of such tools (Mystakidis, 2022). Today, metaverse platforms are increasingly sophisticated

in their design and user affordances, offering users opportunities to engage with the virtual world in a way that was not possible previously (Sparkes, 2021).

Connectivism and the Metaverse

The construction and affordances of metaverses for learning are consistent with the principles of connectivism and connected learning (Mystakidis, 2022). Metaverses are constructed in such a way as to facilitate both social interaction and access to knowledge sources (Díaz et al., 2020). Metaverses enable the connection of nodes and accessing new knowledge (Phakamach et al., 2022), the activity which is central to connected learning (Siemens, 2005; Goldie, 2016). There are two obvious differences between metaverse-based connected learning and other forms of connected learning: the availability of 'nodes' for learning and the flexibility and ways with which they can be connected. These differences mean that the metaverse is potentially a much stronger tool for connected learning than other interactive learning technologies (Czerkawski & Berti, 2021; Maccallum & Parsons, 2019; Zhong & Zheng, 2022)

One of the biggest differences in the metaverse as a connectivist learning tool compared to earlier online and social learning technologies is in the development of the 'nodes' in which knowledge is stored and can be accessed by users. In the earliest iterations of the metaverse, such as Second Life, the learning environment was structured much like a traditional learning management system (LMS) (Kemp & Livingstone, 2006). In this context, individuals could access learning materials through a dashboard, but these learning materials were both limited to what the instructor supplied and had to be sought out and accessed by the learner themselves (Kemp & Livingstone, 2006). Over time, with the development of more sophisticated immersive environments, users gained more access to different sources of information, for example through the incorporation of search engines and broader sets of information and knowledge (Loureiro & Bettencourt, 2010). In modern metaverse environments designed for learning, which some authors have termed Edu-Metaverses, there are many more information nodes available to users (Zhong & Zheng, 2022). This is in part due to more extensive consideration of how immersive learning environments should be designed, including questions like what materials should be provided to students

and how they should be arranged (Czerkawski & Berti, 2021). It is also due to changes in the design of metaverses, with the introduction of artificial intelligence (AI) and deep learning, which increases the amount of information available to individuals and positions this information where they can easily access it (Rospigliosi, 2022a). Thus, the edu-metaverses of today offer learners a wealth of nodes for learning, which are dynamically provided based on AI and deep learning as they are required.

The second major difference in the metaverse as a connected learning environment is the affordances it offers for the process of linking nodes, which is the process by which connected learners learn (Goldie, 2016). Older social learning environments such as Second Life did offer the learner the ability to interact with other users and other sources of knowledge (Kemp & Livingstone, 2006), but there was no way to really manipulate or visualise this knowledge. More recent metaverse applications allow users the ability to interact with other users, as have traditional platforms, but they also offer the opportunity for gamified interaction with the environment and knowledge itself (Zhong & Zheng, 2022). The ability to physically 'act' within the metaverse also offers more opportunities for linking nodes, as individuals can interact with and physically practice skills (Lee & Hwang, 2022). For example, Lee & Hwang (2022), who investigated metaverse-linking in the context of teacher education, showed that metaverse-enabled learning could include activities such as practicing teaching in a classroom, with virtual AI-driven 'students' acting in similar ways to real students. Thus, the potential for connected learning through metaverse technologies is significant, as the tool can enhance the connection process of learning.

Implications for Thai Education

Thailand's National Education Strategy in the year 2017 to 2036 calls for enhancement of teaching and learning to address the need for 21st century skills, meeting challenges such as the need for sustainable development, increasing international cooperation through the ASEAN Economic Community, the Digital Revolution and Fourth Industrial Revolution, and the twin challenges of an ageing population and rapidly growing and unsustainable economic growth. This strategy implies that new teaching practices and learning tools are needed to meet

substantial and multifaceted challenges. The technological potential of the metaverse, as discussed above, is that it could enhance connected learning. However, some authors have disputed this potential, suggesting that the metaverse is a fad, or could even be detrimental to the learning process. This raises the question of what connected learning in the metaverse could mean for Thai education. Specifically, how could the metaverse be used in Thai education, and are the Thai educational system, teachers, and students ready for metaverse-based connected learning? While there have been only a few studies on these questions in Thai contexts, studies from other places offer some insights into what Thailand's experience could be.

One of the most important aspects of the metaverse for Thai learning is the collaborative aspect of the learning process. Metaverse spaces are inherently collaborative, with users co-creating not just knowledge, but the actual reality around them (Mystakidis, 2022). As a result, such tools may excel at providing students with the opportunity to collaborate with each other and with other sources of knowledge, such as subject matter experts and AIs who can be accessed within the virtual world, in effect creating a social learning environment that would not otherwise be available to them (Jovanović & Milosavljević, 2022; Mystakidis, 2022).

There are some serious questions to be asked about the efficacy of metaverse-based connected learning. One group of authors conducted a comprehensive bibliometric analysis on the question of learning effectiveness within the metaverse (Tlili et al., 2022). The authors noted that many of the claims of teaching and learning effectiveness for the metaverse were unsupported by the evidence. For example, there were no studies on learning outcomes for students with disabilities, and few studies on the effectiveness of mobile and hybrid learning. Thus, while these learning practices may be effective, in practice there is not yet enough evidence to prove their efficacy (Tlili et al., 2022). At the same time, there is some evidence that metaverse-based learning could be very useful for meeting Thailand's educational challenges. With growing technology use and technological abundance, metaverse-based virtual learning could be used to vastly increase access to educational environments in Thailand (Phakamach et al., 2022). Metaverse might be used by teachers to build virtual classrooms in which

students interact with one other and the teacher in a 3D environment by collaborating on virtual assignments and simulations, students may practice cooperation and collaboration in a secure setting. This could have a significant positive impact on the equity and access to education, which is a significant goal of Thailand's educational strategy. At the same time, there are also some serious challenges in implementation of metaverse-based connected learning in Thailand.

Technological readiness is a potential limitation to metaverse application in Thai education. Trials of metaverse-based education platforms have shown that their implementation and design has some significant technological challenges, which require a lot of technological knowledge and resources to overcome (Jovanović & Milosavljević, 2022). These technological demands include both mixed reality requirements such as rendering engines and AI-based tools like intelligent agents to construct and deliver lessons, which is much more extensive than earlier applications (Rospigliosi, 2022a). In addition to the technology challenges, there is also the problem of curriculum design for use in metaverse and immersive environments, which is much more detailed than in the classroom because the entire environment must be constructed (Czerkawski & Berti, 2021). Understanding how users interact and how this interaction can facilitate learning is a long-standing problem in metaverse-based learning environments as well, and one which is critical to overcome to provide an effective learning environment (Loureiro & Bettencourt, 2010).

There is also the question of teacher readiness for metaverse-based learning. A study on pre-service teacher preparedness for metaverse-based learning environments has shown that although pre-service teachers often have enthusiasm and a lot of ideas about how these environments can be used, they tend to lack experience (Maccallum & Parsons, 2019). This is particularly relevant since teachers are tasked not only with teaching but also with materials and curriculum design (Czerkawski & Berti, 2021). There are some ways in which teachers may gain experience, particularly since metaverse-based teacher education is now possible (Lee & Hwang, 2022). However, Thailand is already known to have a problem with teacher training, which is particularly weak in educational technology usage and applications in the classroom (Kiatkheeree, 2018). This raises some serious questions about how Thai teachers can be

prepared for use of the metaverse in teaching. However, such technology uses can be incorporated into teacher training (Lee & Hwang, 2022), so connected learning in the metaverse should not be discarded simply because of the need to train teachers.

Thai students may be much better prepared for connected learning in the metaverse than their teachers. Younger people have already had much more exposure to metaverse and metaverse-adjacent technologies, which may be used for entertainment in younger audiences (Maccallum & Parsons, 2019). For example, many younger students are likely to have played games such as Minecraft and Roblox, which are open-world immersive environments oriented toward creative gameplay (Rospigliosi, 2022b). Thus, while students may not have significant experience in educational metaverse environments, they are likely to be familiar with the interaction and affordances of the metaverse itself for learning. The full potential of Metaverse in education is still being explored, and new uses and applications will likely emerge as the technology continues to develop.

Conclusion

The use of metaverse technologies for education has some significant potential advantages for Thailand. Such technologies enable connected learning, which offers learners vastly increased amounts of network knowledge and interactive and integrative learning opportunities. Furthermore, the virtual environment of the metaverse provides the sense of 'being there', enabling learners to interact with teachers, experts, other learners, and even AIs to further their learning and knowledge creation. This could have a significant advantage for Thailand, and its ability to achieve its educational strategic demands. It could also have a significant advantage in terms of increasing access to an equity of education among Thai learners. At the same time, there are some significant technological challenges and readiness limitations of teachers particularly in the use of educational metaverse technologies. There is a need to develop technological platforms, design curricula and learning environments, and refine teaching practices and knowledge to enable teachers to put their good ideas of how to use the metaverse in education to work. Overcoming these challenges will be significant, but it is not impossible. A first step is improving teacher training in

Thailand, including both preservice and in service training, to include teaching in virtual environments. As development of educational metaverse platforms is already underway, development of curriculum and learning environments could also begin.

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