Pedagogies and Practice for Technology Enhanced Learning

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By

Afzal Sayed Munna
and Md Sadeque Imam Shaikh

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CHAPTER 1

THEORIES PRINCIPLES AND MODEL OF TECHNOLOGY ENHANCED LEARNING (TEL)

1.1 Introduction

TEL (technology-enhanced learning) is a practical education strategy that uses digital tools to boost classroom performance. Because of its many benefits, this cutting-edge method is increasingly being used in today's classrooms. By removing barriers based on location, TEL makes education available to people worldwide (Irons and Elkington, 2021). Online courses and digital materials make high-quality educational resources and possibilities available to those in underprivileged or rural places (Bayne, 2015). TEL allows students a great deal of independence, enabling them to study whenever and wherever they like. This flexibility benefits people with busy schedules who cannot attend regular sessions, such as working professionals, parents, and others. TEL often integrates AI with data-driven algorithms to personalize the learning experience. Customization helps students learn at their own speed and master material more thoroughly (Gregory and Lodge, 2015).

Some of the benefits of technology-enhanced Learning include better accessibility, adaptability, personalization, engagement, cost-efficiency, scalability, the prospect of continuous Learning, data-driven insights, global cooperation, and environmental benefits. TEL is vital to contemporary education because it paves the way for students of varying ages and socioeconomic backgrounds to benefit from individualized, high-quality educational opportunities (Popenici and Kerr, 2017). The current report will cover the main concepts of technology-enhanced learning, how these can be implemented for more comprehensive learning initiatives, and how these can help in the education sector. This will also cover the practices that are used to implement TEL.

1.2 Theories Principles and Model of Technology Enhanced Learning

According to Bower (2019), technology-enhanced learning (TEL) is a rapidly developing field that seeks to improve instruction via the strategic application of digital tools. It includes many different theories and frameworks for planning, implementing, and assessing educational initiatives that use technological means. This discussion will analyze the significance of TEL ideas, concepts, and models in contemporary classrooms.

Dunn and Kennedy (2019) stated that knowledge is seen as something that students actively create via their interactions and experiences. For TEL, this means facilitating settings where students may interact with course materials and one another to build knowledge. TEL frequently uses online forums, group projects, and collaboration tools because social constructivism emphasizes the significance of social ties in learning. All students, including those with special needs, should have equal access to TEL. The need to create digital products and platforms that adhere to accessibility standards like the Web Content Accessibility Guidelines (WCAG) is highlighted by this idea (Sweller, 2020).

Sweller (2020) further argues that TEL must be adaptable because each student has unique requirements and preferences. Individualized learning plans and adaptive testing can improve students' motivation and achievement. Students are more interested and willing to participate actively in an interactive classroom. Quizzes, simulations, and online forums are examples of interactive components that might be incorporated into TEL to increase student engagement and learning (Al-Rahmi et al, 2019). In TEL, it is vital to have efficient feedback channels and assessment methodologies in place. Timely and constructive feedback helps students to evaluate their progress and adjust, while a range of assessment methods accommodates a variety of learning styles and goals. Modern TEL relies heavily on collaborative efforts. Video conferencing, document sharing, and online group workspaces are all examples of asynchronous and synchronous learning tools that students should have access to (Valverde et al, 2020).

1.3 Models for TEL Implementation

Flipped Classroom Model:

By employing digital resources (videos, books, etc.) outside of class, students can "flip" the conventional in-class education model and instead

engage in active learning, discussion, and problem-solving during class time. The flipped classroom paradigm uses technology to provide a more engaging and interactive learning environment (Choudhury and Pattnaik, 2020).

1.4 Significance of TEL Theories, Principles, and Models

Effective digital learning experiences may be designed and implemented with the help of TEL ideas, concepts, and models. They provide valuable insight for teachers and authors of educational curricula as they consider how best to use technology in their lessons. TEL theories and principles provide pedagogical advice to ensure that technology is utilized in line with established learning theories and best practices (Sweller, 2020). The efficiency of online classrooms benefits from this. The SAMR framework encourages educators to try new approaches in the classroom. They question established practices and encourage teachers to experiment with alternative strategies for implementing technology in the classroom (Blau, Shamir-Inbal, and Avdiel, 2020).

The growth of teachers requires an understanding of TEL principles and models. Teachers who master the art of incorporating useful technological tools into their lessons may see an uptick in student achievement (Turnbull, Chugh and Luck, 2021). The theoretical and practical underpinnings of TEL are the ideas, concepts, and models that makeup TEL. As a team, they collaborate with teachers and instructional designers to develop online classrooms that meet the needs of all students. These guidelines are essential in this age of fast technological development to maximise the benefits of technology in education (Sweller, 2020).

1.5 TEL in 21st Century

As per Bower (2019), Educators and educational institutions have much to gain by exploring the large field of technology-enhanced Learning (TEL). Everything that helps people learn more effectively is considered technology-enhanced Learning. TEL can relate to analog or digital technology, although in recent years, digital TEL in various educational software has become the norm in schools (Hwang, Lai, and Wang, 2015). Education and educational institutions are profoundly being transformed and improved by TEL. Therefore, it is safe to say that this is unignorable. Given the meteoric rise in demand for educational applications, software for teachers, and online education platforms, this is more applicable, and the use of models

such as (SAMR) Substitution, Augmentation, Modification, and Redefinition will help to enhance the learning experiences.

As per Xie et al. (2019) Technology-Enhanced Universities' use of mainframe computers to aid instruction and research is a watershed moment in the history of education. However, it acquired widespread popularity after the arrival of PCs and the internet in the late 21st century. Thanks to the information technology revolution, students worldwide can access online communication tools, interactive simulations, and multimedia course materials using the TPACK Framework. The proliferation of mobile devices and broadband internet in the twenty-first century has significantly boosted TEL. Learning management systems (LMS) and massive open online courses (MOOCs) have developed as potent platforms for providing education in a variety of settings and mediums (Garcia et al., 2018).

According to Santos et al. (2016), there are several reasons why tech is crucial. It is essential not just because it is the current norm in education but also because it can raise standards overall. Nowadays, students are more tech-savvy than ever, spending a large portion of their day engaging with various forms of electronic media. As such, using the Community of Inquiry framework will help handle all the academic changes effectively and improve the activities. Therefore, youngsters nowadays expect and thrive while engaging with technology, as seen by their ease of use and degree of comfort with cell phones, tablets, laptops, and other devices. Teachers may use students' rising technical savvy by deploying digital tools in the classroom and lecture hall that boost student-teacher interaction and foster deeper Learning (Tseng et al., 2016).

As per Mangaroska and Giannakos (2018), whilst many in the education industry were familiar with hybrid, HyFlex, and remote Learning before March 2020, their popularity has increased dramatically among parents, students, and teachers worldwide. Because of the increasing popularity of distance and hybrid education, students and faculty rely heavily on technological tools to assist them in overcoming geographical barriers to Learning. Tools like video conferencing software, learning management systems, and collaboration tools help teachers maintain order and ensure that no student, regardless of location, is at a disadvantage compared to their in-person classmates when teaching a fully or partially remote class and This can be actively achieved by the use of Flipped Classroom Model that will help to effectively analyze and then flip in from one model of learning to another (Ghanizadeh, Razavi and Jahedizadeh, 2015).

As per Licorish et al. (2018), the complexity of TEL lies in the many interconnected parts and practices that make up this innovative approach to education. Video lectures, quizzes, assignments, and online discussion boards are only some formats used in TEL's introductory online courses. Augmented and virtual reality (AR and VR) technology offers immersive learning experiences, letting students explore complex subjects in three dimensions. Examples of AI-powered solutions that may cater to individual students' requirements include chatbots and tailored learning algorithms (Irons and Elkington, 2021).

1.6 Advantages of Technology-Enhanced Learning

According to Kumar, Tiwari, and Zymbler (2019), bringing technology into the classroom has several positive effects. Everyone in the field, from professors and universities to students, stands to gain from this development. Technology in the classroom has improved student engagement and retention. Institutions and educators increasingly turn to AR/VR and other immersive technology to provide students with a more engaging and interactive learning environment (Brame and Biel, 2015). There has been an uptick in student attendance and effort in the classroom, and this type of teaching can be done more effectively with the help of the SAMR Model. The results in the classroom will reflect that improvement to be taught with the help of the SAMR Model. In conclusion, technological advancements are continuously changing the nature of schooling. To better equip students for the difficulties of today's fast-paced world, it does not replace but rather supplements traditional classroom learning methods (Pan et al., 2018).

Henderson, Selwyn, and Aston (2017) argue that students' access to a wealth of material is a fundamental benefit of technological advancements in the classroom. The data is immediately available to them. Many instructional resources are available online for students to use. The list includes scholarly journals, magazines, articles, papers, films, websites, databases, and author/teacher blogs. High school pupils can benefit significantly from these, which can be completed using the TPACK Framework. Students who include only verifiable evidence in their papers have a better chance of doing well in class. Students can use the information to back up a claim, create a plausible hypothesis, or reach a satisfying conclusion (Brame and Biel, 2015).

Regmi and Jones (2020) tell that with today's tools, students may improve their grades without extra effort. It is optional that kids spend much time in the school library, borrow books or other materials from former students, or

cause trouble in the classroom. A student may produce an excellent paper independently and get a high-grade using only sources. One of the greatest advantages of the Internet is the possibility of remote education. The proliferation of high-speed internet has made it possible to hold lessons online. A virtual whiteboard or online discussion forum is equally valuable as a teaching tool for students (Azevedo, 2018).

As per Ali's research (2020), EdTech's streamlined approach to instruction is a significant plus. Teachers can easily teach and stay in touch with their students outside of class and make decisions based on what the students are feeling with the help of the Community of Inquiry model, which will help to make decisions based on the elements available. This enhances their teaching potential, encourages student learning, and helps them succeed academically. The use of technology in the classroom has also led to the development of apps for mobile and desktop devices that serve as "digital attention coaches" for kids (Rashid and Asghar, 2016). They assisted educators in coordinating student work. Students may be reminded of upcoming assignments and warned if they need to catch up. To monitor their students' academic progress and provide them with further support, many schools and instructors today use online tools. They can quickly identify class slackers and tardy students. They might give them the necessary advice and help them gradually raise their grades (Harandi, 2015).

McKnight et al. (2016) also argue that many learners avoid approaching teachers for fear of ridicule or reprimand from classmates. Their shyness or reserve disappears, however, during online sessions or classes. They can freely communicate via text, voice, and video calls throughout their screen time. Students' communication ability is critical to their future success in school and their careers. Strong communication skills allow individuals to participate in more productive debates and clearly explain themselves. Students are encouraged to talk to their teachers about what they have learned and what they are thinking. People may learn more and be better able to put that information to use in their studies (Schwendimann et al., 2016).

Ali (2020) says that young children find it notoriously difficult to concentrate on schoolwork. They have a short attention span. Older pupils need help with focusing and completing lengthy projects. Many students complain that their academic workload is overwhelming. However, technical developments have allowed everyone to enjoy it (Rashid and Asghar, 2016). Technology like tablets, computers, VR/AR devices, and touchscreen boards in the classroom has increased student engagement.

Students' attention would be easy to maintain for teachers. Immersive classes that use cutting-edge technologies to make complex subjects and science more accessible to advanced students may provide similar benefits. Consequently, incorporating technology into the classroom has the bonus of making education more engaging for students. Teachers saw students' engagement improve, translating to higher classroom performance (Rapanta et al., 2020).

According to the research of Dumford and Miller (2018), Technology in the classroom also aids students in acquiring new abilities and expanding their horizons. Thanks to the web and the convenience of online education, those curious about a subject might find many resources online to learn more about it, and this can be greatly implemented with the Flipped Classroom Model to help the children adapt better. Students may utilize their newfound expertise to get a leg up on the competition in the classroom. EdTech also helps bright young people acquire the occupational competencies necessary for future success. Most professional skills and courses, such as Business Analytics, Machine Learning, Data Science, and Digital Marketing, are not included in the academic curriculum (Ali, 2020).

Using digital tools in the classroom has been shown to improve students' well-being in many ways. They can break up the monotony of studying using various digital tools. There are a variety of ways in which educational technology (EdTech) methods might help improve brainpower. Virtual classrooms and AR technology are essential components (Sharples and Domingue, 2016). Reading, understanding, learning, remembering, reasoning, and using logic will improve significantly. All of them have substantial long-term effects on educational attainment and achievement. When students use technology in the classroom and improve their grades, they develop a growth mindset. As a result, they will have better mental health and be able to focus better on their schoolwork (Dumford and Miller, 2018).

Not only can kids benefit from EdTech, but teachers also stand to gain from this innovative tool. Teachers can enhance lesson delivery using several technology tools, including audio-visual presentations, virtual classrooms, large-screen projectors, and digital planners, and by using frameworks such as the Community of Inquiry (CoI) Framework. The outcome was increased pupils' knowledge and comprehension (Coman et al., 2020). Technology also boosts educators' output. They employ technology to get students more involved and provide fresh educational possibilities. Many educators can tailor classes and supply their students with personalised materials (Daniel, 2015).

Coman et al. (2020) argue in their findings that teachers' use of assignment planner software, or a similar task organizer is a positive result of the widespread adoption of technology in the classroom through the use of the Flipped Classroom Model. They are electronic equivalents of a day planner or diary for use at school. All homework and class projects for the day, week, or month can be entered by teachers. They might plan them around the due dates. They can see when pupils begin and end activities (Becker et al., 2017). They could see how many hours were spent studying, how many tasks were finished, how the student did in each subject, and so on. Each child's progress, achievements, and failures may be recorded. This helps them prepare their lessons for the following class meeting (Arkorful and Abaidoo, 2015).

Better two-way communication between students and teachers is one of the main advantages of employing technology in the classroom. During class, instructors can interact with students via a virtual learning environment. It also facilitates one-on-one communication between students and instructors (Hwang, Lai and Wang, 2015). They can submit their work online and receive teacher comments if they want to work from home. Regarding collaborative assignments like group projects, online learning environments can be compared to traditional classrooms. The class is divided into smaller groups and given specific tasks by the teacher (Bower, 2019).

Some students will be disruptive, others will ask pertinent questions, yet others will be too timid to speak out, and all of these factors together will lead to an atmosphere of confusion and discord in the classroom. Nevertheless, in the virtual world of the internet, it never happens. The virtual classroom provides access to all students (Garcia et al., 2018). On separate monitors, the instructor addresses and resolves each student's concerns. Student contact has also improved outside of the classroom, thanks to online Learning. They could help one another with challenging undertakings by sharing ideas and resources (Mangaroska and Giannakos, 2018).

1.7 Application of TEL in Education

Bower (2019) says that technology has changed many facets of modern life, including the classroom. The advent of computers made the idea of online education possible. Therefore, using personal computers, portable computers, mobile devices, and software applications for educational purposes outside a traditional school setting is rising (Irons and Elkington, 2021). There is no question that the education sector has benefited enormously from the

globalization of technology development. Both pupils and teachers benefited from the resulting ease of use. Educational practices have seen widespread improvements due to the adoption of technological tools. Students could use their time better and get better study results (Kumar, Tiwari and Zymbler, 2019).

Pan et al. (2018) argues that visual images on a screen or in real-time via augmented reality may introduce students to scientific topics. However, using virtual reality, kids may experience informative field trips without leaving the classroom. These technologies revolutionize classroom practice and provide students with more engaging educational opportunities when used together. Ultimately, it provides kids a fun and engaging learning environment (Bower, 2019). The BYOD (Bring Your Device) trend has been halted thanks to educational technology's purchase of classroom gadgets. They also do not need to visit local computer facilities or laboratories. Tablet computers, including the iPad, are becoming standard educational equipment. They also need to be aware of the importance of cyber security in today's online world (Pan et al., 2018).

According to the research of Regmi and Jones (2020), EdTech has helped usher in a new era of individualized instruction. Students can receive individualized instruction in various contexts, including traditional classrooms, independent study, and online meetings. It helps students choose the most effective learning strategies for their needs and abilities. Because of this, students can take on greater responsibility through integrated learning. Inquiry-based Learning requires them to communicate with their instructors directly (Kumar, Tiwari and Zymbler, 2019). One of the most essential technical advantages for pupils is artificial intelligence. It provided students with around-the-clock access to automated education tasks, linked them to resources worldwide, and helped eliminate knowledge gaps. In other words, AI has widened the scope of individualised instruction and helped pupils get answers and solutions more quickly (Rapanta et al., 2020).

Despite this optimistic perspective, Kumar, Tiwari and Zymbler, (2019) argue that several challenges are associated with using technology in the classroom. Students' attention spans may improve if they spend less time in front of screens due to the use of educational technology. The extent to which educators can effectively implement technology like augmented reality, virtual reality, and artificial intelligence has also been called into question. Due to financial constraints, several educational institutions needed help to make the purchase. Teachers and students confront several

obstacles while utilizing technology in the classroom (Hwang, Lai, and Wang, 2015).

The research by Pan et al., (2018) sheds some light on this and says that some educational technology problems are more severe than others. Many educators, parents, and schools are hesitant to fully embrace technological advancements in the classroom. They believe the only successful education methods are face-to-face instruction and communication with parents. Regular updates are necessary for technology. All educational institutions, students, and teachers must employ the most up-to-date versions of all learning tools and software. Because of this, keeping up with the latest developments in educational technology (EdTech) places an additional strain on teachers (Mangaroska and Giannakos, 2018).

Kumar, Tiwari, and Zymbler (2019) say that video streaming, online chat, video calling, and so on are all examples of internet-connected EdTech that need programs or devices that are connected to the internet. Faster Internet access and reliable hardware are necessities for every EdTech course or application. Schools, educators, and students need access to these materials. Both students and educators nowadays need a firm grasp of technological fundamentals to succeed in the field of education. They are the principal users of technologically advanced teaching aids (Irons and Elkington, 2021). Therefore, pupils must acquire the appropriate abilities to reap the benefits of instructional technology. In any field, the adoption of technology comes at a high price. The ever-increasing sophistication of educational technology inspires teachers and pupils to put money into cutting-edge gadgets and software. Using instructional technology, such as eLearning, can raise the price of education (Kumar, Tiwari and Zymbler, 2019).

Thanks to technological advancements, today's kids have instantaneous access to a world of information. Those who struggled to understand the material presented in class could participate in further live online sessions (Bower, 2019). Teachers may develop individualized lesson plans based on each student's strengths and areas of interest. Because of this, teachers may rest easy knowing they are giving their full attention to each student in an online classroom. Students might also benefit from a calm and pleasant setting in which to study. They are not required to pay attention to or mimic the actions of their peers. Instead, students may work according to the teacher-imposed schedule (Kumar, Tiwari and Zymbler, 2019).

Garcia et al. (2018) argue that the use of TEL is very good for student learning and say that improved academic performance directly results from

students' increased use of online learning resources. In addition to providing students with individualized lessons, EdTech aided in developing their time management and analytical skills. This becomes increasingly important as pupils progress through school. It enables people to handle many jobs and focus on each. Numerous time-limited online courses aided pupils in developing dedication. In order to meet the course deadlines, they practiced focusing on the work at hand and postponing unimportant activities. Students may access Information and learning resources quickly and easily (Hwang, Lai and Wang, 2015). They can ask for assistance with a project outside of class by starting an online conversation with a teacher or interacting with them in another way. So, students will not have to worry about becoming stalled in the middle of a task or assignment. Overall, students can devote more time and effort to their studies with the help of online learning resources (Rapanta et al., 2020).

It is no secret that modern tools inspire inventiveness and originality. Many pieces of educational technology use humorous touches to help engage young students. When a user completes a training phase, the program provides a natural reaction such as a score, a clap of applause, a visual representation of a party, a message of gratitude, or any other positive reinforcement (Regmi and Jones, 2020). Inspiring words like this will encourage pupils to continue their studies. Collecting virtual coins, jewels, or other prizes is a common feature of many e-learning programs. They have personalized scoreboards, so kids may try to outdo one another. To rephrase, gamification made learning more interesting and exciting for pupils while also improving their ability to pay attention and be motivated to do well (Kumar, Tiwari and Zymbler, 2019).

Students' exposure to VR and AR ideas provided them with immersive learning experiences that aided in expanding their horizons. Educators used these tools to educate pupils on complex scientific topics, abstract concepts, and historical places. This made it simpler for pupils to take in the material and remember it afterward, which sometimes proved difficult when using textbooks (Irons and Elkington, 2021). Furthermore, students' interest in Learning has been boosted through instructional technology. Books no longer monopolize the visual and intellectual resources available to students. They can utilize the web for research, exploring new topics, and watching videos. Students improved both their grasp of a topic and their grades by taking the time to research and write in-depth papers about it (Pan et al., 2018).

Kumar, Tiwari, and Zymbler (2019) further argue that digital tools have eliminated the need for educators to maintain a personal notebook or checklist. They have significantly reduced their workload by using online resources like lesson plans and exams. They may input their responses into the program and set their submission dates accordingly. Students with access to such an app are thus less inclined to procrastinate. The parents will also breathe a sigh of relief with this news. Various systems maintain tabs on upcoming assignments and provide reminders to students (Kumar, Tiwari and Zymbler, 2019).

As a result, students improve their self-awareness and can better meet deadlines. Therefore, parents do not need to monitor their children to ensure they complete their assignments closely. In addition to MOOCs, eBooks, and YouTube lessons, other eLearning forms have improved students' educational experience, especially in more advanced courses. They should not feel the need to interrupt class to ask for help with homework constantly. Teachers could loosen up a bit, strengthening their relationships with their pupils (Hwang, Lai and Wang, 2015).

While telling about the uses of TEL, Bower (2019) argues that with its use, students will be better prepared for a fully digital future if technology is introduced into the classroom now. We are on the cusp of a technological golden age in which technology drives or controls every aspect of human life. Students were exposed to the current technological world using EdTech tools, including virtual classrooms, AI-assisted planners, video learning, engaged learning for TV shows, and online assessments. It was also valuable for setting priorities for the use of technology. Applications for gaming and television, over-the-top (OTT) services, social networking, and other forms of digital media may be seen differently from educational applications. This will teach youngsters to follow directions and responsibly use technology (Rapanta et al., 2020).

Many modern businesses select prospective employees according to their degree of education, intelligence, and technological proficiency. A student's chances of landing a job at a particular company improve with early exposure to various technologies. Parents are not legally required to provide their children with a college education or training in modern information and communication technologies like computers, software, and the Internet (Mangaroska and Giannakos, 2018). In conclusion, students may progress through lessons at their own pace when they use technology in the classroom. As a result, many pupils need help to retain information. They are falling behind in class because of the intense competition and outdated

teaching methods. They require personalized support to help them succeed in school (Garcia et al., 2018).

Using technology in the classroom has several advantages, but one of the most significant is allowing students a more personalized learning experience. Teachers may now use digital resources to create individualized lesson plans and classroom schedules for their students (Kumar, Tiwari, and Zymbler, 2019). They may assign tasks and due dates for completion based on their expertise and availability. Many children saw their grades rise as a result of this. It helped educators better understand and work with their kids who struggle with attention deficit hyperactivity disorder (ADHD) and similar conditions (Regmi and Jones, 2020).

1.8 Practices for Technology-Enhanced Learning

The advent of video conferencing and online forums has opened up educational possibilities for people worldwide. The 21st century also values student-centered learning, which fosters analytical and creative thinking and problem-solving abilities (Mangaroska and Giannakos, 2018). To better prepare students for the modern workplace, a focus is placed on teaching them to work together on projects. New difficulties, such as the digital divide and worries about screen time, have surfaced, though. In the twentieth century, rote memory was valued, but in the information and technology-driven twenty-first century, flexibility is essential. Finally, the major distinctions in education between the two centuries may be summed up by the transition from a conventional, teacher-cantered paradigm to a technology-driven, student-cantered paradigm (Hwang, Lai and Wang, 2015).

1.9 Conclusion

It can be concluded that Technology-Enhanced Learning practices provide educators with a robust toolset for designing engaging and successful learning experiences in the digital era. These practices are not restricted to online courses but may be used in various educational contexts to meet the unique requirements of students. TEL practices enable educators to harness the potential of technology for improved learning outcomes, whether it is designing well-structured online content, implementing a robust Learning Management System, blending online and in-person instruction, creating interactive multimedia, or gamifying the learning experience. The key is to

approach these practices intelligently, emphasizing educational aims and the distinctive demands of 21st-century learners.

It was concluded that TEL has helped usher in a new era of individualized instruction. Students can receive individualized instruction in various contexts, including traditional classrooms, independent study, and online meetings. It helps students choose the most effective learning strategies for their needs and abilities. Because of this, students can take on greater responsibility through integrated learning. Inquiry-based Learning requires them to communicate with their instructors directly.

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CHAPTER 2

E-LEARNING TECHNOLOGIES AND THEORIES FOR THE 21ST CENTURY

2.1 E-learning Technologies

The term "e-learning technologies" refers to an umbrella term covering a wide range of programs, systems, and online assets developed to facilitate and enhance the delivery of online instruction. E-learning, made possible by technological advances, has transformed how students, researchers, and professionals learn and grow (Asad et al, 2021). Many businesses and organizations have adopted e-learning strategies, which are changing the face of how instruction is provided. E-learning systems improve traditional classroom teaching at all levels (K-12 and above) by providing students with digital textbooks, interactive courses, and a wealth of internet resources. They make it possible for universities to provide online programs, which benefit students who live far from campus or have other scheduling needs. Educators and teachers also benefit from e-learning for their own development as professionals by using it to update their own pedagogical and subject-matter knowledge (Al Kurdi, Alshurideh and Salloum, 2020).

2.2 Artificial Intelligence

It takes much labour from teachers to do other things in the school system, including grade exams and giving out assignments. It would be far more efficient to spend that time engaging with students, helping them fix their mistakes, introducing them to new topics, etc., than of juggling all of these tasks. Time might be saved with artificial intelligence. Nearly all forms of multiple-choice and fill-in-the-blank questions can now be automatically graded by AI, and the technology is quickly approaching the point where it can even score written replies. However, no matter how much AI improves, it will never be able to replace human grading fully. Using AI to automate mundane tasks would free up teachers' time to address student concerns and strengthen their lessons.

As per Dhillon and Murray (2021), schoolteachers cannot be available to kids around the clock because of their predetermined timetables. However, no student has enough background knowledge to take it all in at once, so they always seek supplementary materials and tutors when they are struggling. AI tutors can offer this assistance. Numerous AI-driven educational platforms are now accessible to hone students' arithmetic, writing, and other subject-matter acumen. While these AI systems can help students grasp the basics, they are not cut out for learning advanced concepts in any field. The guidance of an instructor is still necessary for pupils to understand such advanced material. Nevertheless, AI can potentially assist students in the future with intricate tasks that demand reasoning and analysis (Yakubu and Dasuki, 2019).

Giannakos, Mikalef, and Pappas (2021) further tell that AI can help students study more effectively in individualized courses and provide teachers and students with useful feedback on how well the course is doing. Several online education platforms are already implementing AI algorithms that rely on student input to track their development and notify teachers of serious issues with their students' performance. Students may get targeted help from these AI-driven tools, and educators can find out where they're falling short in training. Students benefit from timely feedback because it clarifies their mistakes and suggests ways to improve (Marunevich et al, 2021).

Chatbots and online tutors powered by AI help students by responding to their inquiries, breaking down complex topics, and offering advice. These systems can be used as a complement to conventional classroom teaching or virtual learning environments, as they are accessible around the clock (Stecuła and Wolniak, 2022).

2.3 Prescient Learning Analytics

Alam (2022) argues that in predictive analytics, past data is used to determine the probability of future events using information, quantifiable computations, and machine-learning technologies. Giving predictive scores (probabilities) for each individual hierarchical component is a common way to describe predictive analytics (prescient inquiry) as anticipating at a finer degree of granularity. The goal is to provide the best prediction of what will happen next, in addition to interesting observations and an account of what transpired. This leads to better decision-making and the generation of new information, which in turn drives better actions (Alqahtani and Rajkhan, 2020).

Alenezi, (2020) further agrees that to design a model that can predict values for new or different data, predictive models employ prior findings. This method makes predictions about the target variable's (say, income's) probability based on the importance of a set of data bits. Engaging models that provide light on what transpired and demonstrative models that reveal causal relationships are distinct from this. For example, in marketing, credit risk, or any other area where many people are involved, predictive analytics can help with decision-making by assigning a likelihood score to each individual (client, worker, medicinal services comprehension, item SKU, vehicle, segment, machine, or other authoritative unit) in order to advise on or influence hierarchical procedures (Wu and Plakhtii, 2021).

Dubskikh and Butova (2019) say that, for instance, predictive models will depict the relationship between a certain unit execution and one or more known unit traits or components. Finding out how likely it is that a similar unit in a different specimen would display the precise execution is the purpose of the model. This category includes models from several fields, such as extortion discovery models and marketing, where they look for plain data examples to answer concerns regarding client execution. Predictive models frequently do computations in real-time exchanges to guide a decision, such as assessing the probability or danger of a certain consumer or transaction. As the recording rate has increased, unique expert displaying frameworks have grown to the point where they can mimic human behaviour or reactions to given shocks or situations (Kibuku, Ochieng, and Wausi, 2020).

2.4 Cloud Services

Mousavi et al. (2020) argues that the provision of remote learning and e-learning platforms is perhaps the most obvious use of cloud services in education. Cloud-based Learning Management Systems (LMS) like Moodle, Canvas, and Google Classroom let educators conduct online lessons, control course materials, monitor student performance, and encourage group work and discussion. These sites have been useful to educational institutions, especially during emergencies like the COVID-19 pandemic, which has prevented any learning from being interrupted (Puma, 2022).

Kaushik and Agrawal (2021) further say that the accessibility of cloud services expands the pool of potential students to include people who are economically or geographically disadvantaged or have physical limitations. Online classrooms and course materials are accessible to students from anywhere worldwide. This adaptability makes various study methods and

times possible. Students and teachers may work together on projects, share files and give and receive instant feedback using online collaboration platforms like Google Workspace (previously G Suite), Microsoft 365, and cloud storage services like Dropbox. This encourages group work and makes for a richer educational experience overall (Maatuk et al, 2022).

Al Rawashdeh et al. (2021) also say that using cloud services can considerably lower educational institutions' IT infrastructure expenditures. As an alternative to in-house server and network upkeep, they may use cloud services. With this approach, people may gain entry to cutting-edge IT tools at no cost. As the needs of schools and universities evolve, cloud services may be modified to meet those needs. Cloud solutions may be easily modified to meet the changing needs of an institution, be it an increase in student body size or a need for more data storage or processing power.

Cloud services offer an option for disaster recovery. Regular cloud backups can protect educational data, such as student records and course materials, from being lost in the event of hardware failure or data loss due to natural disasters (Kaisara and Bwalya, 2021). As the internet's capabilities continue to grow, cloud services are expected to play an increasingly important role in classrooms (Marlina, Tjahjadi, and Ningsih, 2021).

Put another way, using cloud computing in schools will help students apply classroom knowledge in real-world scenarios. Previously, students had to leave the comfort of their homes to observe class. Now, they can do it from anywhere. Using cloud computing might be advantageous for teachers and students alike. Teachers may make all their resources, including lesson plans and student handouts, available online for students at any time. An external cloud server receives the school's data. An outside supplier oversees this offline cloud server. Schools and other educational institutions may save money by consolidating their data into one interface (Ebner et al, 2020).

Predictions predict the educational cloud computing market will be at USD 89.53 billion by 2027, with more than 9.5 million users. Since cloud computing has made education more accessible and less hard, this highlights its significance in education. Due largely to the unusual pace and size of digital media adoption by schools following the epidemic, cloud computing for educational purposes has grown in popularity (Estrellan et al, 2021). Using the cloud for instructional purposes has various advantages. Improved efficiency and ease of use for both students and teachers is the primary advantage. Teachers can convey concepts more clearly when