Table
Review Article

Integration of technology in education and its impact on learning and teaching

Abstract

This study seeks to understand the effects of technology on education: teaching and learning.All the data used in this study comes from secondary sources. ~~Information~~ was gathered from several sources, including peer-reviewed journal papers, published and unpublished dissertations, online and print textbooks, and encyclopaedias. Findings: Evidence on the effects of technology is contradictory, according to a review of the relevant literature.Thanks to information technology developments, classroom collaboration between teachers and students is more efficient than ever. It broadens their academic and intellectual horizons, making students more versatile in the classroom. Due to the internet's accessibility, remote learning may now be supported by technological means. Students can use search engines to conduct research. Hardware failures, software incompatibilities between home and school, or non-existent internet connections, and outdated program versions are just some of the dependability problems that students and teachers face in the classroom. Because of developments in technology like graphical calculators, high-tech gadgets, and small cameras, dishonest students may now easily gain an edge over their classmates.Distractions in modern life may be traced back in large part to technological advancements.Students' health might be negatively impacted by excessive technology usage.

Keywords – Education, Learning, Technology, Teaching

1. Introduction

The history of technology in education dates to the 1920s when radio broadcasting was first used to teach political science and history. In the 1950s, the computer-based teaching system, programmed logic for automatic teaching operations (PLATO), was developed at the University of Illinois. The 1960s saw the advent of audio and video cassettes which were used to deliver lectures and educational content. The 1970s and 1980s saw the introduction of personal computers, which revolutionised education. In the 1990s, the internet became available to the masses and educational institutes started using it as a platform to deliver online courses and programmes. Today, technology has become an integral part of education. Virtual learning environments, online courses and educational software have made learning accessible to anyone with an internet connection. Innovations like artificial intelligence (AI) and augmented reality are changing the way students learn, making education more personalised, engaging, and effective.

No longer are technologies exclusive to large corporations and government structures (Baba, 2014:75). Higher education has been significantly impacted by technology and its instruments, and this trend is expected to persist. This letter should not be disregarded given the exponential growth of information and communication technologies (ICT) (Mayo, 2012:1, Ramraj & Marimuthu, 2019:35). Since technology advances, it may be implemented in a variety of forms in a variety of fields, including education. Ghavifekr et al. (2023) argue that the use of ICT in the classroom is crucial for providing students with opportunities to acquire and implement the necessary 21st-century skills.Despite widespread optimism about technology's potential to revolutionize the classroom, its usage remains mostly superficial (Tshuma,2016).Utilization of technology in education has increased over time, particularly (The Coronavirus Disease – 19 (COVID-19) pandemic has altogether changed the traditional dynamics of teaching and learning to online mode). This further necessitated the use of computers and other electronic gadgets as the primary mode of technology which has turned our lives completely different (Rajendran & Kaur, 2023).

The graph of technological advancement has increased and will continue to rise. Teachers are making use of technology to help students in teaching, guidance, and mentoring.As for the students, their use of technology helps them in research, learning and evaluation of their performance (Kouser & Majid, 2021) Since the last few decades, weare experiencing the digital transformation known as the Fourth Industrial Revolution (4IR), which is defined by the merging of technologies and the consequent dissolution of boundaries that separate the physical

characteristics, electronic, and physiological realms. Moreover, it is associated with the presentation and use of technology (Schwab, 2016). While technology is constantly changing how we live, Gullan (2019) argues that the education and training spheres are reaping their benefits. This study explores to know how students may become excessively dependent on technology for their learning which may limit their ability to learn and problem-solve on their own without the aid of technology.

This study seeks to understand the effects of technology on education: teaching and learning. Education and contemporary technologies have revolutionized the way we acquire knowledge and access information. Modern technologies have made education more accessible and practical than ever before. Teachers still follow the conventional methods of instruction in use today, sometimes illuminating lessons with clips from YouTube or presentations using PowerPoint to highlight key ideas. It is obvious that students need to abandon these study habits and adopt new learning strategies that will pique their interest in the subject matter, allow them to use their smart gadgets, and foster a sense of community among classmates (Shala & Shatri, 2022). As a result, institutions and individuals invest heavily in educational technology, including hardware, applications, connectivity to the Internet, and other educational necessities (Bulman & Fairlie, 2016).

2. Data Collection Method

Data for this study were gleaned from secondary sources including peer-reviewed journal papers, published and unpublished dissertations, online and print textbooks, and encyclopaedias. According to Saunders et al (2020), Secondary data are advantageous as they do not need any more work to gather or analyse, rather they give a nonintrusive measurement, and reanalysing them might lead to unanticipated discoveries and lessons learned (P:351)

3. Tools Needed for Teaching and Learning

Understanding how computer science, as well as technology, may be used to improve education is crucial in today's world when they play such a pervasive part in our everyday lives. Both students and teachers have benefited from the widespread accessibility, low cost, and high productivity of technology gadgets and resources (Holt, 2015:1). Cloud computing is a model of delivering computing resources, such as servers, storage, databases, software, and networking, over the internet. These resources are provided as aservice and are accessible to users on demand. Cloud computing allows businesses, organizations, and individuals to access computing resources quickly and easily, without the needfor expensive hardware or infrastructure. The cloud computing model is based on the principle of resource sharing and pooling, allowing users to scale up or down their computing resources as needed, and pay only for what they use (Kumar et al., 2013:17, Kurelović et al., 2013:856; Srivastava, 2023).

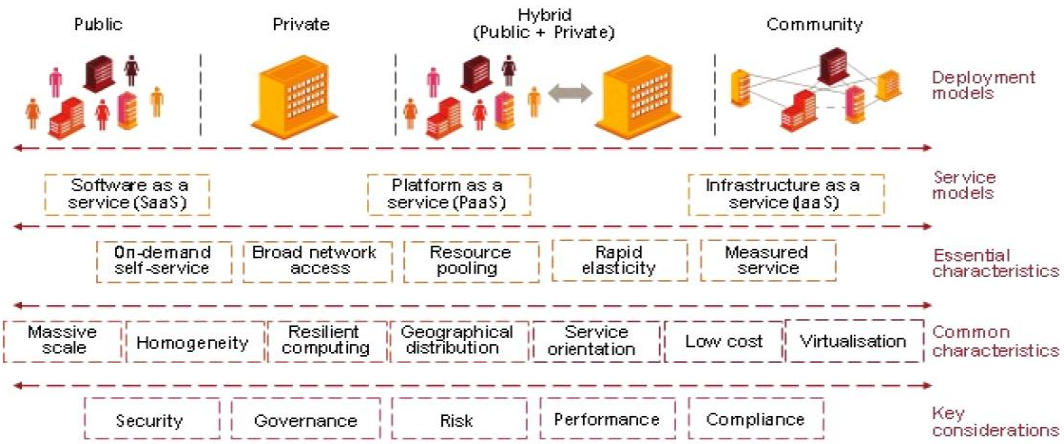

Figure 1: Model and Characteristics of Cloud Computing.(Margianti &Mutiara, 2016:2).

Пінчук (2016) suggested that electronic social networking in teaching and learning has a synergistic consequence. However, pedagogical strategies are beneficial in implementing a curriculum. Furthermore, electronic social networking in education is connected to solving several psychological, pedagogical, and organisational problems, thereby strengthening information security rights, and protecting data in information networks (Пінчук, 2016). The availability of these technological tools helps learners to have access to the relevant and latest theories and practices in education.

4. Uses of ICT in Teaching and Learning

Learning has been and continues to be an ongoing process. In pursuit of their objectives, learners seekknowledge that exists through conventional approaches (Weert & Tatnall, 2005). This leads learners to anticipate and be open to exploring new sources of information, such as ICT or educational tools. Such results in learners expecting and willing to seek a new knowledge sourceICT or learning tools (Fu, 2013). Kent & Facer (2004) indicated that a school is a virtual setting in which learners share a range of learning tools.

Learning tools are the dominant tool for educational change and reform (Fu, 2013). Itmakes wider entry to education, and learning can occur anytime and anyplace. Through learning tools teaching, the environment becomes learner-centred (Sanchez & Aleman, 2011) as learners are actively directing how learning occurs. Learning tools provide both learners and teachers with educational affordances and possibilities (Fu, 2013). Literature has found that following usages of ICT in teaching and learning has many advantages. The following are the uses of ICT in Teaching and Learning:

- Assist learners to access digital information efficiently and effectively; the use of ICT as a learning tool, learners devise learning materials, find solutions, and solve problems given to them or come across in real-life situations, acquire usable knowledge and understandable operation (Brush et al., 2008).
- Support learner-centred and self-directed learning; learners regularly engage in consequential usage Sanchez and Aleman, 2011 (2011), and build knowledge through accessing, selecting, organising, and interpreting data and information.
- Produce creative learning surrounding; learners develop a new understanding of their learning areas (Chai et al., 2010). More creative solutions to different types of learning enquiries are provided using ICT. For example, in a Technology class, Technological Kits are commonly used to build prototypes modelling existing products. Learners can access all types of apparatus used in construction, mechanics, electrical and processing at an early age, develop an interest and later pursue a career in one of these career paths. Therefore, such learning involves purpose-designed applications that provide innovative ways to meet a variety of learning needs (Fu, 2013).
- Promote collaborative learning in a distance-learning environment, learners can communicate, share and work collaboratively anywhere, at any time (Koc, 2005). Through teleconferencing, learners can invite learners from around the world to gather simultaneously for a topic discussion (Fu, 2013), can analyse problems and explore ideas and develop concepts. Furthermore, learners not only acquire knowledge together but also share diverse learning experiences with one another to express themselves and reflect on their learning (Fu, 2013).
- Offer opportunities to promote “critical thinking skills”; a study conducted by McMahon (2009) showed statistically significant correlations between studying with ICT and the acquisition of critical thinking skills. Learners exposed longer to the ICT environment emerge as learners with higher critical thinking skills. Thus, schools strongly integrate Technology across all the learning areas and among all levels (Fu, 2013) so that learners can apply technology to the attainment of a higher level of cognition within specific learning contexts.
- Improve teaching and learning quality; in studies conducted by Lowther et al. (2008), three essential characteristics are needed to develop good quality teaching and learning with ICT: namely autonomy, capability, and creativity. According to Fu (2013), autonomy means that learners control their learning through ICT to become more capable of working by themselves and with others. Furthermore, he mentioned that teachers could authorise learners to complete specific tasks with their peers or groups. Through collaborative learning with ICT, learners have more opportunities to build new knowledge onto their existing knowledge and become more confident to take risks and learn from their mistakes. Serhan (2009) concluded that ICT fosters autonomy by allowing teachers to create their material, thus providing more control over learning content than possible in a traditional classroom.
- Once learners are positive towards learning practices, they flourish in the capability to apply and transfer knowledge while using new technology efficiently and effectively. For example, in a Technology design and make-skill class, learners may be asked to design and make an electrical device that villages may use at home that notifies them if they invade their homes during the night. They are required not only to design but also to make a device that solves the problem. Then, they make this model of the device and present how it works or solves the problem. Before completing the task, they must know or investigate existing products based on the material's suitability, cost, and availability. Finding these existing products, evaluating them, and coming up with a better solution to the problem is another prerequisite for these learners.

Therefore, learning tools are vital factors in effective teaching and learning, especially in a Technology classroom. Technology teaching and learning become stressful for teachers and learners as resources are scarce. Only improvisation or theory is done in classrooms. Most learners feel no need to try or engage themselves as they must go and look for materials around them to work with as it is time-consuming and frustrating. Besides, in a technology classroom is mandatory to have at least some form of tools, especially the basic technological Kits Tools, for learners' motivation to ease their stress when creatively designing and making a particular product in their design and making class.

5. Limitation of ICT use in the classroom

Not enough people have been trained to implement this new method of teaching and learning, and those who are already in the field need more instruction to make the most of the opportunities presented by modern classroom technology. Unfortunately, few educational institutions can afford to invest in technology throughout the classroom. It takes a long time because:— The integration of technology into the classroom is a lengthy process. The quality of classroom desktop computers and digital cameras is low. Computer problems: irregular power supply has been a major barrier to the successful implementation of computers in the classroom as a response to computer failure. Osasebor and Oribhabor (2023:6) note that the lack of power in rural regions is a barrier to the use of computers in the classroom. Due to the adaptability of the human mind and the limitations of technology, computers will never be able to replace human problem solvers. Unfortunately, sometimes the tools we use to teach with are just plain wrong (Lim, 2021).

One of the problems with technology is that it isn't always easy to use. Because not everyone can afford to acquire the most cutting-edge technology, schools and other educational institutions should invest in it so that pupils, as well as teachers, may use it to study (Rajendran & Kaur, 2022). More and more educators are beginning to see the value of incorporating electronic resources and tools into the classroom (Asbari et al., 2020). However, Gressard and Loyd (1985) suggested that educators' perspectives on the use of technology in the classroom are crucial. They noted that not all educators have a favourable outlook on technology, which might spell trouble for computer-based initiatives. Teacher mindsets and opinions might prevent the full integration of technology into the instructional design (Teo, 2008), even though technology offers numerous novel possibilities for addressing problems including methods of learning, student-centred teaching, and the reinforcement of higher-order thought processes.

6. Empirical Review of the Effects of Technology on Education

The use of technology in the classroom has both beneficial and potential implications. Both educators and learners should see this as an opportunity to overcome obstacles that are preventing many individuals and institutions from reaching their full potential (Raja & Nagasubramani, 2018). Most students in this survey agreed that using digital presentations in their technology courses would be beneficial and that doing so would help them to think more critically and provide more reasoned responses in exams. The findings of this study suggest, among other things, that students in the experimental educational setting who participated in the intervention had better learning outcomes than their counterparts in the placebo group who had been taught using more conventional approaches. These successes and outcomes are mirrored in students' engagement with the material throughout the educational process, and they were also evident in the post-test, whereby the class performed much well than the control group's performance (Shala & Shatri, 2022).

With digital tools, today's students may travel the world without ever leaving their desks. Incorporating a guest speaker into a session is a great way to provide variety and excitement. Thanks to advancementsin video conferencing technology, we may easily have a guest lecturer from across the country or across the world join our class for an in-person discussion. It is simple to set up a video chat with students at another school. All children, including shy youngsters who would not normally raise their hands in class, are involved in online surveys and other digital tools. Using online engagement tools, instructors can routinely check in with their students and ask for feedback on course materials and assignments. Understanding where students are having difficulty may also be gleaned through student perspectives. By encouraging student participation and providing immediate feedback, response systems for the classroom foster good digital citizenship. Education technology may also facilitate the use of quizzes as an active learning technique. With the use of social media, whiteboards with interactive elements, and other tools, students may get right into working on a project together in class, where they can easily connect with one another and build off each other's concepts. Students are free to work together regardless of their location or socioeconomic status. Students may now easily take part in impromptu conversations and get prompt responses to any questions or concerns they may have about a topic. This helps students

to complete their assignments at different times due to factors including autonomous learning and individual differences (Haleem et al., 2022).

An in-depth familiarity with both the medium and the theory behind online education is an asset to the field. The contribution of human intellect to the creation of strategies and knowledge is crucial. Concepts and technologies are susceptible to interactional and experiential procedures. The primary and most prevalent goal of educational technologists is to increase productivity, which includes both intellectual growth and the efficiency of the educational process. Every detail counts when it comes to putting technology into action; it is about more than just equipment (Balalle &Weerasinghe, 2021).Teachers and students can work together more effectively in the classroom. It broadens their horizons intellectually and academically, preparing them for a range of roles in the field of education. Using a wide range of technology and software, the classroom experience is enriched. The potential of incorporating cutting-edge innovation into educational materials and procedures is enormous. Individualized teaching, the use of multidimensional and digital media assistance material, and effective and efficient management of various educational institutions are only a few of the numerous demands and necessities of the modern day that are met by this technology (Lortie, 2020).

To educate and learn about new technologies, schools and other educational institutions need to have access to them. However, not everyone can afford to acquire the most cutting-edge devices outright. Teachers and students who are interested in using a scarce resource may have to wait for many hours before getting their turn. They may have to spend time getting to and from school to use the equipment, which might be inconvenient. If the technology is novel to the market, there will likely be fewer people who are familiar with how to utilize it, making it more difficult to locate a competent teacher. Cheating methods are also becoming more sophisticated as technology develops. College students invent novel strategies and tools to excel in examinations. Graphical devices such as calculators, technologically advanced watches, small cameras, and similar items have evolved into reliable exam-cheating aids due to technological progress. They may be more motivated to learn thanks to technology, but instructors often report that it is difficult to get them to stop texting or playing games during class. Addiction to these things prevents students from concentrating on their schoolwork at home, which in turn leads to poor performance in academics, extracurriculars, and even sports. There has been a dramatic deterioration in writing abilities because of the widespread use of computers in the classroom. In addition, today's students are so used to employing keyboard shortcuts for everything from video games to social media chats that they often employ the same strategies while writing. Students relying on autocorrect do not learn proper grammatical use, cursive writing, or word spelling. Students have grown apathetic because of the widespread usage of laptop computers in the classroom. As well as pupils' delicate motor skills have suffered as a result (Rajendran & Kaur, 2023).

Hardware failures, incompatibilities between home and school software, sluggish or non-existent internet connections, and antiquated program versions are just some of the reliability issues that students and teachers face at school. Technological lag, such as poor wireless fidelity (Wi-Fi), causes lessons to run late because materials take too long to load, students' assignments don't get submitted on time, and their laptops shut down during examinations, among other problems. Investing in cutting-edge technology is expensive; hiring a trainer and purchasing the necessary gear will add up quickly (Butler & Sellbom, 2002; Chizmar & Williams, 2001). Ajayi (2004) said that IT-assisted education offers four primary benefits, which he explained in detail below. (a). IT's ability to facilitate the exchange of knowledge and resources has a positive effect on the quality of education provided to educators. (b). It accelerates the rate at which new educators may be produced. (c) It can accommodate many students and allow them to receive instruction regardless of their physical location, making education more widely available. Education becomes less capital-intensive as IT-assisted solutions minimize or eliminate the need for large financial expenditures to replicate large classrooms, labs, and libraries.

The writing abilities of today's youth have been impacted very significantly due to the widespread use of internet conversing and alternatives. Students these days spend so much time typing messages that they have completely abandoned the art of writing. They are unable to write in cursive, utilize good language, or spell correctly. Modern innovations like graphical calculators, high-tech gadgets, and small cameras have given dishonest students a leg up on the competition. Students may more easily and discreetly copy and paste formulae and take notes using graphing calculators. Many students now enjoy using Short Message Services (SMS) or text messaging as a kind of recreation. It is not uncommon to see a student fiddling with their iPhone or other mobile device in the car, at night, or even in class. Having constant access to the internet has been linked to a decline in students' attention and performance in the classroom (Raja, & Nagasubramani, 2018) as well as in various extracurricular endeavours.

According to Durak and Saritepec's (2017) findings, students' average scores on the study's intra-classroom interaction and behaviour management sub-scale were greater than those on the other sub-scales item counts. The lowest average ratings were found in the category of classroom order and instruction. Teachers' usage of technology had a minor impact on classroom management. Except for daily internet usage, there was no statistically significant relationship between teachers' degree of utilization of technology in the classroom and their ability to maintain order in the classroom. The notion that using a collaborative board in the classroom improved classroom management popped out when reviewing the findings collected from qualitative data. The employment of the dynamic whiteboard as a presenting tool in the classroom may have contributed to this impression. Teachers, on the other hand, said that tablet usage in the classroom resulted in challenges with time management, poor student conduct, and occasional disruptions during class.

Arguably the most obvious positive effect of technology within the classroom is the democratization of knowledge. The availability of both historical and current data is facilitated. The accessibility of information on the internet has facilitated the use of technology to facilitate distance education. Due to the internet's accessibility and simplicity, technology has facilitated distance education. One of the major factors that boost originality is the convenience with which information can be accessed thanks to technological advancements; when people have an idea or notice something interesting, they can simply Google it and find a wealth of related information, which in turn expands their horizons and inspires more originality. Students are more likely to pay attention and remain focused when they engage with technology in the classroom. Using technology in the classroom increases students' ability to remember what they have learned for longer. When a student grasps a concept with complete dedication, it is advantageous for both the student's development and the instructor's sense of accomplishment. Students retain greater information when they have opportunities to engage with visual content (Singh, 2023) for the reason to the increased usage of technology in the classroom.

One negative effect of pupils' increased reliance on technology is that they are becoming more introverted and less interested in interacting with others. They get dependent on technology very quickly, which leads to even greater dependence. Another big cause of distraction in modern life is technology. They do notbother to really study anything, instead opting to access the many false claims that populate the web. Their ability to learn is hindered by the availability of irrelevant and improper information. Students' social skills are being hampered by the fast development of technology in the classroom. They are losing their ability to think independently and are instead becoming more reliant. They are becoming less resourceful because of their increased reliance on technology. Students' health suffers from overexposure to technology. The effects of technology on health extend beyond the physiological to the psychological. Obesity, reduced blood flow, a bent spine, poor posture, headaches, and impaired vision are just some of the possible physical consequences. Being distracted, anxiety, and depressive disorders are all possible mental or psychological impacts. Most students squander their spare time on the Internet, despite its potential usefulness. A student's learning is hindered when they spend too much time on non-essential research (Singh, 2023) and squander their time on useless material.

6. Conclusion and Implications

With the advent of video conferencing technology,it is the same for a professor to join us in class from across the county or even from anywhere across the globe. A video conversation with pupils from another school may be set up quickly and easily. Students who may be too bashful to raise their hands in class are nonetheless encouraged to participate in online polls and other digital tools. Teachers may more easily monitor their classes and collect student feedback using online engagement tools. Students may get directly into working on a project together in class with the use of social media, whiteboards with interactive components, and other technologies, making it easy to connect with one another and build off one another's ideas. It doesn't matter where they live or how much money they have, students are free to collaborate with one another. Thanks to IT developments, classroom collaboration between teachers and students is more efficient than ever. It broadens their academic and intellectual horizons, making students more versatile in the classroom. A variety of hardware and software are used to improve the educational environment. Technology's beneficial impact on the classroom is the increased accessibility of educational materials. Both past and present information may be easily accessed. Due to the internet's accessibility, remote learning may now be supported by technological means. When students utilize technology in the classroom, they are more likely to pay attention and keep it up. Students retain more of what they learn when they are exposed to technological tools in the classroom. Students can use search engines to conduct research.

There are several unpredictable issues that students and instructors experience in the classroom, including hardware failures, software incompatibilities between home and school, slow or non-existent internet connections, and outdated application versions. No one at school can spell, use

proper grammar, or even write in cursive. Dishonest pupils now have an advantage over their peers because of technological advancements like graphical calculators, high-tech devices, and compact cameras. Graphing calculators allow students to copy and paste formulas and take notes more simply and covertly. Students develop an unhealthy dependency on technology that only worsens with time. Technology is a major contributor to the distractions that plague contemporary society. They avoid doing actual research and instead rely on the numerous unsubstantiated assertions they may find on the internet. The availability of incorrect or unnecessary data hinders their capacity for learning. The availability of incorrect or unnecessary data hinders their capacity for learning. The rapid evolution of educational technology is having a negative impact on students' interpersonal skills. They are growing less able to think for themselves and more dependent on others. Their growing dependence on modern conveniences is making them less resourceful. Overuse of technology has negative effects on students' health. Technology's influence on health goes beyond the physical to include the mental.

7. Recommendations

In this multi-modal digital era, technology is considered a prerequisite tool for an academic institution to function and flourish. These tools are hardware tools that include Monitor, Motherboard, Keyboard, Tablets, and Mouse. Software tools include learning management software, Operating Systems, Application Software, Data, and the internet. With this significance in view, technology is and continues to be an integral part of private organizations for conducive learning.

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