Possible Futures of E-learning:

The Influence of Technology in Education

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Abstract

Learning can be achieved in different ways; being physically present in the traditional class setting, or virtually through the use of technology in what is now known as e-learning. Recently, the education system was affected by the COVID-19 pandemic, which facilitated and necessitated a better understanding of students' e-learning experience, both during this period and beyond. The purpose of this study was to examine the impact that technology has on education, and how it can/might shape the future of e-learning, with a specific focus on universities in Germany. The target population for this qualitative study included students from seven universities, in either a bachelor's or master's program, that have been or are currently engaged in electronic learning. A case study approach, together with purposive sampling was used, to obtain input from 10 participants. A structured interview with predetermined questions was conducted face-to-face and the response data was collected. The findings of the study revealed that participants' preference is largely dependent on the benefits and challenges that are particular to the traditional, e-learning or hybrid models of learning. The changing times and the influx of innovative technology are driving forces towards the increased adoption of e-learning within higher education, and possibly relevant determinants of its feasibility in the future. The findings further revealed that the recently experienced COVID-19 pandemic also had a huge impact on the increased shift and adoption of e-learning as a method of education, capable of ensuring that learning continues anywhere, anytime and in the midst of unforeseen, unprecedented circumstances. Input from the study also identified areas for which additional observations, exercises and research would be useful.

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Chapter 1

Introduction

1.1 Technology in Education: the rise of e-learning

Education is an integral part of a stable life, since it provides for the acquisition of knowledge and skills. It is a form of learning from which one can acquire knowledge of new concepts. Education has now become an essential economic resource that is integral to acquiring new knowledge, where those that are educated are now the most sought-after human resources. A strategic increase in the number of educated people can impact positively on the global economy in terms of improved quality of life, reduction in global unemployment and poverty, as well as maintaining sustainable growth of the Gross Domestic Product (GDP). According to Dewey (1997), "What nutrition and reproduction are to physiological life, education is to social life" (p. 13)[1], and this form of education is primarily transmitted through communication between teachers and students. Ongoing, societal existence, coupled with its complex structure, necessitates the need for teaching and learning, especially in this technological era, where there appear to be significant differences and potentially gaps between experience gained in a face-to-face interaction and what is acquired in a so-called virtual classroom.

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[1] Quote from: Dewey, J. (1997). *Democracy and education: An introduction to the philosophy of education*. Pennsylvania: The Pennsylvania State University.

Technology has had a significant influence on the way we live, impacted virtually every facet of living, in some ways made life easier, and even revolutionized the field of education. The reliance on technology has become unavoidable in schools, colleges and universities, due to the increased benefits derived from it. These benefits include ease and convenience of knowledge transfer, learning effectiveness, enhanced teaching and learning, as well as an increase in active, creative, evaluative, cooperative and integrative forms of learning. The influx of Information Technology and the global adoption of the internet has impacted almost every aspect of our lives, including the way we learn, work, communicate with others, entertain ourselves, and how we receive and share information.

The delivery of education has witnessed drastic changes and a significant transformation, resulting in methods other than the traditional way of learning, which incorporate technology, becoming more common. Raja and Nagasubramani (2018) declared that the role of technology in education is four-fold; as an instructional delivery system; as an important aspect of the curriculum; as a means of improving instruction; and enhancing the entire process of learning. Significantly, both developed and developing countries are investing enormously in Information Communication Technology (ICT) and technology-influenced learning strategies, as students' learning styles are changing. Worldwide uncertainty about the possibility of experiencing another pandemic like COVID-19 or something worse has brought about and encouraged more focus on how technology can help to mitigate what was essentially the virtually total collapse of life as we know it and how we could leverage it for a more predictive, stable future. In terms of learning, especially at the university level, this includes more dependency on electronic learning, now more often referred to as e-learning.

So, what exactly is e-learning? Short for electronic learning, the term refers to the use of electronic technology, including the Internet and a multitude of software

applications, to facilitate and enhance the learning process. Educational activities are delivered through digital tools, such as online courses, so-called “virtual“ classrooms, multimedia materials and remote, interactive assessments. There are many benefits to this approach, which will be iterated further in subsequent sections. One of the more dominant and universal advantages is its promotion and actuation of lifelong learning by breaking down geographic barriers. The effectiveness of e-learning has been extensively studied, and research suggests positive outcomes in terms of knowledge acquisition, skills development and learner satisfaction (Clark & Mayer, 2016; Means et al., 2013). As technology evolves, e-learning continues to evolve, playing an important role in modern education. The influence and impact of e-learning will be discussed in greater detail in upcoming sections.

In order to alleviate the negative impact of the pandemic, and to ensure that learning continued, tech giants like Google and Microsoft offered huge discounts on their products, and some, like Zoom, were even offered for free. As stated by Molla (2020), Zoom removed the time limits for their free video calls version in China, and for schools in the U.S., Italy and Japan; Microsoft lifted existing user limits on its free version of Teams, while offering its premium version at no cost for a period of six months; Google offered its enterprise video conferencing and recording features, that could accommodate a meeting of about 250 people, for free to G Suite and G Suite for Education customers.

E-learning has moved from being an option to a necessity. These days, more and more universities are increasingly showing interest in e-learning. In the 21st century, e-learning has experienced significant progress and has led to noticeable changes in university education. E-learning brought about a rise of about 12-14% in annual enrollments into higher, post-secondary education for online learning over a five-year period (O’Connell, 2002). Students have greater access to online education compared to the traditional classroom method, since learners can connect with lectures from anywhere, and choose to be either a full-time or part-time student (Worthen &

Sanders, 1987). Higher education has also been greatly transformed by e-learning, owing to easier and faster information and data sharing. In terms of the possible outcome of e-learning for future generations, it is important to recognize that e-learning is likely here to stay, and as with so many technology-based platforms, it will continue to propagate into new areas, in conjunction with the availability of these technologies.

1.1.1 Statement of the problem

E-learning or online education has become the dominant method for remote study programs. This is now prevalent in academic institutions that have migrated to one extent or another, from physical classroom teaching and learning to a virtual classroom, facilitated by the use of electronic devices. The involvement of technology in this domain is now inextricable. Internet technology, in fact, plays a central role. The deployment of web-based applications is essential; using these web applications via the internet is how e-learning occurs (Furnell et al., 1998). Due to the ongoing COVID-19 pandemic, there has been a rapid increase in the use of online Educational Technology (ED-TECH) platforms and cloud computing (managing and storing information on remote servers instead of onsite) by educational institutions, to offer e-learning services to learners (Samyan & St Flour, 2021). The number of online students has increased massively since the outbreak of the virus (Soni, 2020). As a result, academic institutions around the world are now challenged to develop new and effective approaches through this medium to ensure continuous, optimized study as well as privacy and security. Some institutions are now compelled to move their courses online in order to remain competitive, maintain their reputation, attract high quality personnel and to increase their student body by being more available.

On a global level, Funamori (2017) posited that the majority of universities worldwide are yet to be fully focused on the urgent need to adapt to the digital age. Some universities in developed countries like the U.S., the UK, and a few others, as previously mentioned, are the main adopters of the Information and Communications Technology (ICT) revolution in education. The progress of global e-learning, an important but difficult process, has been relatively slow due to the many challenges associated with its roll out. These difficulties, according to Aoki (2010), include the absence of personnel and technical know-how for system management and content creation, educators' lack of ICT competency, challenges related to collaborative support systems within the institution, as well as limited understanding of ICT educational outcomes. Fully deploying e-learning in universities can therefore be a slow and problematic process, which needs time and the right types of resources for it to be successful. Abruptly shifting to a virtual classroom during the pandemic was understandable, given the circumstances at the time, but how has it been since then? Hodges et al. (2020) stated that expecting high quality teaching outcomes from the emergency e-learning platforms as a result of the pandemic is an unrealistic expectation, considering that the planning, development and deployment of a full fledged e-learning methodology in universities takes an appreciable amount of time.

The impact of technological implementation practices on students' learning is an area that needs to be investigated, since it suggests that students may be relying on technology more than on books. Despite the numerous advantages of online learning, increasing internet ubiquity, technological advances, and powerful mobile devices are creating serious privacy and security risks for all stakeholders, and may be introducing new formal and informal challenges to the learning process (Mayes et al., 2015). Unfortunately, there isn't a lot of research in this area. The latter is described in a book titled *The Distracted Mind: Ancient Brains in a High-Tech World*, written by Gazzalay and Rosen (2016), in which the authors stated that when technology is used in the classroom students become distracted, and it can block their efforts in focusing

on a goal that may be key to their success. Digital technology distracts learners' attention because their focus is divided between what is being taught and what the learner is doing on their digital device. A sudden distraction during an e-learning session, like a text message or a notification, for example, forces the brain to abruptly stop the learning action, which immediately removes one's current line of thought. As stated by Wessel et al. (2016), the function of the brain that interrupts or stops body movement also interrupts cognition. Intense, so-called multitasking via multimedia reduces the efficiency and potentially the likelihood of finishing a given task (Ophir et al., 2009), leading to the conclusion that electronic devices may well reduce learners' ability to think and process to their full potential.

E-learning has become an increasingly popular form of education, offering students flexibility and global accessibility (Baran & Correia, 2003; Garrison & Kanuka, 2004b). However, the evolution of e-learning depends on the intentions and decisions of users, especially students (Kukulska-Hulme & Traxler, 2002). Therefore, it is important to understand students' attitudes towards e-learning and design more engaging and supportive learning experiences to enhance its effectiveness. Through interviews and written reflections, researchers can also use focus groups to gather insights from multiple students simultaneously (Morgan, 1997). Focus groups allow for active and interactive exploration of student ideas, fostering dialogue and group dynamics that can highlight shared experiences, challenges, and decisions (Kitzinger, 1995).

During the pandemic, many institutions closed face-to-face classes and e-learning was promoted as a suitable alternative. Though several institutions are gravitating towards it, the question as to whether it is capable of providing the same instructional quality as the face-to-face class is yet to be answered. The effects of this shift to an e-learning platform have not yet been studied enough, and it is unclear what it will look like in the future.

With these gaps in research and therefore understanding, the current state and future possibilities of e-learning, especially in terms of making it accessible to all classes of university-level learners, requires more thorough investigation, and is therefore an appropriate area of interest as part of this study.

The main objectives of this study, therefore, are to examine the progress of e-learning globally, analyze the technological implications, and predict its possible impacts and outcomes for future generations.

1.1.2 State of e-learning globally

Education and training are now being delivered over the internet by a growing number of organizations and institutions including secondary schools, colleges, universities, military institutions and corporations.

The COVID-19 pandemic contributed greatly to the increased adoption of e-learning, with the shift to remote online learning platforms by academic institutions for continuous learning, and helped to fuel its popularity worldwide. E-learning played a crucial role in effectively planning, delivering and tracking learners' study processes during the pandemic and essentially forced institutions to adopt digital learning platforms (Acharjya & Das, 2022).

Technological advancement is rapidly changing the face of e-learning by making it more engaging, interactive and personalized. Technology has been the most significant lifeline for continuous learning on digital platforms and has caused a noticeable rise in the adoption of e-learning because it can facilitate students' ability to learn independently (Basak et al., 2018; Shams et al., 2022). E-learning now allows equal access to education for many types of learners. It is, however, inhibited by the so-called digital divide, internet connectivity, and the lack of access to advanced technologies in many areas. The digital divide, according to Moore et al. (2018), means

that young urban students have less access to the internet due to poverty, limited access to electronic devices at home, and a lack of the digital skills that facilitate learning. Furthermore, those that do not have access to functioning desktop computers or laptops but have smart or cell phones may still be hindered by the cost of data to be online to access class materials (Lynch, 2020). This is further confirmed by the global estimate presented by UNESCO (2020a), indicating that 826 million learners do not have access to a computer, 56 million lack network coverage, and 706 million do not have internet.

Ayoub (2020) speculated that Artificial Intelligence (AI) is another and significantly influential factor on the current state of education, with huge implications; the potential to heighten institutions' competitiveness, transform education systems, and empower learners and educators with the necessary abilities. Microlearning has also become a popular trend, which, according to Mohammed et al. (2018), is content that is structured and delivered in small manageable chunks, and allows learners to have access to it wherever, whenever and in whatever form of media they wish to use. It is an action-oriented, technology-enhanced learning approach that helps learners meet their immediate needs and converts complex information into easily digestible portions for improved learning (Leong et al., 2020; Allela, 2021).

Blended learning, in which the traditional teaching approaches are combined with online learning, has also shown to be effective in improving learning outcomes and getting learners to become more engaged in learning. The blended learning approach makes e-learning effective and offers the most scalable and flexible channel to e-learning (Hameed et al., 2008).

Data and analytics are also important aspects of the current state of e-learning, because they enable educators to make decisions based on available data that will help improve the effectiveness of online methods and monitor the level of students' engagement and learning. The advent of e-learning in many universities has enabled the field of education to gain insight and obtain actionable data from the large chunk

of “Big Data” now available via this technology and is important as a means to add value to educational processes (Tulasi & Suchithra, 2016).

1.2 Research background

Learning is no longer confined by space and time, due to the various ways through which one can acquire knowledge, and a lot easier and more convenient than it used to be. E-learning is said to have had its origins in 1840, from the learning by mail method via correspondence courses, created by *Sir Isaac Pitman,* in which a shorthand technique was used to teach. His courses are also regarded as the first distance learning courses, and the concept has remained the same throughout history, with different mediums as a result of technological development (Horton, 2001). In the United States, the first major correspondence program was established at the University of Chicago in the late 1800s, in which the educator and learner were in different locations (McIsaac & Gunawardena, 2001). This marked the beginning of education being made accessible to those who couldn’t afford tuition for full time study and/or could not attend an academic institution due to geography or other obligations.

Correspondence education was first developed in Europe (Great Britain, Germany and France) and in the United States in the middle of the 19th century, and the first recognized correspondence courses were offered by the Chautauqua College of Liberal Arts between 1883 and 1891 (Bizhan, 1997). In the U.S., the first correspondence school was founded in 1873 by *Anna Eliot Ticknor* and was called “The Society to Encourage Studies at Home” (Cole, 2012). The first American educator, *William Harper*, often called the father of American distance education, was the first to introduce structural correspondence study at the university level (Holmberg, 2005). In the UK, the first distance learning college was *Wosley Hall*, Oxford, founded in 1894 (Holmberg, 2005). In Germany, organized correspondence education is believed to

have been introduced by *Gustaf Langenscheidt* and *Charles Toussaint* in 1856 (Noffsinger, 1926). In Sweden, distance education was first introduced in Hermods in 1898, which grew to become one of the world's largest and most influential correspondence organizations in the 1960s and 1970s (Gadden, 1973). In Australia, the first university to enter the distance education field was the University of Queensland in 1911 (Store & Chick, 1984).

These examples demonstrate that the original concept of e-learning, then known as correspondence or distance education, dates as far back as the eighteenth and nineteenth centuries and appears to validate that learning can occur and be effective without learners and educators meeting face-to-face. The major difference then and now is the use of sophisticated Information Technology tools, which make learning far more easily accessible, convenient and can support an effective knowledge process.

The introduction of Information Technology into the learning process presents learners with a wide variety of opportunities to individualize their way of learning, ensure the effectiveness of the knowledge acquired, and organize their cognitive activity, which invariably improves the quality of learning. These benefits have been observed, according to Zhang and Nunamaker (2003), because e-learning provides learners with personalized and flexible ways to learn, learning-on-demand opportunities, and reduces the cost of learning.

Information Communication Technology tools include a wide variety of digital technologies that facilitate learning and correspondence, through the creation and exchange of relevant information. These include computer software and hardware, internet and multimedia tools, cellular and satellite technologies, cable and wireless communication networks, as well as electronic or so-called e-mail. E-learning has significant technological implications on academic institutional stakeholders, including availability, accessibility, flexibility, quality, and affordability. Electronic teaching and learning make it possible for educators and learners in diverse locations

to continue sharing and acquiring knowledge using appropriate platforms and digital devices. It makes reliable learning content readily available and affordable, almost anywhere. It also makes it possible for educators to repeat a lesson to several and diverse groups of students, located anywhere and in different time zones, lowering the cost-of-service delivery (McCormick & Scrimshaw, 2001; Nagy, 2005; Allen & Seaman, 2008).

The use of technology is a significant aspect in the e-learning domain and continues to improve to optimize the educational process. Education using IT was introduced into universities in the late 1980s. The momentum of this trend gained significant traction nationwide as Local Area Networks (LAN) were progressively deployed on campuses from the 1990s into the early 2000s (Funamori, 2017).

For e-learning to be effective in universities, the following are required: High speed, reliable internet connection, video conferencing software that can accommodate at least 40 to 50 students, accessibility of lectures on both mobile phones and laptops, availability of discussions to keep classes organic, and provisioning for real-time feedback, as well as previously recorded lectures that can be viewed anytime (Basilaia et al., 2020). E-learning requires universities to create and develop the following resources to support the learning process: Technology, staffing, automated training, online educational resources and ongoing adoption of new technologies that align with the goals of the institution (Sandybayev, 2020).

E-learning can also be enhanced by leveraging technology that provides educational resources and making the learning environment more flexible, by adding electronic media via established communication networks (Velazquez & Assar, 2007). Online learning can have a huge positive impact on students' outcomes, and there are indications that some students enrolled in university e-learning courses perform much better than those being taught in traditional classes. One example, as reported by Helwan University (n. d), reported improvement in students' examination results due

specifically to e-learning techniques. This would indicate that it is likely essential for universities to embrace this new technological and social environment, to see how they can best enable its benefits to the student experience.

1.2.1 Study objectives

This study aims to understand the concept of e-learning and the use of information technology in university education, by providing a broad view of what is involved in learning, specifically via electronic media. In order to understand the issues around e-learning, the research questions are based on the aforementioned objectives:

1. To examine the progress of global e-learning
2. To analyze the effects and implications of technology in the educational domain
3. To predict e-learning's possible impacts and outcomes for future generations

1.3 What is learning?

Learning is a complex and varied process with several definitions, theories, perspectives, and interpretations as to how it can be facilitated effectively. The concept of learning is very important because not everyone learns the same way, and everyone has their own unique method of learning. According to Dewey (1938), learning is a lifelong process of building and rebuilding experience, in which one pursues education in order to acquire new knowledge and skills. Vygotsky (1987) stated that learning can occur effectively in a social environment and can be made meaningful by engaging with others. If learning was a straight line, understanding and applying it would be a lot simpler.

In the course of this research, the knowledge of learning theories is considered relevant, because as stated by Ertmer and Newby (2018), they are sources of established learning techniques, that provide the foundation for reasoned and intelligent discernment and decision making, where the integration of the chosen approach becomes critically important to the instructional framework. Theories allow trustworthy prediction (Richey, 1986) and learning theories provide valuable information about correlations between instructional design and components, while illustrating how specific techniques can fit each learner within a stated context (Keller, 1979). Understanding some of the principles of learning allows one to project them to other areas as needed. A fundamental knowledge of the learning theories as stated by Bruner (1971) can also provide "canny strategy whereby one could know a great deal about a lot of things while keeping very little in mind" (p. 18).[2]

There are basically two learning process perspectives – cognitive and behavioral, both of which have distinct features, but converge to describe the learning phenomena. These two perspectives have historical and current relevance to instructional design, and when examined can provide insights into their prescribed learning activities. Historically, the roots of learning theories go back to when the question of the origin of knowledge arose. In answering this question, Ertmer and Newby (2018) stated that *empiricism* and *rationalism* are the two opposing positions on the origin of knowledge that have existed for ages and are still evident and being used in learning theories.

[2] Quote from: Bruner, J. S. (1971). The process of education revisited. *Phi Delta Kappan*, 53, 18-21.

Empiricism, according to Schunk (1991) refers to the fact that the main source of knowledge is experience. This is known as the *tabula rasa*, where the mind is thought to be blank hypothetically, before acquiring knowledge from outside impressions through interactions with the environment. On the other hand, rationalism is the notion that knowledge is derived from reason, without the help of the senses (Schunk, 1991). In this case, humans learn from the intellect, by recalling things that already exist in the mind.

1.3.1 What is e-learning or online education?

E-learning, online education and distance learning are terms that are continuously used interchangeably, in an attempt to describe learning that is assisted by some form of electronic device, in either a physical or virtual classroom. Although the goal is the same, there are distinctive differences in how it is achieved. E-learning refers to activities involving the simultaneous use of interactive networks and computers, where the devices are not the dominant activity, but must be incorporated into the learning activity (Tsai & Machado, 2002), which can be conducted nearby, at a distance or as a combination of these (Wheeler, 2012). Online education can be a synchronous or asynchronous learning experience, where students and instructors can be anywhere to learn, using different types of electronic devices that have internet access (Singh & Thurman, 2019). In defining distance learning, Moore and Kearsley (1996) described it as planned learning, which takes place outside the four walls of a classroom, with special instructional techniques and course design, using electronic means of communication and other technology, and includes specific administrative and organizational arrangements.

The term e-learning was first mentioned in 1999 by Researcher and Educator *Elliot Masie* during a Computer Based Training (CBT) seminar, to show how computers are used to learn, earn an online degree, and improve the overall delivery of education (Keegan, 2020). There is, however, evidence, as previously noted, that suggests that

the earliest forms of what we now call e-learning existed as far back as the 19th century. By 2019, e-learning was already enjoying a high rate of adoption and growth with US$18.66 billion in education technology investments reported, as a result of recent technological improvements even before the pandemic, and exposed the vulnerability of physical classrooms. Online learning is positioned to experience exponential growth, with a projected spend of US$350 billion by the year 2025 (Research & Markets, 2019; Business Insider, 2020).

In the e-learning environment, learning is achieved using Learning Management System (LMS) tools. An LMS is a software application used to organize, record, document and deliver e-learning courses including, but not limited to reading materials, learning games, grading, testing, web conferencing, video, and audio (Bezhovski & Poorani, 2016). Along with an LMS, e-learning is also supported by an internet connection, a personal computer or other electronic device, a web browser, email programs, a video camera for video conferencing, a microphone for audio conferencing, as well as various types of media players (Horton & Horton, 2003).

The abrupt shift of classroom learning to e-learning during the pandemic and its continuation has also impacted negatively on another cohort of learners. UNESCO (2020a) reported that 706 million students do not have access to the internet at home or a household computer, and 56 million students live in areas not covered by mobile services and do not have the technical know-how to utilize mobile phones for online learning. On the other hand, the explosion of information technologies where available, for both e-learners and site-based learners, has enabled them to come together. Erasing the boundaries of time and place, and blurring the distinctions between traditional, face-to-face education and these newer forms facilitates both individualized and collaborative learning (McIsaac & Gunawardena, 2001). A significant change has occurred in the e-learning platform as a result of the exponential growth of information technology and the internet, which has brought about the rapid

development of new e-learning platforms for educators to facilitate assessments, and for students to engage in learning (Molins-Ruano et al., 2014; Biasutti, 2017).

1.3.2 Quality assurance and accreditation issues in online learning programs

Quality and accreditation are important factors in ensuring the reliability and effectiveness of online learning systems. However, there are many challenges to maintaining and certifying these systems. Research by Allen and Seaman (2016) reveals that the pace of online development has outpaced the development of rigorous quality control measures, raising concerns about accuracy and reliability, as organizations and accreditation groups struggle with how to define and measure quality in virtual learning environments (Wheatley, 2016). In addition, issues with faculty qualifications and training pose challenges in ensuring the quality of online education. While online instructors need specialized knowledge and skills to successfully design the virtual learning experience, there is often a lack of advanced training and professional development opportunities in this area (Bartley et al., 2018). This lack of faculty preparation can affect teaching quality and student outcomes in online courses. Addressing these issues is essential in order to maintain educational standards and build stakeholder confidence. By developing robust policies via improved qualifications, developing clear criteria for accreditation, and investing in teacher training support, institutions can increase the reliability and effectiveness of online education.

1.3.3 Shaping the future of e-learning through cognitive learning

Understanding the conceptual foundation of e-learning is critical to shaping its future. E-learning is based on active participation in a digital environment, which requires engagement with cognitive processes such as memory and problem solving (Eysenck & Keane, 2015). Vygotsky's (1978) developmental focus emphasizes the scaffolding of

students' cognitive development. Mayer's (2005) cognitive theory of multimedia learning emphasizes managing the cognitive load for optimal outcomes. Sweller's (2011) cognitive load theory suggests how to optimize e-learning materials. Bransford et al., (2000) examine cognitive strategies and instructional practices in "How People Learn". Emphasizing the role of prior knowledge, meaningful interactions, and metacognitive (awareness of one's own thinking process) strategies, this work informs the design of e-learning modules to foster deeper understanding and process development among students. Clark and Meyer's (2016) "E-Learning and the Science of Instruction" provides evidence-based guidelines for e-learning design. Integrating insights from these activities improves e-learning by aligning with students' natural cognitive processes. Integrating research findings from cognitive perspectives, this resource provides teachers and instructional designers with practical strategies for using multimedia, managing cognitive load, and facilitating active learning in digital environments. A progressive approach approach to learning requires a deeper integration of conceptual foundations and social interaction theories. By leveraging these insights, e-learning platforms can be tailored to meet the needs of students, providing an efficient and engaging educational experience in the evolving digital landscape.

1.4 How are education and democracy related?

Dewey stated that "Democracy is a way of life controlled by a working faith in the possibilities of human nature" (Dewey,1939/1988, p. 226)[3] – not merely by faith "but by faith in the capacity of human beings for intelligent judgment and action if proper conditions are furnished" (Dewey, 1939/1988, p. 227)[3].

[3] Quote from: Dewey, J. (1939/1988). Creative democracy – the task before us. In J. O. Bodyston (Ed.), *John Dewey, The Later Works 1925-1953, volume 14: 1939-1941* (pp. 224-230). Chicago, IL: Southern Illinois University Press.

Democracy in education, as declared by Feu et al. (2017) is indiscriminately linked to equality, governance, altruism, the common good, participation and collaboration, with no precise criteria used in determining the correlation of these concepts with democracy. Westbrook (1993) stated that Dewey, who was regarded as the most prominent advocate of participatory democracy, saw it as an ethical ideal that calls on everyone in the society to build communities where the necessary resources, infrastructure and opportunities are made accessible to every individual, so as to enable them to build their powers and capabilities via active engagement in a social, political and cultural life. Democracy is seen as a process that provides more access to information and more efficient access to voting.

Dewey (1897) further suggested that education for democracy involves sharing in a common life, that "education is a regulation of the process of coming to share in the social consciousness; and that the adjustment of individual activity on the basis of this social consciousness is the only sure method of social reconstruction" (p. 15).[4] Education and democracy are correlated because education is seen as a pivotal democratic institution that concerns itself with building societies where citizens can have equal rights to available resources for better living.

While revisiting Dewey's book *Democracy and Education*, Peters and Jandric (2017a) evaluated the growth and development of democracy against the Western decline of social democracy and identified three turns – global, ecological and digital - which distinguish the democracy of today with that of Dewey's times. The authors further stated that the three turns cannot be analyzed in isolation, and that although Dewey's understanding of democracy is significantly different without the impact of these turns, his work is still considered valuable.

[4] Quote from: Dewey, J. (1897). My pedagogic creed. *The School Journal, 54*, 77-80.

The digital turn, which is the focus of this research, relates to the concept of collective intelligence which manifested with the arrival of Information and Communication Technologies (Peters & Jandric, 2017b). It has landed us into the age of digital reason (Peters, 2014), where an individual's approach to knowledge sharing is gradually but surely being supplemented, and in most cases, fully replaced by technology-supported, collective intelligence (Peters 2015; Peters & Jandric, 2015).

Collective intelligence is defined as the creation of enhanced capacity through technology, in which people work together to mobilize a wider range of insights, information and ideas (Berditchevskaia & Baeck, 2020). Collective intelligence is further defined as a process that merges human and machine intelligence, with the intention of achieving results that neither one of these can achieve in isolation (Lykourentzou et al., 2011).

In the 19th and early 20th century, the growth of political rights, especially as related to suffrage, resulted in the expansion of access to lower-level education in the UK, the U.S. and the Scandinavian countries (Lindert, 2005). In Africa, Stasavage (2005) demonstrated that democracy is linked to spending money on primary education, while Harding and Stasavage (2014) illustrated how elections can result in subsequent elimination of schooling fees. Though democracy is highly ranked above autocracy in terms of providing easier access to and more education, as well as greater enrollment, it is not certain whether it is better (Dahlum & Knutsen, 2017). Even so, a strong link has been established between democracy and education which in the long run, will likely result in better educational outcomes. Murtin and Wacziarg (2014) further stated that in the coming years, countries with unproblematic democratic transitions will have a large percentage of children and youths enrolled in schools, where they will spend more years, and enjoy subsidized schooling fees.

1.5 Research questions

The following research questions were formulated:

1. How is e-learning influencing the global university education system in the 21st century, especially in Europe?

E-learning has revolutionized global university education in the 21st century, especially in Europe. This shift, reflected in the use of digital technologies and online methodologies, has resulted in more accessible instruction (Johnson et al., 2018). Blended learning models and virtual classrooms are increasing in popularity (Garrison & Kanuka, 2004a), and the work of several scholars suggests that e-learning tools increase student engagement and enable personalized learning experiences (Picciano, 2017; Siemens, 2005). The combination of asynchronous and synchronous teaching approaches results in different teaching strategies (Means et al., 2013). Continued research is essential to the success of e-learning in higher education (Allen & Seaman, 2016). This will be discussed and developed in greater detail in Section 2.5.1.

2. How does technology influence education?

Technology has a profound impact on education, shaping teaching methods, accessibility, and student engagement. Research highlights its impact on instruction, such as the transformative potential of online learning (Garrison & Kanuka, 2004a). Digital tools and multimedia enhance information delivery and control different learning styles (Mayer, 2014). Adaptive technologies can personalize learning experiences, improving outcomes (El-Sabagh, 2021). In addition, mobile devices facilitate collaborative learning and knowledge sharing (Gikas & Grant, 2013). The role of technology in education is constantly evolving, requiring continuous evaluation and adaptation (Simonson et al., 2012). This will be discussed and developed in greater detail in Section 3.1.

3. What is the importance of software in e-learning?

Software plays a key role in e-learning, transforming the way education is delivered and experienced. It empowers teachers to create interactive, engaging, and personalized learning environments that meet the needs of diverse learners (Bates, 2005b; Mishra & Koehler, 2006). A learning management system (LMS) forms the backbone of e-learning, managing course content, tracking progress, and facilitating communication between instructors and students (Garrison & Kanuka, 2004a; Picciano, 2002). E-learning software has increased accessibility and affordability, allowing students to access educational materials pretty much anytime and anywhere (Moore, 1993; Prensky, 2001). It has also provided a platform for collaborative learning, fostering networking and knowledge sharing among students (Dede, 2005; Garrison & Anderson, 2003). E-learning software has become an indispensable tool, transforming the educational landscape and empowering students to reach their full potential. This will be discussed and developed in greater detail in Section 3.1.2.

4. Does the growing popularity of e-learning globally indicate its possible future?

The rise of e-learning as a dominant form of education is reflected in the growing number of e-learners worldwide, estimated to reach 524 million by 2024 from 372 million by 2020 (Cisco, 2023). This increase is due to technological advances, especially high-speed internet and accessibility via devices that are now available almost anywhere. In addition, the increasing demand for lifelong learning has led to the adoption of e-learning platforms (Cisco, 2023). E-learning is usually very cost-effective, eliminating the need for travel and accommodations (Etikan et al., 2016b). It has the potential to democratize knowledge acquisition and make learning more personal and enjoyable (Etikan et al., 2016b). E-learning can empower individuals to pursue their educational goals, regardless of location or program (Blatter &

Haverland, 2012). It also has the potential to enhance the learning experience, allowing students to learn at their own pace and in line with their own style of learning (Patton, 2002). For these reasons, the expanding popularity of e-learning points to a promising future for this form of education. This will be discussed and developed in greater detail in Section 3.4.

5. Why do we need to consider students' experiences, in order to understand their responses?

Exploring students' views through their responses can provide nuanced insights into the diverse factors shaping educational perspectives. Grounded in educational psychology (Piaget, 1970; Vygotsky, 1978) and student-centered learning (Weimer, 2002), this approach recognizes the subjective nature of experiences. By actively engaging students in the research process, educators gain access to authentic narratives, enriching our understanding of individualized learning journeys. This participatory strategy ensures the relevance and depth of research findings, fostering more comprehensive insights into the intricate elements influencing students' outlooks. This will be discussed and developed in greater detail in Section 4.1.4.

1.5.1 Hypotheses

The following hypotheses were also formulated, in order to consider potentially negative impacts of e-learning:

Ho1: E-learning may not have a promising future because of the absence of social interaction.

Ho2: Students may lose the essence of education as a result of being technology dependent.

Chapter 2

E-learning factors and influences

E-learning is the result of many factors; the need to access education more conveniently, reduce the associated time, cost and distance required to acquire it, leverage the benefits of technology that facilitate learning, as a means to complement the traditional approach to learning, and enhance students' attendance, motivation and engagement in the learning process. These factors, and the effects/outcomes of e-learning may motivate higher education institutions to take more proactive and tactical steps towards deploying and implementing e-learning, including a focused attention on the quality of its delivery. E-learning has migrated learning from the conventional, teacher-focused method to one that is technology driven, synergistic, convenient, flexible, and learner-focused. Because of this, e-learning has a structured, but very different approach to learning, that every institution may benefit from.

The following chapter presents a review of previous literature from various researchers and institutions about past scenarios of e-learning and how the term came to be used. The subsequent section will analyze the e-learning education system, examine how e-learning has revolutionized education and review the state of e-learning in higher education institutions. The chapter will also outline a theoretical review by providing a framework for understanding the application of e-learning

technologies in higher education. This is followed by an analysis of e-learning strategies deployed in the European Union, Germany, Netherlands and Sweden. Lastly, the chapter will examine how e-learning is becoming a business and a significant contributor to the economic sector.

2.1 The history of e-learning

The development of e-learning is linked to the technological innovation, affordability, and accessibility of electronic devices that facilitate communication. The first form of electronic education, Computer-Based Training (CBT), regarded as the cornerstone of e-learning today, originated in the late 1980s and 1990s (Eger, 2005). CBT was key to the progress of the development of e-learning, because personal computers could store additional media via so-called compact read-only memory discs, or CD-ROM. These provided additional content but were limited in terms of where and when the information could be accessed, since it was confined to the device (Hubackova, 2015). During this time, tremendous development on the technological front was also being experienced. This led to the rise of the internet and the creation of the information system now known as the World Wide Web (www), which, at that time, could only deliver information in text format. Then, in the early 1990s, browsers were created, which enriched texts with various types of media and promoted more widespread accessibility, which in turn brought the cost of the internet down and made it more affordable for a lot more people (Hubackova, 2015). Web-based training, which created programs not only for teaching but to facilitate communication between teachers and students, emerged (Baresova, 2003), and formed the basis of what is now known as e-learning, with the term first being used in 1999 (Kopecky, 2006). By 2002, e-learning emerged as an educational approach that demonstrated positive results in universities and organizations, showing that it could be effectively included for both distance and face-to-face instruction (Eger, 2005).

A brief summary of historical events in e-learning between 1980 and 2018, according to Tamm (2019):

1. In 1983, an online educational network named Electronic University Network (EUN) was established by former Atari president, *Ron Gordon,* to assist universities and colleges with implementing online courses.
2. In 1986, one quarter (25%) of all high schools were already using personal computers for career and college guidance.
3. 1989 saw the invention of the World Wide Web (www) by British scientist *Tim Berners-Lee,* designed for knowledge sharing between academic institutions.
4. In 1994, CompuHigh – the first accredited, wholly online high school was established to serve international, English-speaking students from grades 9 to 12, as well as U.S. nationals.
5. The term "e-learning" was first used in a professional context in 1999, by *Elliot Masie*, during the TechLearn conference at Disneyworld.
6. The first fully accredited online university, Jones International University, was also introduced in 1999, which offered online courses and diplomas in business and education to students until 2015, when it was officially shut down.
7. In 2002, the Massachusetts Institute of Technology (MIT) started offering free lectures and online course materials through its OpenCourseWare project.
8. In 2008, the term Massive Open Online Course (MOOC) was first used by *Dave Cormier*.
9. Then 2012 was tagged "The Year of the MOOC", when one of the world's largest online learning platforms, Coursera, was established by *Andrew NG* and *Daphne Koller* from Stanford University. Two other successful online learning platforms were also started – edX and Udacity.
10. By 2014, 98% of public universities and colleges were already offering fully online learning programs.
11. In 2018, the size of the global e-leaning market surged to US$168.8 billion.

This high level chronology shows a steady and continuous growth, and indications are that even more, exponential development will occur, which will compel institutions and the e-learning market to constantly evolve, innovate, adapt and redesign e-learning practices, as well as cater to changing demands, in order to remain competitive in the learning industry. According to Tamm (2019), e-learning is still in its early stages, and the world is waiting for the next round of innovators in educational technology to push the envelope even further.

2.1.1 Origin of and defining the term e-learning?

One of the myths about e-learning is that everyone knows what it means, when in fact it has a different meaning to different people (Dublin, 2003).

The term "e-learning" was coined in 1983 by *Mary Alice White* in a journal article entitled "Synthesis of Research on Electronic Learning" where it was defined as "learning via electronic sources, such as television, computer, videodisk, teletext, video text" (White, 1983, p. 13)[5]. E-learning is an abbreviation for electronic learning, which refers to an environment for interactive, distance learning (Morri, 1997). It was and still is used to describe the use of technology to deliver learning programs. The intention is to support a wide range of electronic media, such as the intranet, the internet, the extranet, interactive TV and CD-ROM, audio/video tape, as well as satellite broadcasting, to make learning more flexible (Blezu & Popa, 2008).

[5] Quote from: White, M. A. (1983). Synthesis of research on electronic learning. *Educational Leadership, 40*(8), 13-15.

The term e-learning is also used to refer to a form of learning where the entire course and all interaction between learners and tutors take place online (Obringer & Hawkins, 2005); a methodology where learning experiences, as well as teaching contents are enabled and delivered by technology (Glušac, 2012); and any learning that includes all online and computer activities that facilitate learning and teaching inside and outside a classroom (Bates, 2005a), which could take place as part of a class, or individually, instructed or guided by a computer (Odero, 2005).

2.1.2 Blended vs. hybrid learning

The influx of technology has increased the rate at which traditional face-to-face learning is blended with online learning environments, which has increased the reliance on it for this purpose. Blended and hybrid learning are tools used to implement e-learning in educational institutions. Blended learning was first used at the beginning of 2000 and was regarded as the most popular pedagogical concept (Guzer & Caner, 2014). The first study that used the term “blended learning” was conducted by Cooney et al. (2000) and was aimed at combining the elements of work and play, in order to illustrate blended activities. Though O’Byrne and Pytash (2015) declared that blended learning, hybrid learning, and mixed-mode learning can be used interchangeably, Reed (2020) used distinct definitions for blended and hybrid learning: Blended learning refers to the use of online learning to enhance and complement traditional face-to-face methods, while hybrid learning is a form of learning that mixes traditional face-to-face with distance or offline learning techniques (Reed, 2020).

Blended learning was defined by Rao (2019) as a learning technique that provides educational solutions through the effective combination of traditional classroom learning and online learning activities, and is rooted in the fact that learning is a continuous process and not a one-time event.

Blended learning, like any other learning modality, presents its own set of challenges that must be addressed. Norberg (2012) suggests that while technology has eliminated the need for a physical classroom, cultural barriers still persist, hindering the creation of an ideal learning environment. The combination of online and offline study necessitates a shift in our traditional approach to teaching and learning.
Bell et al. (2014) outline four types of synchromodal learning structures, which serve as topographical representations of blended learning: linked classroom, shared portal, personal portal, and small group. The effectiveness of blended synchronous learning, therefore, largely depends on its design and dependability (Stewart et al., 2011; White et al., 2010).

In the initial stages of synchronous blended learning, there were issues with bandwidth and correspondence (Shield et al., 2005; Park & Bonk, 2007; Atweh et al., 2005). Teachers and students must, therefore, work together to ensure the success of blended learning as an interactive study method.

Hybrid learning is further described as a comprehensive learning technique, where some learners attend the session virtually, while others attend in-person in a classroom setting, and instruction is provided to both at the same time (Krantzow, 2022). Some of the tools used for hybrid learning include LMS, video conferencing, pre-recorded video training, online tasks, and online discussion boards. Hybrid learning can be implemented in diverse ways, and provides personalized instruction, with students having control to some extent over the pace, path, time and place (O'Byrne & Pytash, 2015).

Studies have indicated that both learning styles are effective and beneficial to students, since they enable content engagement, flexible scheduling, learning at one's own pace, and the ability to track learning, as well as being cost effective, and potentially encourage personalized learning (Reed, 2020; Sandy, 2021; Neelakandan,

2021). Through the implementation of blended learning, students acquire interactive and communications skill sets within the educational community while tapping into the world of knowledge (Vaksalla et al., 2019). The major difference between the two styles, as declared by Neelakandan (2021), is that blended learning combines e-learning and traditional methods, while hybrid learning provides students with the choice of either learning in-person or participating online.

2.2 Analysis of e-learning in education

E-learning has a very vital role to play in the education system, especially in the area of enhancing learning and making it more easily accessible. Several international authorities have declared that e-learning will not only play an important role in reaching some 21st century global goals like lifelong learning, e-governance and globalization, but will also promote sustainable development in several sectors (UNESCO, 2020b; United Nations, 2010).

The application of modern ICT through the introduction of e-learning has created a positive and stimulating climate and serves as a catalyst for the recent changes experienced in higher education (Zlatkovic et al., 2019). Globally, post-secondary institutions have started investing heavily in e-learning and the use of technology to support it. According to Bates (2001), e-learning is used in universities and colleges primarily in three ways:

Technology Enhanced Classroom Teaching: This involves integrating the Web and the internet into classroom teaching where educators can build a course Web page with links to resources, convert PowerPoint presentations to electronic documents that can be downloaded and printed by students from a website, construct a course website with links to the educator’s papers, research materials, and links to other authors’ resources, and use other websites for illustration purposes, in which learners can participate in online discussion forums.

Distance Education: Highly reputable universities with vast on-campus teaching programs, whose mandate is to serve all citizens in their surrounds, have been offering combined campus-based and distance education programs for a long time. Essentially, distance education is implemented to complement on-campus teaching. These are mainly print based, with support from online components like e-mail. Here, distance education was created to cater to working professionals, farmers, and those who could not afford to be on campus, or away from their jobs and homes (Rumble & Harry, 1982; Mugridge & Kaufman, 1986). There are also large and dedicated single-mode distance education institutions that are known for using mass communication technologies, like print and broadcasting, whose enrollments exceed 100,000, with high fixed costs and low marginal costs. These offer an average cost per student that is less than the dual mode and other conventional, campus-based institutions.

Distributed Learning: The revolutionary development into distributed learning radically changed the ways of the traditional campuses into a mixed form of learning, where there was a deliberate reduction in face-to-face teaching, combined with increased online learning. This could also be described as mixed mode or flexible learning, enabling the benefits of combining campus and online learning. As declared by Sorg et al. (1999), when face-to-face classes are combined with online learning, grades are greatly enhanced, compared to either distance education courses or straight face-to-face teaching.

In the course of introducing e-learning into the education system, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis (see Table 1, below) was carried out and cited in Zlatkovic et al. (2019). This type of analysis further considers it impacts, by outlining internal strengths and weaknesses, as well as external opportunities and threats for a given framework.

Strengths (Internal Factors)	Weaknesses (Internal Factors)
I. Creative learning (e-learning is more fun and exciting) II. Better visualization and simulation, innovation and multimedia capabilities III. Collaborative learning. Possibility of dynamic interaction (students have better access and communication with the tutor, immediate feedback and discussion with other students) IV. Adapting to student learning style (students learn independently at their own pace; no need to change their learning style) V. Ability to integrate work and learning VI. Lower costs (minimized travel costs, reduced administrative costs, etc.) VII. Save time for students and tutors; Use of communication aspects of ICT usage VIII. Availability of all required teaching content on the internet, greater availability of knowledge and information	I. Students should be extremely motivated, active, with high self-confidence and excellent self-organization skills; II. Fear of losing educational values (students miss teamwork, discussions, and expressing the professors' views and opinions "face to face"); III. Fear of losing personal contact by reducing Face to Face (F2F) communication, the internet has the potential to isolate students; IV. Possibility of misunderstanding and misinterpretation; V. Financial investment and system setup costs; VI. Technological readiness and technical prerequisites for students and tutors; VII. Reorganization required; VIII. The possibility of under-participation of students in interactive online activities (fear of inconvenience in public); IX. The problem of authorizing teaching content on the web; X. The problem of student identification (in knowledge assessment)
Opportunities (External Factors)	**Threats (External Factors)**
I. Learning anywhere, anytime, and the so-called 'just in time any time' approach; II. Lifelong learning III. Flexible approach to learning (ability to work and learn side by side); IV. Reducing the cost of education; V. Increasing the share of highly educated staff; VI. Response to the "imperative" of technology	I. Risk of unprofitable investment; II. The problem of recognizing such a mode of education and a diploma; III. Obsession with an easy way to earn a diploma, without gaining adequate knowledge of a degree; IV. Deviation from traditional university values; V. Danger of personal isolation

Table 1 - SWOT Analysis (Source: Zlatkovic et al., 2019)

2.2.1 The e-learning revolution in education

In the last couple of years, ICT in learning has brought about remarkable changes in education. Web-based course delivery, for example, has been on the rise in most educational institutions. A revolutionary period has been created in education, due to recent developments in ICT-facilitated e-learning, which has invariably transformed

conventional education methods into virtual platforms (Meena et al., 2017). The education domain has accompanied civilization throughout the centuries by regularly adapting its tools in order to fulfill learners' expectations (Bilal, 2015). A significant number of institutions, university websites, e-Portfolios and governments have chronicled the increased number of web-based education initiatives (Gyambrah, 2007). Evidence of this heightened activity is underscored by the number of publications continually evaluating the processes of electronic education (Kakoty et al., 2011; Rana et al., 2014; Almaiah et al., 2020).

The 1980s according to Bilal (2015) marked the emergence of the use of the compact disc (CD) in education, and was characterized by the poor quality of interaction between the learner, educator and the instructional material. This setback was resolved by the appearance of the internet, which helped to justify the adoption of e-learning and fulfilled the conditions of immediacy and simultaneity. This revolution has made it possible for the traditional learning process to be transformed into the enhanced learning process we are experiencing today, where learning materials are accessed anytime, anywhere, from numerous sources, and the means of acquiring knowledge, both on a full-time and part-time basis, has been greatly simplified.

In a study conducted by Gupta et al. (2013) on the revolution of e-learning in education, it was proposed that the field would be transformed by this format, regardless of whether it was a full-time, part-time or distance program. Education has been greatly altered because opportunities for lifelong and general learning, as well as creativity and innovation have all been enhanced by e-learning. E-learning facilitates learning without the traditional constraints of time and boundaries. It provides learning content via various digital means, unlike traditional education. It also, notably, requires self-motivation and self-discipline to achieve desirable outcomes (Meena et al., 2017). E-learning is a very powerful tool that addresses the need for better access to education. Students who desire educational attainment but

are restricted due to distance can achieve schooling via virtual connection, with online platforms as a viable alternative to classroom learning (Vanve et al., 2016). E-learning technological innovations allow learning to be personalized (adaptive learning), enhance learners' interactions with others (collaborative learning), present several research opportunities for faculty, and also deliver a broad range of solutions to enhance performance and knowledge (Vanve et al., 2016). Learners have become more aware and active in the use of, as well as comfortable with technology, due to easy access to digital devices like computers, mobile phones, tablets, and so on (Khajanchee, 2016), which suggests that there may be an even brighter future for e-learning.

2.2.2 E-learning in higher education

In Higher Education Institutions (HEIs) worldwide, the unprecedented outbreak of the pandemic established e-learning as one of the most critical components in the continuity of learning (Pham & Ho, 2020). In recent years and especially since COVID, higher education has been forced to look at re-modelling the learning processes and methodologies, by incorporating digital resources and devices into learning and training. The pandemic resulted in the closure of all educational institutions, including colleges, schools and universities in almost all countries in the world. The United Nations Educational, Scientific and Cultural Organization (UNESCO) as cited in Araújo et al. (2020) reported that nationwide closures were implemented in more than 160 countries, which impacted about 87% of HEIs students. Additionally, approximately one billion students who rely on face-to-face learning were also impacted (Fauzi, 2022). According to the World Bank Group (2020), the educational system was already struggling, and the COVID-19 pandemic served to destabilize it even further.

The suspension of face-to-face learning, aimed at curtailing the spread of the virus, increased the uptake of synchronous and asynchronous online learning globally (Li & Lalani, 2020; Dhawan, 2020; Pokhrel & Chhetri, 2021). Before the pandemic, e-learning

was not new to HEIs, just not implemented on the large-scale level it is now. In-class was the main mode of learning, while e-learning served as complementary. Video and teleconferencing platforms such as Google Classroom, Webex, and Microsoft Zoom gained tremendous traction when institutions needed alternatives during the quarantine period (Fauzi, 2022; Dash et al., 2021).

By 2025, worldwide demand for higher education is projected to experience exponential growth, from 100 to 250+ million students (European Commission, 2014). These days, students want a form of education that is easily accessible, timely, relevant, flexible, available on demand, and fits into their particular circumstances. This then raises the question of how higher education institutions intend to maintain and improve the quality of learning in the face of these growing and changing needs. In order to remain viable, higher institutions must, for example, have seamless integration between online and in-class learning. A report for the European University Association declared that the main goal of the European Higher Education Area (EHEA) is to ensure that digital learning is used to enhance traditional higher education methods, not replace them (Gaebel, 2015). In the European Union, one report has indicated that the e-learning market is led by Germany (Research & Markets, 2019), and that it is growing at a rate of 8.5% annually, compared to the country's rate of economic growth at 1.9% (Michel, 2018).

The invention and influx of high-performance mobile devices, such as iPhones, has resulted in a shift from being just a convenience item to being a necessity. In higher education, the use of mobile technologies in learning experienced a rapid increase over just a 10-year period (Krull & Duart, 2017; Crompton & Burke, 2014). The increased ownership of mobile technology, particularly smart phones, has resulted in their rising usage to support students' learning, attributed to the fact that these devices are agile taskmasters for communication, photography, and information access (Pomerantz & Brooks, 2017).

The increased use of technology for academic purposes comes with challenges; these include the absence of effective technical support for mobile learning, different views between learner and educator of mobile technologies, as well as a lack of training for educators and other forms of pedagogical support (Seilhamer et al., 2018). A number of instructors frown upon the use of mobile technology in the class, because they view it as a form of distraction. A study conducted by Brooks (2016) indicated that even though more than half of educators admitted that mobile devices are beneficial to learning, 63 percent expressed concern about the devices also being a source of distraction. In another study, the majority of students reported that instructors did not want them to use their tablets (65 percent), or smartphones (58 percent), as learning tools during lectures and 52 percent of faculty banned or discouraged the use of smartphones in the classroom for this reason (Pomerantz & Brooks, 2017).

2.3 Theoretical framework

There has been a tremendous increase in the amount of research and number of articles written about the e-learning practice. Very little attention, however, has been given to the theories of e-learning. In spite of this, the considerable amount of institutional investment into the e-learning practice, published articles, and adoption of web-based learning tools in the past decades attest to the fact that e-learning has achieved an accelerated momentum, that will likely make it an essential part of future education (Nichols, 2003). In order to ensure that e-learning practices continue to evolve, it is necessary to explore and debate its theoretical underpinnings, by embracing a common philosophy and a wider platform, so that e-learning can thrive (Gyambrah, 2007). As stated by Ravenscroft (2001), the use of technology in education has unfortunately tended towards being technology-led rather than theory-led. The E-learning Theory Framework and the Social Construction of Technology (SCOT) Theory will serve as the theoretical bases for this study.

2.3.1 E-learning theoretical framework

Figure 1 below illustrates the main components of a theoretical framework, adapted to e-learning systems (Aparicio et al., 2016):

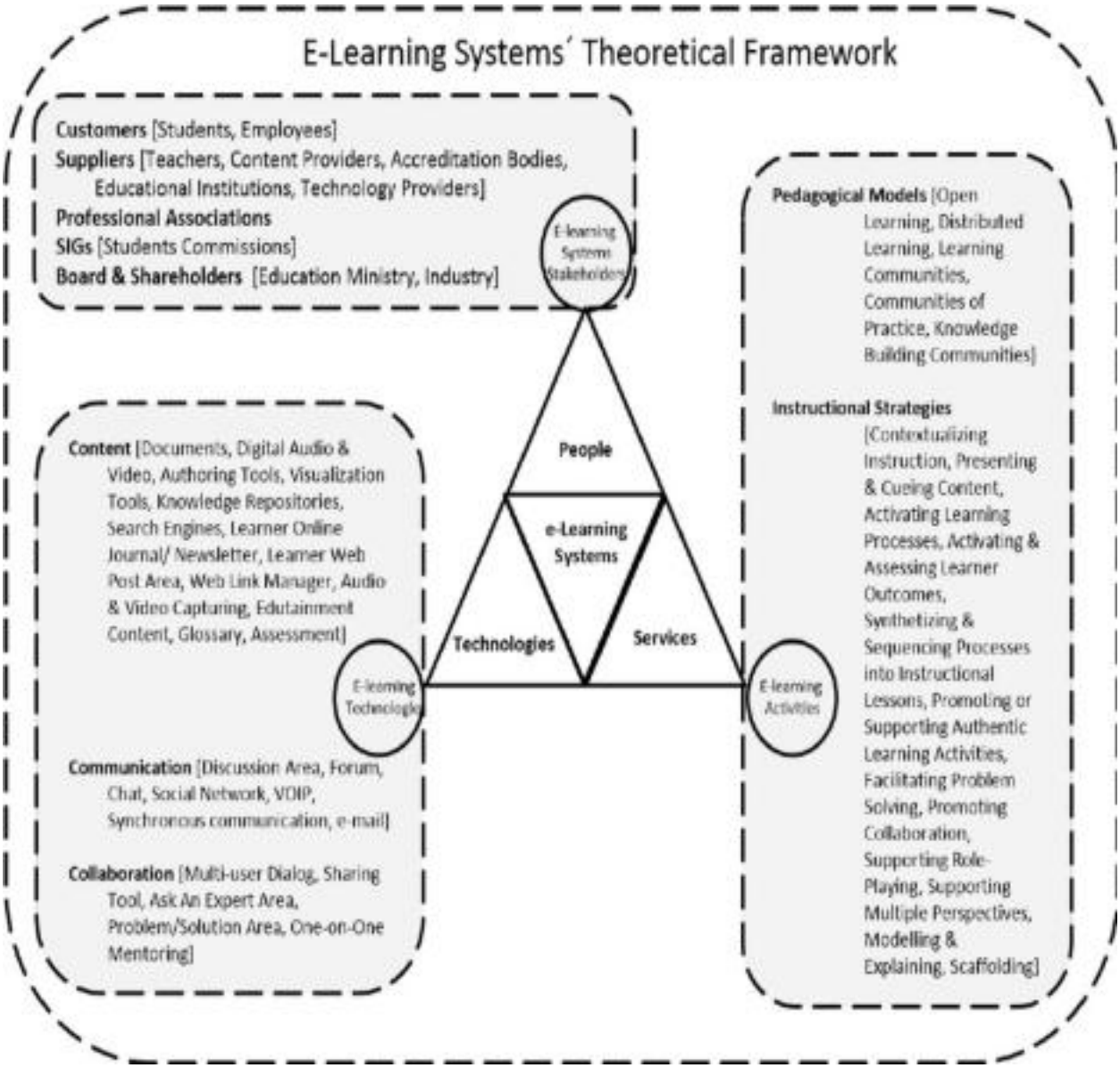

Figure 1 – Theoretical Framework for E-learning Systems

(Source: Aparicio et al., 2016)

This framework identifies the participants, technologies, and services that are related to e-learning. Its three main components can be described as follows:

People: They make the interaction between the stakeholders and e-learning systems possible. These stakeholders are the students, teachers, content providers, educational institutions, education ministry and so on.
Technologies: Provide support through collaborative tools that enable communication and the integration of content, as well as enabling the direct or indirect integration of diverse groups of users.
Services: These are the main output and activities that operationalize several e-learning pedagogical models and instructional strategies.

This framework provides a holistic view and theoretical background for e-learning research approaches and also provides the theoretical structure for several studies in e-learning systems.

2.3.2 The social construction of technology (SCOT) theory

This theory asserts that human action shapes technology and that technology does not determine human action (Pinch & Bijker, 1987). The SCOT theory provides a valuable framework for evaluating the social and cultural factors that may detract from or contribute to the successful incorporation of computer technology into educational environments (Martin, 1999). Martin further stated that "this theory… suggests methods for studying…technological development, such as identifying the relevant social groups involved in the development process, and the factors that either leave the technology in a state of interpretive flexibility or bring the interpretation of the technology to closure." (p. 406).[6]

[6] Quote from: Martin, W. (1999). The social and cultural shaping of educational technology: Toward a social constructivist framework. *Artificial Intelligence and Society, 13*, 402-420.

The conceptual framework of SCOT according to Pinch and Bijker (1987) consists of three stages:

The **first stage** is referred to as

Interpretive Flexibility: This idea originated from the empirical program of relativism (EPOR), and it suggests that the design of technology is an open process, capable of producing different outcomes, as a result of the social circumstances around its development. The concept of interpretive flexibility is applied to technological artifacts by SCOT scholars, to reflect how artifacts are also the products of intergroup negotiation, which allows for multiple possible designs (Klein & Kleinman, 2002).

This **second stage** includes the concept of

Relevant Social Groups: These are usually the users and producers of the technology, but can include a lot of other subgroups as well, and are the embodiment of distinct interpretations and, as stated by Pinch and Bijker (1987), "all members of a certain social group share the same set of meanings attached to a specific artifact." (p. 30)[7].

The **third stage** involves

Closure and Stabilization: When different interpretations result in conflicting images of an artifact, a multigroup design process can experience controversies.

The **fourth stage** is an extension of the original theory, which suggests a

Wider Concept: This concept, in which the wider socio, cultural, and political milieu affects the development of artifacts in a given period, plays a minor role in Pinch and Bijker's original SCOT concept, and is now what most of the critiques are focused on.

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[7] Quote from: Pinch, T., & Bijker, W. E. (1987). The Social Construction of facts and artifacts: Or how the sociology of technology might benefit each other. In W. E. Bijker., T. P. Highes., & T. Pinch (Eds.), *The Social Construction of Technological Systems: New Direction in the Sociology of Technology* (pp. 399-441). Cambridge, MA: MIT Press.

The original formulation of the SCOT theory which views society as composed of groups, has been criticized as insufficient, and even the original authors, as stated by Pinch (1996), have acknowledged this assessment. The specific requirements of this theory as highlighted by Keel (2006) are:

1. The conditions, where either change or continuity occurs, are specified and considered.
2. The success and/or failure of a particular technique is explained as being the result of socio-technological development, and not as a cause of these developments.
3. Regarding actor/structure integration, the theory seeks to understand specific individual actors in a particular situation, as well as the options and choices constrained by structural elements.
4. Regarding interrelationships, the theory declares that there is no distinction between technology, societies, economics, politics, etc.

This theory is considered relevant to this study because as Information Technology (IT) is being integrated into learning on a large scale, it becomes necessary to examine how the use of technology by students and teachers can be shaped by personal and institutional beliefs. The theory also exposes how certain social groups exercise power over others through technology, by highlighting the invisible forces at work.

These invisible forces, such as organizational structures, financial constraints, cultural norms, and capacity dynamics, shape the use of technology. For example, the adoption of learning management systems may be influenced by agreements made, prevailing beliefs in favor of traditional teaching methods, or decisions made by administrators. These factors may constrain choices, by marginalizing the perspectives of the stakeholders. Socially constructed theories of technology shed light on these developments, highlighting how some social groups exercise power over others

through technology, and emphasizing the need to examine individual and institutional values, by technology types that govern integration in education.

2.4 Analyzing e-learning strategies

The vast proliferation of Information Communication Technologies (ICTs), and the rate at which learning has been migrating from the traditional form to online, has prompted governing bodies to develop e-learning strategies. According to Cesie (2021), strategy documents are vital, because they reveal institutional deliberations and present current practices with vision statements of strategic processes, aimed at achieving set goals. The development of these strategies in an international context had three common phases as declared by Brown et al. (2007). The first phase involved governments' efforts towards making e-learning possible; the second entailed effectively integrating e-learning into the education system; the third and last phase was to ensure that e-learning's transformative roles were made visible.

Higher education institutions have been adopting a diverse range of approaches and tools when integrating e-learning into the delivery of education. A bottom-up innovation agenda, rather than an institutionally induced change in the process of delivering education, has been stimulated by a wide range of e-learning activities (Boezerooij, 2006). The process has mainly adopted the incremental change and bottom-up/from within method, using e-learning to integrate old and existing practices (Collis & van der Wende, 2002).

2.4.1 How is e-learning influencing the global university education system in the 21st century, especially in Europe?

The origin of the European Union (EU) e-learning policy which outlined the strategies that should be followed by Europe to address the factors that could inhibit the

emergence of an information society, can be traced back to the Bangemann report (Roumell & Salajan, 2014). A chapter of the report proposed that ICT should be incorporated into delivering distance education services into schools and colleges, to extend advanced distance learning techniques, and advocated for the establishment of a trans-European advanced network, where research centers and universities across Europe are linked, with open access to each other's libraries (European Commission, 1994).

The European Commission's document titled "Learning in the Information Society", was an action plan seeking to promote a link between schools and community knowledge networks between 1996 and 1998, aimed at developing a European market for educational multimedia content, and the first attempt at developing a policy direction for e-learning in the EU (Salajan, 2007). Then in 2001, the European Commission formulated the 3-year "e-Learning Action Plan", which focused on providing ICT training for teachers, expanding infrastructure, developing enhanced multimedia services, and establishing cooperation among participants at the local, regional, member state and community levels (European Commission, 2001).
In September 2007, the European Commission adopted a communication on "e-Skills for the 21st century", which presented a long-term electronic skills agenda for Europe, and included five key action items (Aceto et al., 2010, p. 5):

1. *Raising Awareness*: Campaigns aimed at providing pupils, teachers and parents with an understanding of the opportunities in ICT education and careers, and reinforcing the connection between learning, ICT and innovation. Promotion of ICT, science, math, teacher training, and gender issues through the exchange of information and good practices.

2. *Developing Supporting Actions and Tools*: This was aimed at supporting the establishment of a European e-skills and career portal as a European e-

competence framework, promoting multi-stakeholder partnerships, new curriculum guidelines, and incorporating appropriate incentives and services, particularly for Small and Medium Enterprises (SMEs).

3. *Fostering Employability and Social Inclusion*: The e-inclusion initiative was launched in 2008, aimed at reducing the digital divide by 2010, encouraging Corporate Social Responsibility (CSR) initiatives, and promoting how these initiatives could be supported by public and private funding.

4. *Promoting Long-term Cooperation and Monitoring Progress*: Presentation of an annual report that assesses the impact of global sourcing of ICT jobs, demand and supply, and to provide regular communications between stakeholders and member states.

5. *Promoting More and Better Use of E-learning*: Facilitating the networking of e-learning and training centers, promoting successful e-learning strategies, as well as the development of courses and mechanisms to enhance the exchange of e-skills training resources.

These strategies were necessary to prevent shortages in e-skills in the region, with the increasing influx of IT and the development of new learning and teaching models. From a national perspective, let's look at how various strategies have been developed and implemented in Germany, the Netherlands and Sweden:

2.4.2 Germany

German higher education is characterized by the federal principle, decentralization and the "Hochshulrahmengesetz", which is the national law used to govern this level of learning, and is responsible for laying out the general principles and goals for HEIs, including research and teaching, as well as rules on membership, access and human

resources (Gyambrah, 2007). The federal principle refers to the division of powers and responsibilities between the federal government and the individual states (Länder) with respect to German higher education. In this principle, the federal government establishes general policies and regulations, called The Higher Education Framework Act, reflecting Germany's federal system of government which provides general guidelines and principles, as well as modifications and adaptations to regional needs and priorities.

Within this landscape, e-learning has seen tremendous growth in and support for German universities and colleges. The development of e-learning content, for example, enjoyed huge financial support from the Federal Ministry of Education and Research/Bundesministerium für Bildung und Forschung (BMBF) between 2000 and 2004, when more than 230 million Euros was provided to underwrite well over 100 projects (Ravermann, 2006). In order to bring the country's schools into the digital age, more than EUR 5 billion was made available over a period of five years, (equivalent to EUR 5 billion for every one of Germany's 11 million students), to upgrade schools' digital infrastructure with online learning platforms, and provide mobile devices, smartboards, and Wi-Fi (MacDougall, 2021).

The digitization process within the context of German HEIs has three noteworthy axes; the think tank 'Hochschulforum Digitalisierung', the federal digital agenda, and requests for research proposals by the federal government, using funding from the German Ministry of Education and Research (BMBF), which fosters research on higher education digitalization (Bond et al., 2018). A national digital agenda was created by the German government between 2014 to 2017, to address all education levels, in order to enable a major economic, societal and political transformation (Die Bundesregierung, 2014). Originally proposals for a single e-learning body (Bundesministerium für Bildung und Forschung, 2000) did not go far, because none of the processes were implemented. The second round for project proposals was made

by the Deutsches Zentrum für Luft- und Raumfahrt (DLR) to enable the integration of e-learning into universities sustainably (DLR, 2009). It also sought out an appropriate LMS via extensive strategy considerations and evaluation of technicalities, such as performance, finances, adaptability to corporate usability, and identity aspects within a top-down strategy, although the acceptance of this solution by learners and educators could not be reliably predicted in advance (Kruse et al., 2011). The authors further stated that an LMS is usually implemented in universities as a starting point for Technology Enhanced Learning (TEL). So, the strategy used for the implementation of an LMS in German universities is based on two main approaches, top-down and bottom-up, each with differing actions and impacts, as seen in Table 2 below:

Approach	Bottom-Up	Top-Down
Proceeding	One faculty or one department starts using an LMS, afterwards other faculties/departments start participating	The key administration pushes the integration of an LMS into the university
Advantages	LMS is chosen based on user demands. Users have concrete will and request to use the LMS. High intensity of usage in courses. High satisfaction with the chosen system refinement participation by the users is higher	High frequency of usage. Academic staff might get interested in the didactical possibilities during administrative usage. Other IT systems used at the university can be connected to the LMS support and authentication can be organised centrally from the beginning. Students can use one single LMS and not different ones in their subjects.
Disadvantages	Low number of users. Coexisting of several LMS in different faculties or departments. Redundant workload for supporting the several LMS. If one LMS is chosen to be the general one at that university: difficulties to merge the different users and data to one LMS. Several login data for academic staff and students. Users might have to handle with different LMS interfaces. Other IT systems are most likely not to be connected to the several LMS	Focus is possibly on administrational processes. Didactical possibilities might play a minor role. People might be displeased by the reason that one LMS is forced when they have used another one before. The LMS mirght not fulfil the special needs of some academic staff or departments. Lower intensity of usage in courses
Rate of usage	low usage/few users in the beginning, can increase fastly	high/many users from the beginning

Table 2 - Overview of Bottoms-Up and Top-Down Approaches

(Source: Kruse et al., 2011)

Another illustration of how these approaches are implemented, is presented in Table 3, for three universities based in the German Federal State of Lower Saxony. This reveals that both approaches play an important role in each strategy, with collaboration and networking playing a crucial role in the technical development, as well as the organizational and educational benefits of deploying an LMS software (Kruse et al., 2011).

	TU Braunschweig (13,500 students)	Leibniz Universität Hannover (20,600 students)	Universität Osnabrück (9,300 students)
Strategy/Approach	More bottom-up than top-down	Equally top-down and bottom-up	More top-down than bottom-up
Implementation	first 2004 university-wide 2009 (implementation process in progress)	first 2004 university-wide 2008 (implementation process completed)	first 2003 university-wide 2004
Focus of use	didactical	hybrid	administrative
Funding	institutional funding from 2004 to 2009 central university funding since 2009	institutional funding from 2004 to 2005 third-party project funding from 2005 to 2008 central university funding since 2008	third-party project funding from 2003 to 2004 central university funding since 2004
Institution responsible for service	within the university, teaching and learning centre	within the university, e-learning centre	within the university, e-learning centre
Number of student users	7,500 (57%)	14,700 (71%)	8,400 (90%)

Table 3 - Key Features of an LMS Implementation at 3 Universities

(Source: Kruse et al., 2011)

2.4.3 Netherlands

Netherlands has a good record historically of e-learning initiatives in higher education. Though small in geographical size, it has laid the groundwork for e-learning and is

considered a strong player in the international higher education market (Fisser & Wetterling, 2005). The state universities in Netherlands offer free enrollment into higher institutions for all students who have graduated from secondary school, and the use of media is encouraged because it facilitates internalization, contributes to flexibility, and helps to maintain diversity in its programs (Kommers et al., 2014). In 2005, Dutch higher education included 14 universities and approximately 60 institutions, also called Hogescholen, similar to the former British polytechnic and the German Fachhochschulen (Fisser & Wetterling, 2005), offering advanced professional education. Even though these universities are designed to prepare students for independent scientific work in a professional or academic context, and the Hogescholen enable students to function in society at large and practice a profession on a self-regulated basis, both institutions have incorporated e-learning (Fisser & Wetterling, 2005).

Integrating e-learning into higher education in the Netherlands includes technological, social, and organizational changes. It also involves a strong cooperation between the institution and the corporate sector, in order to optimize the quality of graduates and their career opportunities (Fisser & Wetterling, 2005). Universities adopted MOOCs, to facilitate the ongoing use and evolution of e-learning and ICT tools, both in traditional and virtual classrooms for flexible learning, to develop awareness at the teachers' and curriculum designers' level, and for better incorporation of education (Kommers et al., 2014).

The strategic vision on e-learning by the Dutch government according to Fisser and Wetterling (2005) is geared towards the following:

1. Transition to a knowledge-based society, to improve the innovative powers of corporate organizations, by linking them with the country's higher learning institutions.

2. To strengthen the position of higher education in the Netherlands and enhance its competitiveness internationally.
3. To encourage more lifelong learners and those from other sectors of education, for more participation in higher learning.

Institutions in the Netherlands are merging education and e-learning, to more creatively develop students' international competencies and to attract foreign students. Clear policies, however, that incorporate e-learning as a tool, are still lacking in many institutions of learning (Frencken et al., 2006).

2.4.4 Sweden

Sweden is ranked among the highest for the best ICT in the world, since several Swedish telecommunication companies, in conjunction with the Swedish government, worked together to accelerate the deployment of new technologies on a national basis (Odero, 2005). The history of e-learning in Sweden has its roots in the country's distance and traditional learning. In 1999, a Swedish Agency for Distance Education (DISTUM) was launched as a state authority to develop ICT-based learning. E-University was created by the government in 2002, which included 31 colleges and universities that shared a government grant of SEK 211 million to fund ICT-based programs (Odero, 2005).

The Swedish educational model is characterized by a decentralized system at all levels; decisions about organizations, curriculum, employment, buildings and salaries are made locally within a general framework. Changes are promoted by the government to some extent, through research, policymaking, funding and setting up intermediary agencies to act as change agents (Hansson et al., 2005). Even though the Swedish government highly subsidizes higher education, and the institutions have a non-tuition fees policy, e-learning is a means of generating income through other

services like consultancy, which helps to alleviate the cost of purchasing expensive equipment needed for e-learning (Odero, 2005).

The strategic plan for the adoption of e-learning in Sweden, aimed at how the use of advanced technology for learning, research and teaching can be utilized and developed to enhance learning, has four key goals according to Ossiannilsson (2012):

1) Provide an attractive environment for study that includes e-learning, LMS, virtual and personal learning;
2) Provide an environment for innovation and research;
3) Provide increased transparency;
4) Develop a more prominent infrastructure.

These all relate to e-learning strategies, which also emphasize four objectives: cross-disciplinary collaboration, quality assurance, internationalization, as well as leader, teacher and employee excellence (Ossiannilsson, 2012).

The models developed by Laurillard (2002), and Clinch (2005) created a framework for implementing e-learning master's programs, and considered the relationship between students' learning experiences and the different methods and media available.

Laurillard (2002) identified five media forms for different types of learning experiences - narrative, interactive, communicative, adaptive and productive - which Conole and Fill (2005) describe as follows:

Narrative Media: This shows or tells the learner something (e.g., text, images).

Interactive Media: Responds minimally to what the learner does (e.g., multiple choice tests, search, simple models).

Communicative Media: Facilitates communication between people (e.g., discussion forum, email).

Adaptive Media: This is modified based on learner's activities (e.g., simulations, virtual worlds).

Productive Media: Allows learner to produce something (e.g., word processor, spreadsheet).

Table 4 illustrates how each media form relates to the different types of learning experiences and the methods/technology that supports them:

Learning Experience	**Method/Technologies**	**Media Form**
attending, apprehending	print, TV, video, DVD	Narrative
investigating, exploring	library, CD, DVD, Web resources	Interactive
discussing, debating	seminar, online conference	Communicative
experimenting, practicing	laboratory, field trip, simulation	Adaptive
articulating, expressing	essay, product, animation, model	Productive

Table 4 - Learning Experiences, Methods and Media Forms

(Sources: Laurillard, 2002; Clinch, 2005)

2.5 Has e-learning become a business?

The e-learning and internet markets are growing exponentially and are now a large part of the global economy. According to Global Market Insights (2022), the e-learning market surged to USD315 billion in 2021 and is estimated to realize a Compound Annual Growth Rate (CAGR) of 20% from 2022 to 2028. Figure 2 that follows shows:

1) projected increased investment in IT infrastructure in the North American e-learning market, valued at USD120 billion in 2021, with steady growth through 2028, and Asia Pacific will grow 27% between 2022 and 2028;
2) the German LMS e-learning market is expected to experience a 22% growth rate between 2022 and 2028, due to the increased use of technology in the education sector;
3) the service provider sector in India is projected to grow by 30%, driven by companies that are increasing their research and development (R&D) investments for deploying solutions, originally to accommodate the rising demand for alternative online learning platforms due to the pandemic, which resulted in schools and colleges being closed;
4) the mobile e-learning sector is predicted to have 25% growth from 2022 to 2028

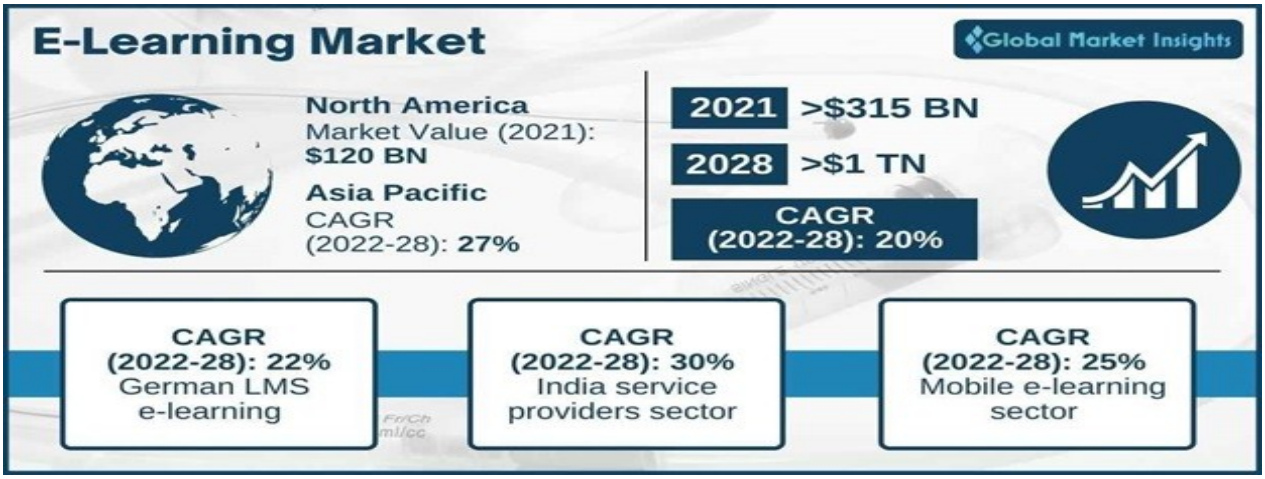

Figure 2 - E-learning Market

(Source**:** Global Market Insights (2022)

The International Telecommunication Union (ITU), a specialized agency of the United Nations, stated that although the estimated number of internet users globally, which was 4.1 billion in 2019, rocketed to 4.9 billion in 2021, 2.9 billion people had still never used the internet (ITU, 2021). The agency also predicted that the rise in internet penetration worldwide would increase access to economical connectivity plans and

drive global industrial growth. The global lockdown and school closures experienced during the COVID-19 pandemic, combined with peoples' quest for access to news, healthcare updates, government services, online banking, and e-commerce, were all key contributors to this substantial increase (ITU, 2021). This significant growth in the number of internet users could also result in more people having the opportunity to utilize the various e-learning platforms and tools to learn, engage and acquire degrees.

The need to face new competition, seek out new financial resources, and strive for greater domestic and international prestige is causing higher education institutions to undergo both behavioral and organizational changes (Gyambrah, 2007). The major external drivers for change include government policy, demographics, technology, and economics (Wills & Yetton, 1997; Fisser, 2001; Middlehurst, 2003). The higher education e-learning marketplace has experienced exponential growth, forcing universities to commoditize their digital knowledge production. For example, universities are now standardizing and converging undergraduate and graduate degree programs internationally, recruiting new pools of students outside their national boundaries, and also applying new learning technologies to increase enrollment and enhance the profitability of international ventures (Gyambrah, 2007). Many universities and colleges are implementing e-learning courses to enable them to increase student enrollment worldwide and enlist a wide range of students to earn their degree online, saving all parties a lot of time and money.

The rise in costs, the decline in public funding, a heightened demand for diverse services and programs, students' changing needs and expectations, as well as increased diverse student demographics, means that higher education institutions must now handle a whole host of market forces (Eckel et al., 2005; Douglas, 2005). Commercialization and entrepreneurialism have therefore become the major focus of HEIs who were once only concerned with research, teaching and service (Boezerooij,

2006), are now forced to deploy new technologies for the delivery of education, to reach new student markets, and increase enrollment (Douglas, 2005).
In terms of the quality of e-learning, Gaebel et al. (2014) stated that most institutions set their e-learning standards in such a way so as not to affect the comfort levels currently in practice. As a result, there is no assurance of specific standards, or quality checks by an instituted body that is responsible for adherence, nor sanctions for non-adherence.

There is a real need to put new measures in place to ensure that e-learning practices are not just for profit, but for the delivery of quality education. As stated by Ogunlela and Ogunleye (2015), the quality assurance approach deployed for programs in traditional higher institutions should not be superimposed on those that now offer both modes of education. Instead, the need is to create a quality assurance strategy that will specifically cater to e-learning. Constantly improving student satisfaction with e-learning systems and combining the efforts of enterprises and higher education institutions to support learners is needed, in order to ensure that it is beneficial to HEIs and to achieve the desired knowledge-based society (Tanye, 2017).
Since education is no longer about teaching and teachers, there is a high demand for it to be learners and learning focused, and only institutions with quality-based strategies and learning outcomes will be well placed to benefit from the e-learning evolution (Williams & Goldberg, 2005). Beyond being a learning tool, e-learning is also a strong contributor to economic growth, development of Information Technology, and online markets. It has also aided in the establishment of e-learning platform startups like Cousera, edX, Udacity, Udemy, Ulessons, and so on. Consequently, the competitive global framework has seen an increased need for new efforts in quality review and international accreditation processes (Douglas, 2005).

Chapter 3

The use of technology

Globally, technology has had a great influence on the way we live and on various aspects of our lives on a personal, organizational, social, economic and governmental level. The use of technology has already left an indelible effect on everything we do, everywhere we go, and virtually reshaped our existence (Alhumaid, 2019). Though the use of technology has become omnipresent, there are still some human roles that technology cannot substitute, and the use of technology is not independently effective since it is still, to a large extent, dependent on human intervention. This includes decisions related to how it should be properly used based on manufacturers' specifications, technical know-how, and ensuring that it meets the specific purpose for which it is intended.

The use of technology is a huge factor in educational development, especially in the teaching and learning processes, where all levels of decision making, and implementation incorporate its use one way or the other. National ICT policies play several vital roles in the teaching and learning processes when technology is integrated, by providing a rationale, a vision of how the education system can be operated with technology, and a set of goals that will be beneficial to learners,

educators, parents and the general population (Dudeney, 2010). Until recently, academic institutions prohibited the use of mobile phones, as well as internet access and digital tools in the classroom, mainly regarded as a distraction to students (Almen & Grigic, 2021). Since technology has already disrupted many other aspects of life, higher education institutions are currently reviewing their mobile phone policies and developing innovative measures to allow and regulate its usage, since it is now seen to facilitate students' engagement in the learning process.

E-learning creates a platform that enables students to acquire various forms of knowledge by interacting with different technological tools that support their learning capabilities and plays a crucial role in advancing Information Technology in this area. In terms of usability and satisfaction derived from e-learning, important factors that can determine the role of technology in enhancing the success of an e-learning system include measures such as the rate of occurrence, its responsiveness, and the extent of its use (Eom et al., 2012). In turn, technology can contribute significantly to the success of e-learning, by providing a highly efficient mode of learning for everyone, including students, employees, adults and children.

3.1 How does technology influence education?

Technology in education refers to the use of diverse equipment and devices such as video, tape recorders, language laboratories, etc., to assist learners and educators (Richards & Schmidt, 2010). The use of technology has strengths and weaknesses, leaving users with the responsibility to optimize the advantages and control the negative impacts. As stated by Alhumaid (2019), technological experience is a bittersweet one, where its presence in our lives is relished, while the effect it may have on our attitudes, manners, and social interactions are worrisome.

For the most part, technology has a favorable impact on education, owing to the fact that its positive learning outcomes can be realized conveniently, faster, effectively,

and at a more affordable cost. In fact, education has shifted from passive and reactive to active and interactive, thanks to the use of technology (Raja & Nagasubramani, 2018).

Studies have also shown that although education is greatly enhanced by technology, it can also have a negative influence on the learning process. According to Fried (2008), Wentworth and Middleton (2014), the negative impact of technology is experienced in the following four areas:

1. Distortion of the relationship between educators and learners, as well as the dehumanization of education in many environments. The high dependence on technology in the classroom results in a lack of connection among students, as well as between students and teachers (Nneji, 2014). An example of this is illustrated by the zombie walk, where students are essentially disengaged from their surroundings, stuck on their phones, walking the halls with their heads down (Rivedal, 2017).

2. Competency in the three basic skills of writing, reading and arithmetic, that students are expected to master, deteriorates. Regular texting, with its fragmented wording and lack of proper punctuation has reduced students' ability to write full sentences (Strain-Moritz, 2016). Handwriting and reading can be greatly impaired, replaced by constant typing, and the processing of information can become superficial (Spitzer, 2014). In addition, the use of technology in teaching mathematics and arithmetic can hinder students' analytical reasoning (Alhumaid, 2019).

3. The digital, virtual world can isolate students from any form of interaction. Distance learning via the internet restricts one's access to a community of students, which can create a sense of loneliness (Vonberg, 2015). The repetitive use of technology-based entertainment and games to make learning more

appealing can also isolate students and lead to poor learning outcomes (Iserbyt et al., 2014).

4. Social inequalities between the haves and the have nots are increased. Those who live in urban environments are 50% more likely to have internet access than those in the rural areas, and students who speak English as a second language are mostly computer illiterate, which invariably places them on the wrong side of the digital divide (Steele-Carlin, 2017).

In 2017, the United Nations Children's Emergency Fund (UNICEF) also declared that "digital technology and [reduced] interactivity pose significant risks to children's safety, privacy and well-being, magnifying threats and harm that many children already face online and making already vulnerable children even more vulnerable" (UNICEF, 2017, p. 8)[8].

3.1.1 The use of the internet and mobile phones in e-learning

Academic institutions are increasingly incorporating modern advances in educational and instructional technologies into various teaching methods to enhance students' learning. A combination of these advances with newer learning approaches such as hybrid, adaptative and collaborative, as previously outlined, have disrupted the pedagogical framework and created a major shift from teacher-led to more self-lifelong and student-learner centered methods (Ahmad, 2020).

[8] Quote from: United Nations Children's Emergency Fund (UNICEF) (2017). The State of the World's Children 2017: Children in a Digital World. https://www.unicef.org/reports/state-worlds-children-2017

The internet is a global platform that connects computer networks and facilitates all forms of communication and information sharing. In academic institutions, particularly in HEIs, students are able to connect their phones to the internet, which enables them to acquire knowledge on any subject or area of interest, communicate and collaborate with other learners, as well as increase their learning electronically, without time and location restrictions (Junco & Cotten, 2012).

The use of smartphones, iPads and tablets connected to the internet as e-learning tools has become the preferred platform, enabling students to engage in various associated activities, especially at the university level. There are different categories of mobile devices. Churchill and Churchill (2008) classified the mobile phone as a Portable Digital Assistant (PDA), a handheld device with computer capabilities that aids in the support of educational goals. Mobile devices generally fit into six categories: PDAs, tablets, mobile phones, smartwatches, web pads and laptops (Sharples & Beale, 2003).

The development of new e-learning forms that incorporate the use of mobile technology and the internet on and off campus, has disrupted the long-held notion that learning can only occur in a classroom setting, at a stipulated time and place. Mobile learning enables learners to practice real-time learning anywhere, anytime, which is thought to enhance student engagement, performance, focus, enthusiasm and motivation (Martin & Ertzberger, 2013). Mobile devices are regarded as distinct learning tools, incorporated into a variety of educational settings, (Ahmad, 2018) and the combination of mobile devices and wireless internet, together with ICT, is being considered as the future of learning and education technology (Peng et al., 2009; Moreira et al., 2018).

3.1.2 What is the importance of software in e-learning?

The use of technology in education has reshaped the sector and can enable learners of almost any age, economic status, or location to enhance their experience in a virtual environment. E-learning is a platform that is computer-supported and web-based which requires software, hardware, network infrastructure and browsers for access. E-learning software provides the learning content and methodologies for an online platform (Seuling, 2021). According to *Seuling* (2021), e-learning software takes many forms, including an LMS, digital instructional design, content authoring tools, online training systems, learning experience platforms, and digital learning applications. Different software and network services can be used individually or in combination for e-learning, including simulation software, e-mail, discussion forums, chats, Usenet, testing and assessment software, vocabulary trainers, collaboration tools, blogs and games (Piotrowski, 2009).

Software plays a crucial role in online learning, particularly in the area of creating an enhanced and positive user experience. It enables course designers to devise a virtual environment that aids in the production of online courses involving two processes – creation (or authoring), as well as distribution, where courses, products and platforms are managed (Seuling, 2021). It provides the content in which educators and learners engage with the course and with each other. E-learning software simplifies the learning process and allows learners to take a course and acquire knowledge anywhere, anytime (Yefremenko, 2021).

Besides some of the benefits already mentioned, like its flexibility, the savings in travel costs, and better time management for working students, Figure 3 outlines additional benefits of e-learning software programs (DDI Development Company, 2020):

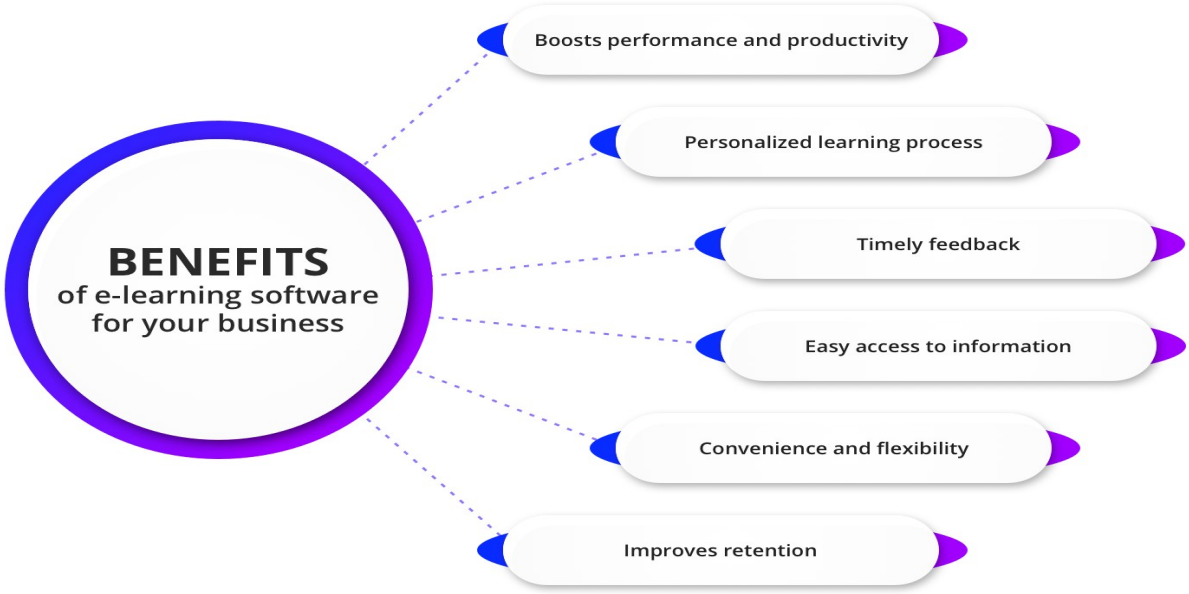

Figure 3 - Benefits of E-learning Software

(Source**:** DDI Development Company, 2020)

In as much as e-learning software has the capability to personalize and boost the learning experience, there are still some issues associated with it. With so many packages available on the market, it can be difficult to determine which software is most suitable. It doesn't guarantee to keep a student's attention, and this method of learning is not the first or preferred choice for all learners (Yefremenko, 2021). In order to address some of the challenges associated with choosing an appropriate e-learning software, Figure 4 outlines a six-step guide to aid in this process:

Figure 4 - How to Choose E-learning Software

(Source: DDI Development Company, 2020)

The realization that the benefits of e-learning can greatly outweigh the traditional classroom approach, as well as the advancements in today's digital environment, has already resulted in a shift to e-learning solutions to save resources, time and money (DDI Development Company, 2020), and software is a vital component in this virtual learning arena.

3.1.3 The dynamic nature of e-learning tools

The internet has become an important platform that facilitates different forms of learning through the use of tools that enable everyone to gain knowledge about known and unknown topics. Using online tools to learn saves costs, resources and time, especially "going to the library" time and reading pages of resource materials to acquire knowledge about something (Bates, 2019). These days, obtaining any kind of information can be achieved by just pulling out one's smartphone or any other learning tool with an internet connection (Xiangming, 2020), which can often reduce the need to go to an academic institution or wait to learn at a teacher-led or controlled pace.

E-learning tools are basically any app, program or technology that is connected to the internet through which educators are equipped with the opportunity to present information that can be accessed by learners (Moon, 2022). There are three types of e-learning tools that emphasize different parts of the learning process:

1) Curriculum tools - responsible for providing a standardized and systematic environment, that facilitates classroom learning and whose main function is focused on enhancing the initiation and selection stages;

2) Digital library tools - that provide efficient and effective access to learning resources; and

3) Knowledge representation tools - whose main focus is on formulation and representation (Oye et al., 2012).

One of the dynamic aspects associated with the use of e-learning tools is its ability to provide a form of learning that specifically focuses on the learner, rather than on the instructor, which can result in more positive learning outcomes for both. The end goals of any e-learning program include the determination of what delivery tool best supports the desired learning outcome, ensuring that knowledge and skills are transferred successfully, and creating interactive learning programs that engage students through the use of multiple mediums (Ciccarelli, 2019).

The growing demand from online learners to effectively acquire knowledge through e-learning tools has increased the need for a certain level of dynamism when using these tools. The active use of these facilities according to Ajayi (2008) involves several methods, including a structured feedback system, computer assisted instruction, operational networks, audio and video conferencing, as well as worldwide internet websites. This diversity further emphasizes the need to carefully select the most appropriate e-learning tools that will best support various types of knowledge acquisition.

3.2 Digital technology in e-learning

The unprecedented influx of digital technologies used in learning has propelled e-learning to the forefront of educational processes, making it one of the most popular forms of learning. Digital technologies, according to Kumi-Yeboah et al. (2020) are represented by systems, devices, electronic tools and resources that make it possible to store and generate data from learning and teaching, and include instructional materials like online games, mobile computing, 3D printing, multimedia and cloud computing, using technology across all facets of the curriculum. They also provide learners with access to video lectures, video presentations, Wikis, audio-visuals, Google hangouts, blogs, video threads and chats, as well as the digital resources in an LMS (Kumi-Yeboah et al., 2020).

These technologies have significantly contributed to the level of revolution that research, learning and teaching is experiencing, and succeeded in opening up diverse means through which e-learning can be delivered to all types of learners. In comparison, the demand for the traditional mode of acquiring knowledge, particularly on-campus attendance, has been on a steady decline due to the inconveniences now associated with it. The traditional forms of delivery - lecture, on-campus attendance, and tutorials - are no longer as appealing to learners, since technology-based learning liberates them from adhering to the time and place restrictions associated with the former. (Gana, 2017).

Globally, the use of technology in e-learning has increased the need for educators to understand how emerging technology is used, which is quite different from how it was employed in the traditional face-to-face classroom setting (Oliveira et al., 2019). It also requires that learners and educators understand and incorporate advances as they become available, in order to keep pace and continue to leverage its benefits. In higher education institutions, e-learning’s steady growth can also be attributed to the use of digital technology for more cost-effective instructional delivery, compared to

the high cost of tuition in traditional models, and the ever-evolving workforce that is looking for lifelong learning options (Allen & Seaman, 2019).

As previously mentioned, the use of digital technology in e-learning comes with advantages and disadvantages. A fair amount of research upholds that the use of digital technologies in e-learning enables learners to reflect, share, engage and get involved in online collaborative group work, which affords them the opportunity to become part of the knowledge building process (Kear et al., 2010; Roblyer & Doering, 2010; Biasutti & El-Deghaidy, 2012). It also maintains that learners' collaborative learning ability in an e-learning environment is highly supported by digital technologies, like wikis and forums, while blogging or blogs can enhance students' writing skills (Twinning et al., 2017).

On the other hand, in a study conducted by Kumi-Yeboah et al. (2020), the majority of the participants stated that the absence of an instructor and multicultural content on how to effectively use digital technologies hindered their academic success and experience in online learning. This would indicate that one has to consider that digital technology tools may not always be inclusive or support all learners' needs. It may be useful in these cases to provide a variety of content via various multimedia, and incorporating students' past work activities (Li, 2012; Ashong & Commander, 2012).

3.2.1 How is digital media involved in e-learning?

The rapid growth of technology and internet availability has promoted digital media to a basic "need" for staying well-informed about happenings all over the world. This growth has also brought about the rapid development of innovative tools that simplify the e-learning process and encourage individual learning. Ber's assertion (2010), about the main purpose of technological development being to ensure that learners are properly guided in the positive use of technology, which will enable them

to achieve innovative thinking and have more fulfillment in their life and work, is essential.

Digital media uses digital codes to create digitized text, video, audio, graphics and other content, which can be transmitted over computer networks or the internet, including news from newspapers, magazines, and television networks, and can also be presented on blogs or websites (Radha et al., 2019). The advent of digital media has changed the traditional mode of teaching and learning, student engagement and e-learning, and these changes are noticeable. Digital media is now part of our digital society, and has become an integral part of education, especially in e-learning. Learners have expressed the enjoyment they derive from a digital media learning experience, due to its ability to enhance their problem solving, critical thinking and creativity under educators' well-planned guidance, leaving the latter with the responsibility to constantly design, review and support learners towards meaningful content, within a clearly defined learning experience (Chien, 2012).

Digital media's impact on student engagement through e-learning has expanded immensely (Khan et al., 2021), providing a large variety of easily accessible educational materials, ensuring equitable access to educational services (García-Peñalvo et al., 2010) and having a long-lasting effect on learners' knowledge acquisition (Boutzoukas, et al., 2021).

Digital media is revolutionizing e-learning by increasing the level at which learners are becoming more engaged in the process, as well as enhancing its approach. It has also transformed the "lecture and learn" model to a fully interactive version, which enables learners to be more responsible for their own education, by becoming more fluent in its use as part of a lifelong process for learning (Chien, 2012). Students' formal and informal e-learning behavior has been positively influenced by digital media and, with adequate guidance and moderation, the outcome from this learning process may also help more people improve their lives.

3.2.2 Digital tools

Technology is transforming how academic institutions are carrying out their daily activities through the use of digital tools for learning, research and teaching. Technology continues to advance new learning approaches, so it is important for both learners and educators to keep updating their knowledge of how to effectively use these tools. These devices enable the creation of alphabetic communication, the display of photographs, the facilitation of research through the internet, and support the digital storage of programs, e-books and lesson plans (Skelley, 2022).

The so-called digital divide referred to earlier exists not only among learners, but in academic institutions, with some having abundant resources to invest in the best digital tools to enhance learning, while others are limited in terms of what they can afford and therefore offer. Students at academic institutions with limited resources for advanced technologies that contribute to the cost of education, are negatively affected by this digital divide, compared to those with plentiful funding. As such more emphasis should be on making use of digital technologies that are freely available, in order to close this gap (Mucundanyi & Woodley, 2021).

Tablets, iPads, computers, word processors, email and the internet are digital devices and services that have infiltrated the classroom and altered the face of learning and teaching (Alhumaid, 2019). Students can become increasingly engaged in learning, develop a more personalized plan, and build 21st century skills when digital learning tools are used effectively in classrooms (American University, 2020).

Figure 5 illustrates the extent of current digital tools that learners use or have access to on a daily basis, to learn and acquire any form of knowledge which can enhance creativity and provide the freedom to choose where, when and how to learn. When available, learners can draw from a rich library of digital tools to create their own personal learning environment virtually.

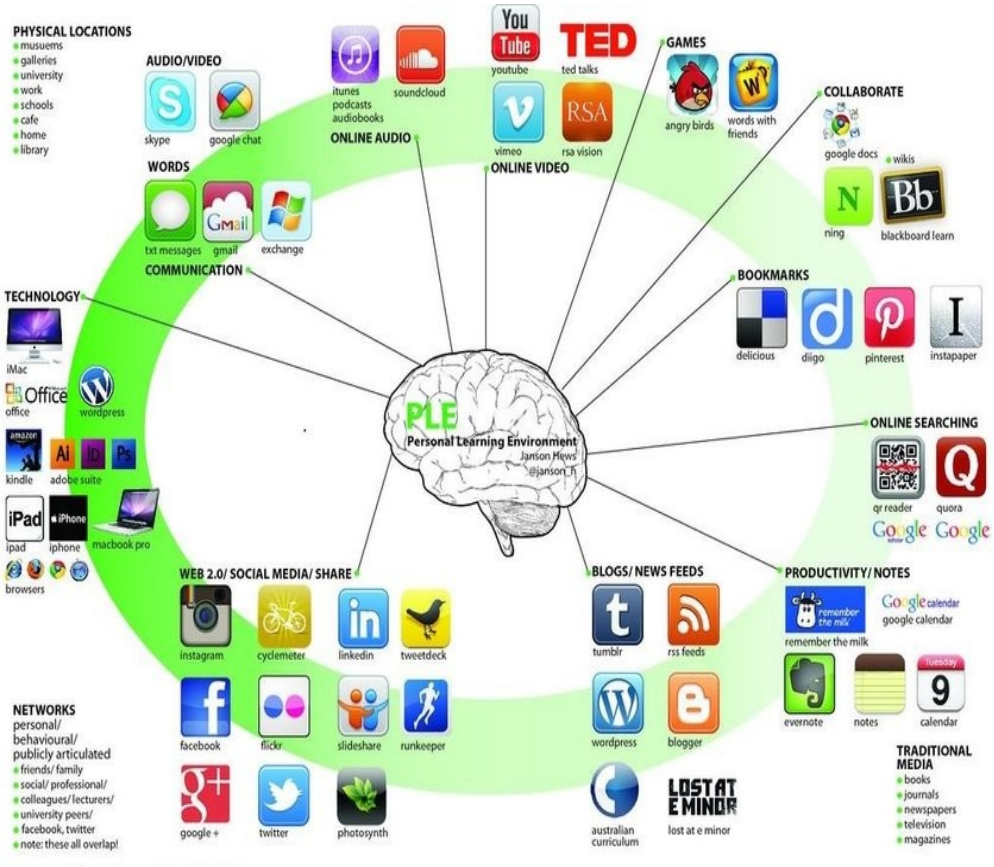

Figure 5 - Personal Learning Environment

(Source: Hews, 2012)

Different types of students learn at different paces, which should be taken into consideration when choosing the appropriate digital tools. As asserted by Badran (2017), digital learning tools work differently, depending on the learner. Some tools are harder to use and may depend on how well or how easily the learner can adapt to new methods, as well as the scope of their learning needs. E-learning uses a mix of digital tools to enhance students' learning experience, encourage personalized and greater competencies, as well as provide easy access to information and knowledge. Today's learners are more tech savvy, because they are already involved in it, and make use of it regularly, so it's easier for them to quickly adapt to its new features. As

a result, the effective use of digital technology in learning will more likely engender positive feedback from this generation of students.

3.3 The impact of online courses

Online courses have experienced an unprecedented growth rate in the last few decades, mainly because they address the need for when learners may not be inclined or have the opportunity to attend traditional classrooms in person. According to McAuley et al. (2010), the high number of enrollments in open online courses is nothing short of “massive” (MOOCs). They provide the middle ground for learning and teaching between the chaotic open web of fragmented information and the highly structured and organized traditional classroom environment (Siemens, 2013).

Online courses make it possible for higher institutions to increase their international and long distance student enrollment, which was especially significant during the COVID-19 pandemic, and compelled institutions to pay more attention to this form of learning, in order to survive in what was already becoming a highly competitive market. As declared by Marginson (2017), under any circumstances, an abrupt decline in the number of international students would leave many academic institutions in financial difficulty. The interest generated in the media by online courses has also increased people’s awareness and interest, as well as discussion on the opportunities available in online learning (Siemens, 2013). As a result, enrollment growth of traditional face-to-face university students has been outpaced by online learning (Allen & Seaman, 2011).

The positive impact of online courses for higher education according to Popovich and Neel (2005) includes several aspects; extension of a university’s reach, an increase in enrollment and profit, reductions in infrastructure costs, an increase in students’ technological skills, elimination of overcrowded classrooms, the development of individualized learning styles, the ability to align with a learners’ pace, improved

graduation and retention rate, and reduced faculty bias. The amount of work, dedication and time needed for online courses and the traditional learning classroom are almost the same, with the major differences being the flexibility, convenience and easy access that online courses offer. Regardless of the reason for choosing an online course and even if there is difficulty in adjusting to its mode of learning, when one is fully adjusted, it can showcase key skills to potential employers and can facilitate career advancement (Miller, 2019).

Though online courses have become quite popular and preferred among students, student workers and adult workers, there are still some setbacks associated with it. These include less direct access to classmates and educators as available in the traditional setting, less accountability due to the absence of peer and instructor feedback, poor time management (since learners sometimes believe online courses require less time than classroom learning), and a high dropout rate (Prestiadi et al., 2020).

3.3.1 Motivation for learning technologies

The incorporation of Information Communication Technology (ICT) into learning is gradually becoming an effective and highly sought-after method of learning in many educational institutions. This option is becoming increasingly popular because, according to Panigrahi et al. (2018), it reduces the spatial and temporal challenges linked to traditional learning and can therefore facilitate better learning and training. Motivation can be said to be a strong force that propels someone to put in the needed effort to achieve desired tasks that will eventually yield rewards. Motivation also refers to a drive that pushes one to act and carry out specified actions and tasks (Sharma & Srivastava, 2019), so someone who is motivated can attain better results than someone who lacks motivation (Pinder, 2014).

In examining the factors responsible for the motivation to use learning technologies, a study by Sharma and Srivastava (2019) declared that value beliefs (VB), perceived ease of use (PEOU) of technology and social influence (SI) all play a vital role in the behavioral intention (BI) to use technology. VB is the belief and perception that the task at hand is a significant factor towards the achievement of future goals. The perceived ease of use refers to the degree to which the use of technology is considered easy and does not require any specified effort (Sharma & Srivastava, 2019). SI refers to the effect and perception of friends, family, employers, professional colleagues, and the media, as well as the general assumption that everyone knows how to use the internet (Klobas & Clyde, 2001; Venkatesh et al., 2003). BI describes the need to adopt and use a specific model of learning technology (Sharma & Srivastava, 2019).

Teachers and institutions also factor significantly into how technology is used for learning. A teacher's attitude, their teaching preferences, computer skills and learning priorities can motivate the use of technology (Bakar, 2007). Their level of confidence and experience in using technology may also influence their willingness to incorporate perceived benefits derived from it, so that it can facilitate learning (Cox et al., 1999; Mumtaz, 2000; ChanLin et al., 2006). Institutions have to provide adequate training to its staff on the use of technology in teaching (Scrimshaw, 2004), as well as provide educators with laptops, projectors, and appropriate software to motivate them, alongside students, in the teaching and learning process (Abdullah et al., 2006). Inadequate technical support and technical problems can hinder its use (Yilmaz, 2011; Assan & Thomas, 2012), so these areas need to be properly provided for, made readily available, and addressed, in order to positively influence the incorporation of learning technologies.

3.3.2 Changes in social interaction

E-learning platforms provided a measure of support and ensured the continuity of learning to students worldwide during COVID – 19. They have also resulted in reducing or eliminating certain forms of social interactions between learners and educators. Social interaction refers to the level of communication between the stakeholders vis-à-vis the content on an online learning platform. The ability of humans to form connections and come together is referred to as socialization (Barber, 2021), achieved through the sharing of information and ideas, communicating with one another, and agreeing on a mutually accepted method to use in confirming the connections (Van & Thi, 2021). Interaction in this case is defined as the process of creating a meaningful pedagogical exchange of regular contact between two or more people (Rehman et al., 2020). Interaction in an e-learning platform can occur in several ways. The three most frequently described forms according to Azmat and Ahmad (2022) are content – learner, learner – learner and instructor – learner.

Social interaction in an online learning platform is a key issue to be considered, because of the positive and negative effect it may have on students' academic performance, their mental and psychological health, as well as their level of satisfaction. Every participant in all forms of electronic learning struggles with socializing online, as a result of the lack of physical contact. Its absence in e-learning is due to the fact that students do not have the opportunity to talk to each other in person, removing a key element in the very definition of this experience (Hermanto & Srimulyani, 2021).

The lack of social interaction in e-learning reached an unprecedented level during the COVID – 19 pandemic. Social interaction is known to foster a sense of belonging among students; in its absence, students can become less motivated to do assignments (Yeager et al., 2013), feel generally more lonely (Labrague et al., 2021), and may be detrimental to students' physical and mental health (Pietrabissa & Simpson, 2020). A study conducted by Berge and Muilenburg (2005) on student

barriers to online learning revealed that social interactions ranked second on the list. Social interactions are important in the learning process and are difficult to incorporate into all forms of e-learning due to the lack of physical contact.

3.4 Does the growing popularity of e-learning globally indicate its possible future?

These days, most learners are choosing to earn a degree or acquire knowledge by enrolling in online courses, rather than attending the traditional classroom setting, since it provides flexibility, convenience, no commuting and the opportunity to learn and earn at the same time. The internet has facilitated e-learning's growing popularity, which in turn has increased the desire of higher education institutions to promote its use to enhance students' learning outcomes (Barber, 2020). There are currently two main forms of e-learning; credit courses, where students enroll primarily for credits, and certification/professional training, aimed at preparing learners for certification examination. The latter is more popular because learners prefer to work and study at the same time, in order to develop their skills (Debroy, 2017).

E-learning has become more popular globally since the pandemic. Figure 6 below shows that the Coursera e-learning platform had 20 million new learners who registered for courses in 2021 - a number equivalent to three years' total growth prior to the pandemic (Coursera, 2021). Between 2016 and 2019, the learning platform had an annual increase of about 7 million, but the abrupt switch to remote learning during the pandemic significantly increased new enrollment, causing a surge from 71 million in 2020 to 92 million in 2021. According to the World Economic Forum (2022), the increase in the number of registered learners and enrollments may indicate a more global acceptance of e-learning and an increase in the number of remote learners, including more vulnerable and remote communities taking higher education courses.

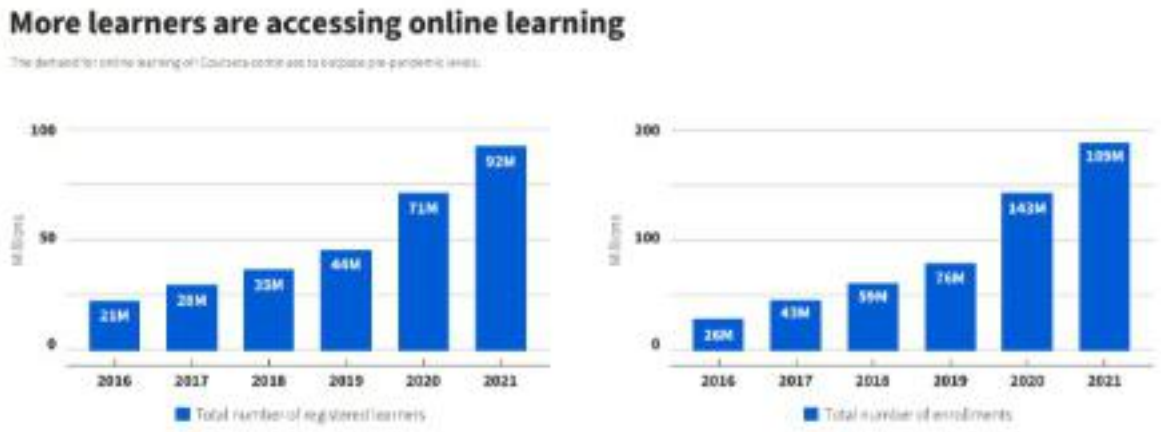

Figure 6 - The Upward Trend in Online Learning

(Source: Coursera, 2021)

Globally, the countries considered to be leaders in online education are the United States, India, China, South Korea, and the United Kingdom, and are also seen as role models for others aspiring to be in the same league (Debroy, 2017). The countries with the most electronic learners, as per Figure 7 below, indicates that the United States topped the list with over 17 million, followed by India with over 13 million. There is a wide gap between the first two countries and the rest, with Mexico, Brazil and China rounding out the top 5, followed by Canada, Russia, UK, Colombia and Egypt (Coursera, 2021).

Figure 7 - Countries that most Online Learners Call Home

(Source: Coursera, 2021)

Many reasons have been attributed to why e-learning is growing rapidly in popularity globally. The benefits people associate with e-learning compared to the conventional forms include the quick potential pace of delivery, the reduced cost to train large groups of people, the way it challenges learners and uses a variety of media in delivery, and the lower impact it has on the environment, due to less travel time and printing (Reinvigoration, n. d). The tallies in Figure 6 and Figure 7 indicate a continued demand for and growth of e-learning. They also exclude large populations and places in the world where e-learning and even digital transformation is still in the early stages or non-existent. So, the future would see an increase and further acceptance of e-learning as it can be facilitated in these areas. On the other hand, high concentrations of digital technology (e.g., excessive digitization) in learning, which, as mentioned, may create personal, emotional or functional issues and challenges, may serve to curtail its acceptance, at least in its current form. With all of its benefits and the ubiquitousness of digital technology, it seems hard to imagine the future without it, perhaps just its shape and form will change to suit what appears to be the ever-changing landscape. In many areas of the world it has become mainstream, so part of its future may be the opportunity to expand into the rest of the world.

3.4.1 The demand for digital skills in Europe

Digital skills are in high demand, since they are now required in almost all sectors including education, business, marketing, and media, due in part to the high influx of technology into everyday life. These skills include cognitive and non-cognitive abilities relevant to the labor market, as well as technical abilities specific to a particular sector, job or occupation (European Digital Skills, 2022). At a basic level, digital skills can be applied to opening emails, turning on devices, using word processing software, scrolling down a page, or more advanced tasks like creating digital content, developing and programming software, developing and integrating emerging technologies such as Artificial Intelligence, as well as implementing and running cloud-based infrastructures (Feijao et al., 2021).

At every organizational level, there is a growing need for leaders with digital skills since technology has touched all levels of business and society (Leahy & Dolan, 2013). They are acquired over a period of time through formal or informal learning, as well as the social use of technology on various communicating, networking and collaborating platforms. In all areas of the personal, professional and social life of young people and European citizens, Information and Communication Technology has irreversibly influenced the ways of accessing knowledge, working, communicating, succeeding and socializing (European Commission, 2013).

The Digital Agenda for Europe recognizes the need for digital skills which can enhance growth and innovation, even as requirements are constantly changing (European Commission, 2010). The Organization for Economic Co-operation and Development (OECD) analysis indicates that there is a high demand for digital skills in most countries (OECD, 2015) and that over 40% of workers use ICT regularly, but do not have adequate skills to use them effectively (OECD, 2016). The European Commission (2020a) in its 2020 communication on ‘Shaping Europe’s Digital Future’ stated that over 90% of available jobs require at least basic digital skills, and that the need for this type of competency goes beyond even the job market.

Figure 8 illustrates the number of people in Europe who have basic digital skills in five areas, including communication and collaboration, literacy, safety, problem solving, and content creation. It shows that in 2021, over half of all EU residents had at least basic digital skills, with the Netherlands, Finland and Ireland recording the highest scores, and Romania, Bulgaria and Poland with the lowest. Figure 8 also shows that over half of the population between the ages of 16 and 74 who possess basic overall digital skills are capable of performing at least one of the activities associated with the five areas noted.

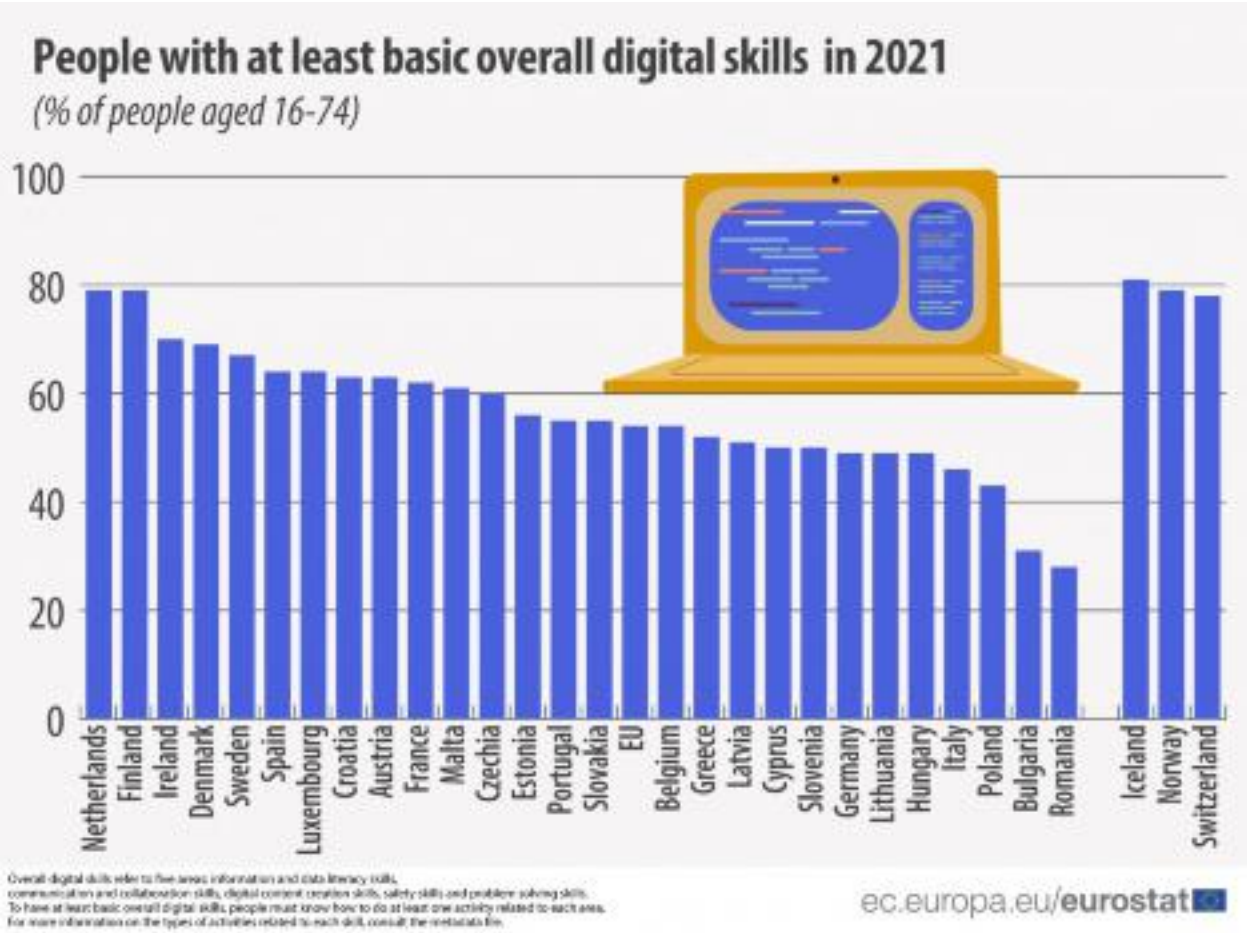

Figure 8 - People with Basic Digital Skills - 2021

(Source: Eurostat, 2022)

Digital skills have become fundamental to social, modern-day governance, economic functioning, as well as for access to parts of the healthcare system, and can no longer be considered optional (Cowhey & Aronson, 2017), according to the 2020 update of the European Skills Agenda (European Commission, 2020b). The abrupt shift to online learning during COVID-19 clearly indicated that a digital society can be achieved and, as stated by (Honeyman et al., 2020), it also widened digital divides and increased existing economic and health inequalities. Van Kessel et al. (2022) questioned whether the current European system is capable of safely and sustainably hosting a digital society. The Office for National Statistics (2019) in the United Kingdom stated that 10% of the adult population do not make use of the internet, and it was also reported by Global Kids Online (2021) that there is no frequent internet access for 14% of children under the age of 19 in Europe. According to Van Kessel et al. (2022), about half of the population in the EU lack basic digital skills with 20% having none at all, which would indicate that Europe cannot currently sustain a digital society, due to these enormous gaps in digital literacy and access to the internet.

3.4.2 E-learning in the United States

Globally, the increase in advanced technology and adoption of the internet as the major means of communication and acquiring knowledge, has resulted in e-learning growing exponentially and the U.S. is no exception. As stated by Palvia et al. (2018), by 2025, e-learning is on the path to becoming mainstream. The evolution of e-learning in the U.S. has had four phases: 1990s – when the internet propelled distance learning; 2000-2007 – increased use of LMSs; 2008-2012 – growth of MOOCs; and since then, e-learning enrollments in higher education are outpacing traditional learning enrollments (Dziuban et al., 2016).

The e-learning market in the United States between 2020 and 2024 is expected to grow by US$12.81 billion with 63% of students in higher education, 45% in elementary school, and 64% in middle school using a minimum of one digital learning tool daily,

with 39% of undergraduates and 52% of American graduates believing e-learning to be better than traditional classroom learning (Chernev, 2022). This would indicate that e-learning has a strong foothold in the United States, and has become a growing source of business and revenue generation. This is clearly demonstrated by the fact that e-learning platforms are now plentiful in the United States, including BitDegree, Thinkful, Codecademy, KhanAcademy, Skillshare, Coursera, Udemy, Edx, DataCamp and Pluralsite.

The United States does not have a policy regarding the integration of ICT into education and even though the federal government has developed and articulated a fair amount of communication to support e-learning, the primary responsibility to educate its population lies with the individual states (Roumell & Salajan, 2014). Educational policy is not as centralized as it is in other countries (Roumell & Salajan, 2014), nor is it clearly mandated or regulated by the federal government (Hirschland & Steinmo, 2003; Walker et al., 2008).

College enrollment in the U.S. declined from 20.6 million in 2011 to 19 million in 2016, with the expectation of more significant declines in the late 2020s (Hildreth, 2017; Hoover, 2017). The cause of this decline can be attributed to the stiff competition among universities to outshine one another, where the top tier institutions experience an increase in enrollment, while the middle and lower tiers grapple with declining rates. Universities and colleges with low endowments depend on tuition and enrollment numbers to stay afloat, and their bottom line is determined by the amount paid out in student aid (Hildreth, 2017). Another reason for the decline may be because of students' changing needs, the availability of sophisticated technology, less interest in conventional degrees, and rather wanting to develop digital skills that will enable them to more effectively earn. Other reasons for the decline in student enrollment as outlined by Palvia et al. (2018) include the cost of commuting, the lack of desire to travel long distances, an unwillingness to incur long term school loan

debts, and skepticism about the incremental value of advanced studies, based on the perception of the high cost of education.

Even before Covid-19, despite the rise and fall in student enrollments, and the shrinking or growing economy, e-learning in the United States experienced significant growth (Palvia et al., 2018), and enrollment into the traditional face-to-face classes at the brick-and-mortar campus had already been on a decline (Seaman et al., 2018). There was a noticeable shift in the number of students who preferred online learning to traditional classroom learning, with the former growing steadily, due to the benefits of e-learning as outlined earlier.

Chapter 4

Research design for case studies and findings

The purpose of this qualitative study was to understand how the concept of e-learning and the use of information technology in university education come together, by providing a broad view of the intricacies involved in learning, specifically via electronic media. In this chapter, a detailed account of the elements used to conduct this research study is provided. These elements include the research design, methodology, participants, data collection and analysis procedures, as well as the validity and ethical considerations of the study. Also provided are the findings of the study as generated from the interview responses, discussion of these findings, as well as the ensuing conclusions. A systematic research methodology enables the investigation of a specific topic from varying angles (Cohen et al., 2018), which ensures that the critical and descriptive aspects of the work are incorporated when credible findings are produced (Gentles et al., 2016). The study topic focused on different aspects of e-learning, as it sought out students' opinions about e-learning and its impact. Also included are how the method options for the study were chosen and the justifications used.

The analyzed data, findings and interpretation of the data generated from the interview questions used for data collection are also presented. All observations that arose from the research process, and studies whose findings appeared relevant to the outcome were also included. The discussion of findings compared to previous studies is shown in Section 4.4. The analyses of the interview questions are presented sequentially. Students' responses on e-learning, especially as experienced during the 2019 Coronavirus pandemic, are examined, analyzed, interpreted, and discussed.

4.1 Qualitative research

Qualitative research refers to a form of research that explores real-world problems (Moser & Korstjens, 2017), generates hypotheses, answers the how and why questions instead of how much or how many, and gathers participants' perceptions, behaviors and experiences (Tenny et al., 2022). Qualitative research provides answers to open-ended questions that are not easily translated into statistics (Cleland, 2017), and this capacity to explain patterns of human behavior and processes that cannot be easily quantified is one of its strengths (Foley & Timonen, 2015). Previous research suggests that data obtained from qualitative research is based on personal interactions, which invariably leads to context-based, negotiated results (Fontana & Frey, 2000; Silverman, 2015).

4.1.1 Research methodology

The choice of a research method is usually based on a paradigm that ensures reliable data and valid research findings (Cohen et al., 2018; Mukherji & Albon, 2018). For these reasons, this study employed a case study approach. This approach starts with an examination of students' responses to their experiences, then identifies and compares factors that influence their judgments (Blatter & Haverland, 2012).

The case study approach enables a researcher to be focused on a specific topic, understand the context, and then produce valid results that are acceptable to all stakeholders (Cohen et al., 2018). Using case studies in qualitative research makes it possible for data to be observed and analyzed in much more detail, unlike quantitative analysis, where data patterns are evaluated on a larger scale and at a higher level (Crawford, 2016).

4.1.2 Participants' demographics

Ten students in either a bachelor's or master's program, with most having experienced e-learning participated in the study. They were selected from seven universities: University of Bremen, Leipzig University, Jade University of Applied Sciences, University of Bayreuth, University of Oldenburg, University of Freiburg and City University of Applied Sciences, Bremen. Five males and five females with ages ranging from 19 to 30 were involved, as per Table 5 below:

Participants	Age	Gender	Department	Institutions
Subject -1	26	Female	Business Administration	University of Bremen
Subject -2	21	Female	Public Health	University of Bremen
Subject -3	26	Female	Chemistry	Leipzig University
Subject -4	19	Female	Mathematics	University of Bremen
Subject -5	22	Female	Nautical Science and Maritime Transport	Jade University of Applied Sciences
Subject -6	21	Male	Sport	University of Bayreuth
Subject -7	23	Male	Biology	University of Oldenburg
Subject -8	19	Male	Economics	University of Freiburg
Subject -9	27	Male	Medical Bio Statistics and Biology	University of Bremen
Subject -10	30	Male	Economics	City University of Applied Sciences, Bremen

Table 5 - Participants' Demographics

(Note: Participants were given pseudonyms)

Students in this demographic were selected to ensure the most relevant and accurate results for this research study, especially because their mode of learning was greatly affected by the pandemic.

4.1.3 Interview approach (structured)

A structured interview refers to a fixed design with pre-determined content, in which respondents are all asked the same questions in the same order (Ashfaq, 2016). More in-depth insights on participants' thoughts, attitudes and actions are often gathered using a qualitative data interview approach (Kendall, 2008). Each interview was structured to last 35 to 45 minutes since, according to Jacob and Furgerson (2012), this type of activity should not exceed 90 minutes, in consideration of participants' other commitments.

The structured interview questions were guided by the literature and students' perspectives of their e-learning experience. The interview approach is useful when one seeks to gather detailed information and opinions from a smaller, more specific group (Driscoll, 2011).

4.1.4 Why do we need to consider students' experiences, in order to understand their responses?

Delving into their responses based on their own experiences is paramount to understanding students' decisions and gaining a broader insight into the complexities that affect their educational trajectory. Learners' perceptions are inherently subjective, shaped by circumstances, learning styles, and prior exposure (Vygotsky, 1978). By actively reflecting on and analyzing their responses, teachers and researchers develop a multi-dimensional understanding of the complex determinants of student decisions. Applying educational psychology, as exemplified by the

groundbreaking work of Piaget (1970) and Vygotsky (1978), the latter emphasizing the central role of cognitive development in a sociocultural context in shaping students' learning experiences, while the former believed that experiences guided by individuality, was key. From either perspective, including student responses can help to interpret the psychological, social and emotional factors that affect their educational decisions.

The philosophy of student-centered learning advocated by Weimer (2002) emphasizes the importance of active student participation in the research process by valuing student voices and taking their responses into consideration, so that teachers not only embrace a rich variety of perspectives, but also empower students as active participants in education discourse delivery. This participatory approach increases the validity and relevance of research findings, and grounds them in students' lived realities. Essentially, finding answers based on students' experiences is not just a theoretical endeavor but a practical requirement for better understanding their decisions. Each answer provides a unique story, offering a glimpse into a student's individual learning journey. Collecting this narrative, when analyzed together, enriches the educational environment by providing a deeper understanding of the various factors that influence students' decisions. This requires intentional attention to their responses, as well as acknowledging the subjective nature of their experiences. This approach, drawn from educational psychology, student-centered theories of learning, and the influential work of Piaget and Vygotsky, ensures a thorough and refined sampling of their educational experience from which to extrapolate specific observances.

4.2 Data collection method

Prior to the interview, a consent form was given to each individual, indicating that participation was voluntary, their information would be kept confidential, answers

would be anonymous, and that they could freely withdraw from the study at any time. Participants were also informed that their responses would be recorded, so as to have a precise record of the interview, and only used for the purpose of analysis (Percy et al., 2015; Creswell & Creswell, 2020). The interview was conducted face to face, and all of the interview questions (as shown in Appendix A) were asked sequentially.

All of the interview responses were recorded and noted in the data collection paperwork. Audiotaping was considered essential in order to ensure that exact records of the interviews were obtained, and eliminate possible bias, rather than rely on the researcher's perspective and memory (Driscoll, 2011; Percy et al., 2015). The interview had 10 questions, with the first five asking about the participant's demographics such as name, age, gender, city, institution, and department. These 5 questions are not specifically presented, due to data privacy requirements. Some small talk also occurred during the interview, to help make the participants more relaxed and comfortable. According to Mukherji and Albon (2018), it is essential that all respondents are at ease and relaxed while answering questions. The conversation then gradually entered into the core discussion to discover participants' emotions, experiences, and feelings about their e-learning study experience. Individuals came from different backgrounds and shared their opinions from different points of view. The interviewer focused on using open ended questions (What, Why, How, and Where), in order to obtain detailed answers and explanations.

It was necessary at times to pause and resume recording during the interviews, in order to ensure that the questions asked were well understood by the participants before giving their responses. It was also the responsibility of the interviewer to check during the conversation as to whether participants were feeling pressured or wanted to discontinue the discussion. Getting their views in person was very helpful, because their expressions were visible to the interviewer, who was able to observe their norms, gestures, emotions, and what they meant to convey. Upon completion of

the interview, the researcher reassured participants where necessary of any personal concerns they might have. They were also encouraged to reach out to the researcher via email for any changes or additions to the original data they had provided. Since participants came from a variety of locations, emailing was a convenient method for keeping in contact, without the limitations of time and distance.

4.2.1 Data sampling method

Selecting interview participants helps in gathering relevant information and enhances the understanding of the topic of interest (Etikan et al., 2016a). The sample size for this study was 10 university students across various disciplines, who were involved in bachelor's or master's studies and familiar with online studying, likely as a result of the pandemic in early 2020. The purposive sampling technique was used in selecting the participants for this study.

The reason for choosing this sampling technique is, as stated by Campbell et al. (2020) that it accurately matches research participants to research objectives, which invariably enhances the trustworthiness of the data and the outcome of the research. This sampling technique is also used in selecting information-rich participants that meet a pre-determined criterion, to help answer the research objectives, and have in-depth views on, knowledge of and experience with the topic of interest (Palinkas et al., 2015; Shaheen et al., 2016; Shaheen et al., 2019). The participants for the interviews were carefully chosen based on a set criteria, and the interviews were based on the questions developed from the research. According to Driscoll (2011), successful interviews result from choosing suitable candidates.

4.2.2 Data coding and analysis

Data coding according to Leech and Onwuegbuzie (2007) refers to the technique of constant comparative analysis, based on grounded theory (Glasser and Strauss, 1967), and can also be applied in other qualitative methods that are independent of grounded theory (Miles & Huberman, 1994; Patton, 2002). It assists in breaking down text for better understanding and categorization. The coding process involves identifying and collecting data, as well as grouping and labelling it into segments (Ngulube, 2015). The qualitative data gathered from the structured interviews was examined within the framework of the questions, using a content analysis technique, which examines the content, as well as the context of the data (Mayring, 2000). Qualitative content analysis creates and applies categories to the data, obtained by closely reading the data needed to capture key concepts, to generate themes, and for analyzing the data (Hsieh & Shannon, 2005; Forman & Damschroder, 2007). These are labelled to reflect the key perspective of the participants and then sorted into different categories based on previous studies. According to Miles et al. (2013) and Forman and Damschroder (2007), data obtained from interviews in the form of transcripts, audio recordings or note taking are analyzed and interpreted by evaluating the data, applying descriptive codes to it, and then condensing and categorizing the codes to look for patterns. Following the transcription of the interviews, MAXQDA (MAX Qualitative Data Analysis) software used in conducting content analysis helped in coding and identifying themes from the participants' responses. The themes that emerged from the study were then discussed to describe participants' responses based on previous studies.

4.2.3 Data interpretation

Interpretation of data is the core of qualitative research and the final phase of a qualitative inquiry (Flick, 2002; Denzin & Lincoln, 2005). In this phase, the empirical

evidence that has been collected is assessed, analyzed, as well as interpreted, and the different perspectives of the participants are presented in detail, so as to enable the reader to gauge the accuracy of the analysis (Ngulube, 2015).

Students' firsthand accounts of their experiences provide rich qualitative data that can help researchers to understand their judgments and perspectives (Patton, 2002). Interpreting these lived experiences can provide insights into the factors that influence their decisions and behaviors.

Comments made by participants are usually quoted and reveal the meaning as expressed in their words, rather than in those of the researchers (Baxter & Eyles, 1997; Ngulube, 2015).

4.2.4 Trustworthiness

The trustworthiness of qualitative research, unlike quantitative, has always been questioned. This is because it is believed that numbers can be manipulated, and their validity and reliability cannot be addressed in the same way as in quantitative research, in which the process is more rigorous, systematic and transparent (Shenton, 2004; Adler, 2022). Trustworthiness is a way of persuading readers that the research findings presented are reliable, and this concept can be achieved by showing how credible, dependable and confirmable the findings are, which is parallel to assessing the reliability and validity of quantitative research (Lincoln & Guba, 1985). As suggested by Creswell and Creswell (2020), the researcher achieved the trustworthiness of this study in part by regularly meeting with the supervisor who assessed, critiqued and recommended various changes to improve its validity and quality. The trustworthiness of this study was established based on the following:

Credibility

Credibility addresses the fit between participants' perception and how they are represented by the researcher (Tobin & Begley, 2004; Bloomberg & Volpe, 2019). In order to achieve this, focus was on listening carefully to the participants' experiences, accurately capturing these experiences, and setting aside, or bracketing personal biases that could influence the information collected. Bracketing is a process used in sorting through, acknowledging and exploring ways in which prejudices and biases can impact data interpretation (Moustakas, 1994; Bloomberg & Volpe, 2019).

Dependability

Dependability is a measure of reliability which, according to Shenton (2004), employs techniques to indicate that similar results would be obtained if a study was repeated, using the same participants, methods and context. To demonstrate dependability in qualitative research, the approach must be logical, documented clearly, audited and traceable (Koch, 1994; Tobin & Begley, 2004; Bloomberg & Volpe, 2019). These steps were carefully carried out by the researcher.

Confirmability

This is a measure of objectivity. Confirmability is determined only when credibility and dependability have all been achieved (Guba & Lincoln, 1989). Confirmability establishes that results obtained, and their interpretation were all derived from the data gathered in the course of the research and it requires the demonstration of how conclusions were reached (Tobin & Begley, 2004; Bloomberg & Volpe, 2019). The researcher has clearly described and justified the theoretical, methodological and analytical choices made in the study.

4.3 Ethical considerations

In a research study, ethical considerations are vital, because human participants are involved and often described as the moral foundation of a research study (Aubrey et al., 2000), and its importance therefore cannot be emphasized enough (Cohen et al., 2018). The researcher sought out the needed approvals and ensured that participants were advised of their rights, by way of an informed consent form. The researcher also ensured that participants' identities were kept anonymous, by replacing names with pseudonyms, to maintain confidentiality. All data obtained was secured on a password protected computer, which could only be accessed by the researcher. The content of the interviews was guaranteed to be used solely for educational and research purposes (Creswell, 2014; Newby, 2014; Cohen et al., 2018). Researcher confirms that strong ethical principles were upheld in research (Cohen et al., 2018), and research participants' welfare and rights were prioritized (Greig et al., 2007; Newby, 2014).

4.4 Findings, discussions and arguments

The interview questions, responses, findings and discussions are presented in this section. The structured interviews and participants' responses can be viewed in greater detail in Appendix B. The findings of this study were interpreted and explained in accordance with the interview questions formulated for the study. There were 10 interview questions, with the responses to the first 5 demographic questions (as shown in Appendix A) summarized in Section 4.1.2. The remaining 5 questions, their responses, findings and discussions are presented here and have been renumbered as questions 6-10. The interpreted data is presented as a percentage of the participants' responses. Any observations that arose out of the research process, as well as other studies that appear relevant to the outcome of the study which may not have been previously identified in the literature review have been incorporated in

this section. The collected data, analysis and findings are discussed in this chapter and the responses to the second group of 5 questions are presented in Appendix B.

4.4.1 Finding: 01 (Question 6)

Have you already done some online courses, or are you currently doing any?

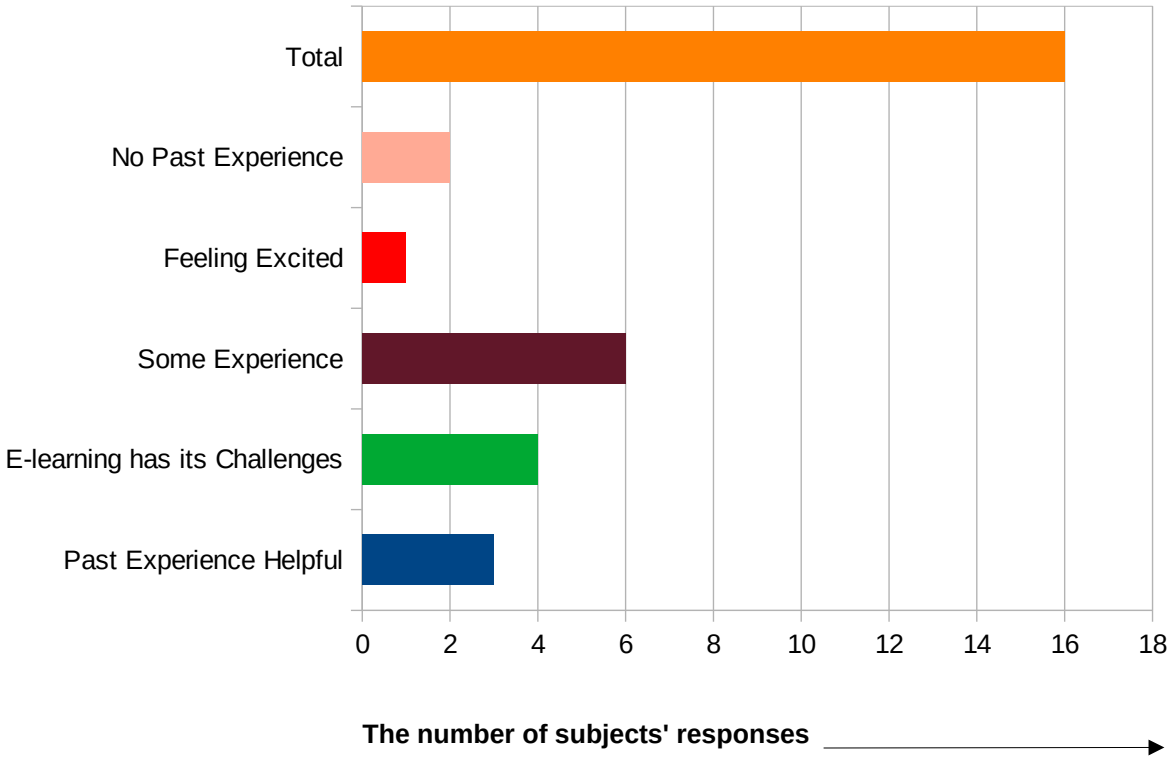

Figure 9 - Past E-learning Experience

Legends	The number of subjects' responses
Past Experience Helpful	3
E-learning has its Challenges	4
Some Experience	6
Feeling Excited	1
No Past Experience	2
Total	16

Table 6 - Data Coding Statistics for Past E-learning Experience

Within the total sample group of 10 respondents, where 6 reported having e-learning experience, and 2 have no previous experience. Among the participants with e-learning experience, 3 stated that the experience had been helpful and 4 of them agreed that the e-learning platform presents unique challenges to effective learning and academic progress.

These results confirm the statement made by the Organization for Economic Co-operation and Development (OECD) that student take-up of e-learning is growing, and the number of students enrolled in at least one e-learning course is increasing, from 30% to 50% on average, of total enrollments (OECD, 2005).

Subject 2 from the interview stated that:

> "I have already done some online course in the last semester and till now doing more. This Internet based education is nothing completely new for me since the virus pandemic started all on-campus study converted to e-learning. So, still trying to cope up with the e-learning method."

Subject 3 had this to say,

> "Yes, I have done an online course. The experiences, in the beginning, were not that comfortable, but I don't have any other options at the moment, so trying to stick to it. I already experienced the online courses even before admitting to the university for learning technologies. So this previous knowledge about e-learning was an advantage for me."

Subject 1 stated,

> "I don't have previous experiences but doing currently. I have been excited about the new learning system. Because since my childhood till today, I did follow the traditional way of learning. This kind of e-learning system is something new what I never tried out, even for personal study. Let's see how it goes."

Irrespective of students' previous experience with or without online learning, it is important to implement the transition gradually, so as to carry all levels of learners along. Onyema et al. (2020) posited that though the use of e-learning platforms has had a significant impact on students' interest in learning, its usage should be encouraged gradually, in order to ensure that learners fully understand the new approach and maximize its potential. The gradual transition may play a vital role in equipping students to rise above challenges that have affected their academic progress.

4.4.2 Finding: 02 (Question 7)

What is your opinion about e-learning, positive or negative?

Figure 10 - Opinions about E-learning

Legends	The number of subjects' responses
Negative (Opinion e-learning)	7
Positive (Opinion e-learning)	5
Total	12

Table 7 - Data Coding Statistics for E-learning Opinions

All participants responded, with 7 having negative opinions, while 5 had positive things to say about e-learning. The result of this study is consistent with Omar et al. (2021), who declared that there are mixed reactions towards e-learning, where some

people are in support of it, and some are against it. Subject 5 from the interview, for example, stated,

> "Some parts are positive, and some are negative. If I could go to the university to take the lectures, it is more fruitful to learn something directly from the teacher, which is face-to-face interaction. But in online, I can do only virtual interaction where I miss the actual feelings of talking to someone who reacts after the questions. On the positive side, I would say I can enroll myself in many courses compared to on-campus studying since I can attend several lectures within a short interval. Which is helping me faster graduation."

All of the interview participants were also asked to identify which aspects of e-learning they perceived to be positive, and which were negative. Graphical illustrations of their responses are presented in Figures 11 and 12, as well as Table 8 and 9, with some examples of actual responses below:

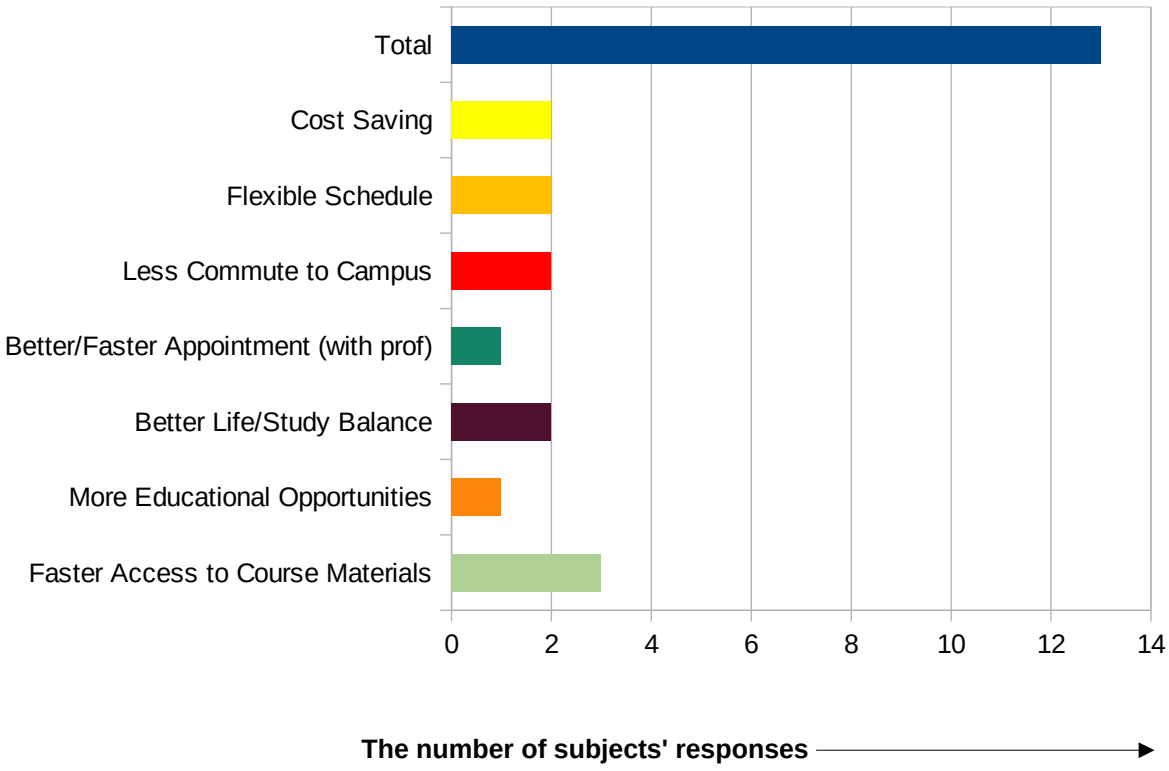

Figure 11 – Benefits of E-learning

Legends	The number of subjects' responses
Faster Access to Course Materials	3
More Educational Opportunities	1
Better Life/Study Balance	2
Better/Faster Appointment (with prof)	1
Less Commute to Campus	2
Flexible Schedule	2
Cost Saving	2
Total	13

Table 8 - Data Coding Statistics for Benefits of E-learning

Participants mentioned a number of positive aspects associated with e-learning. Key points mentioned included the benefit of little or no commuting to campus or classroom (2 responses), a more flexible schedule compared to in-person learning (2 responses), more educational opportunities (1 response), and that it might encourage more study/life balance (2 responses). Other benefits cited were faster access to course materials, easier access to instructors, and cost savings.

This result upholds the view of previous authors who have stated that the higher flexibility and convenience offered by online learning makes it an attractive option (Amir et al., 2020; Dost et al., 2020; Mukhtar et al., 2020; Muthuprasad et al., 2021). In this context, Subject 2 had this to say,

> "I would say the positive on the major side because it is cost and time saving. I don't need to visit the campus every day by using the local transportation. I can choose any flexible time for a particular lecture that fits my schedule. I have the opportunity to get a professor appointment within a short time which wasn't possible on-campus study and so on."

The results of this study also confirm the common statement that online learning enables students to choose the time and place to study and provides easier access to educational materials (Baczek et al., 2021). Subject 9 stated that:

> "There are many disadvantages. But still, there some benefits because I can access many learning materials online. I don't have to go to the university to print the soft copies to get hard copies all the time. But negatively, I am missing the direct exchange with the teachers. The content of the lecture is discussed less online. If I could be on the spot, that would be much better."

Included in Subject 10's responses to this point were

> "I think positive and negative both. I have to stay home for every lecture, which is not comfortable for me. Because I think staying in a comfort zone can't be the ideal way to achieve such an educational degree. But still there some positive sides as well, for example, the teachers are providing us the visual lecture materials immediately after lecture which can be studied again and again."

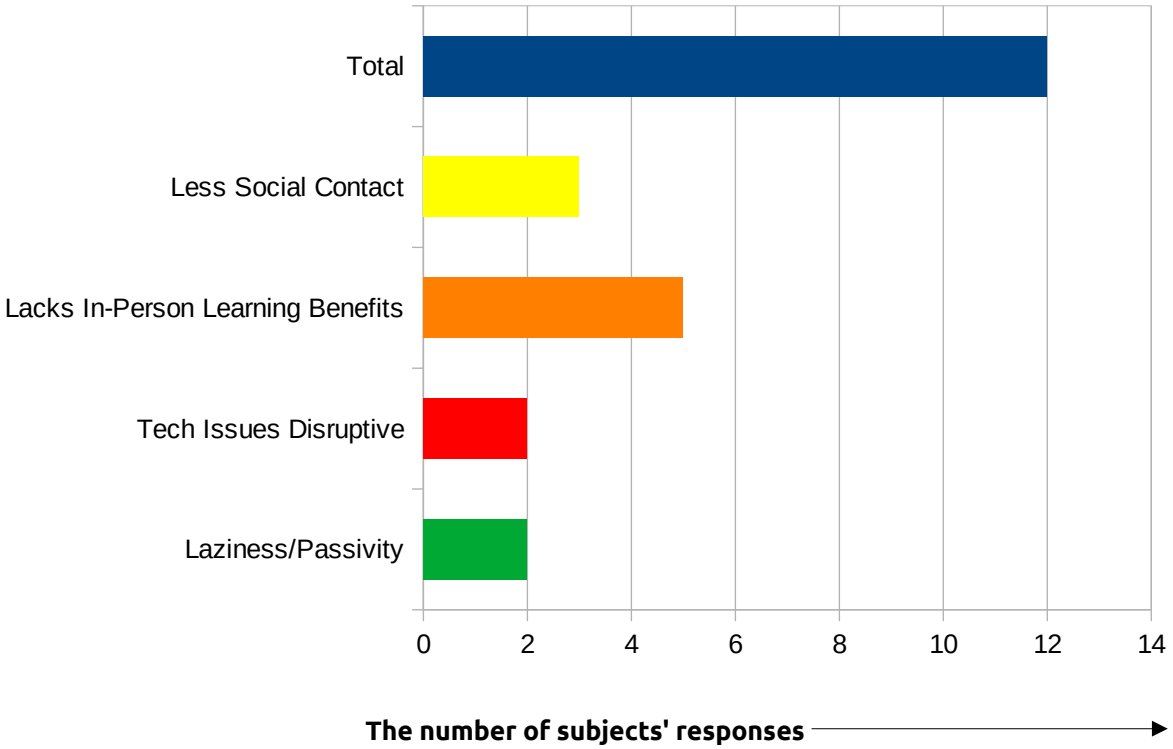

Figure 12 – Disadvantages of E-learning

Legends	The number of subjects' responses
Laziness/Passivity	2
Tech Issues Disruptive	2
Lacks In-Person Learning Benefits	5
Less Social Contact	3
Total	12

Table 9 - Data Coding Statistics for Disadvantages of E-learning

The key negative aspects identified by participants were that it may increase passivity in learning or encourage laziness (2 responses), that it lacks some benefits of in-person learning (5 responses), and that it negatively impacts students' social capital due to limited or digital-only interaction (3 responses).

In support of this finding, previous research by Smith and Smith (2014) and Singh et al. (2021) declared that online learning poses a danger of disengaged participation in class, as students passively listen or watch the instructor's lecture, and that learning virtually was lonely and could contribute to them being lazy. Additionally, Mukhtar et al. (2020) mentioned some downsides, like students' limited attention span and lack of attentiveness. Subject 4 said:

> "I find it negative because I miss the social contact with people. We are human beings, and we need to be in touch with society to become social. But due to the virus pandemic, we are maintaining the social distance that's true, but if it exists forever, it would be a severe problem for studying at the campus."

This finding also aligns with the view that e-learning has the challenge of poor/limited learners' interaction with instructors and fellow learners (Sing & Khine, 2006; Bernard et al., 2009; Fedynich et al., 2015; Tanis, 2020), thereby making them feel isolated as a result of limited or the absence of connection (Dixson, 2015; Kwary & Fauzie, 2018).

In terms of disruptive technology issues, the finding is in line with Muthuprasad et al. (2021) who posited that broadband connectivity poses a challenge to students when using online learning initiatives. To this point, Subject 6 said:

> "I would say not so bad. I think everything is according to order. But a couple of things work positively and negatively at the same time. For example, sometimes, due to server problems and Internet speed, I face technical issues, which slows down the process sometimes since it is entirely technology dependent. The on-campus study doesn't rely on the technology as e-learning which is the more flexible handle."

4.4.3 Finding: 03 (Question 8)

Do you feel remote learning is sufficient for understanding the lectures?

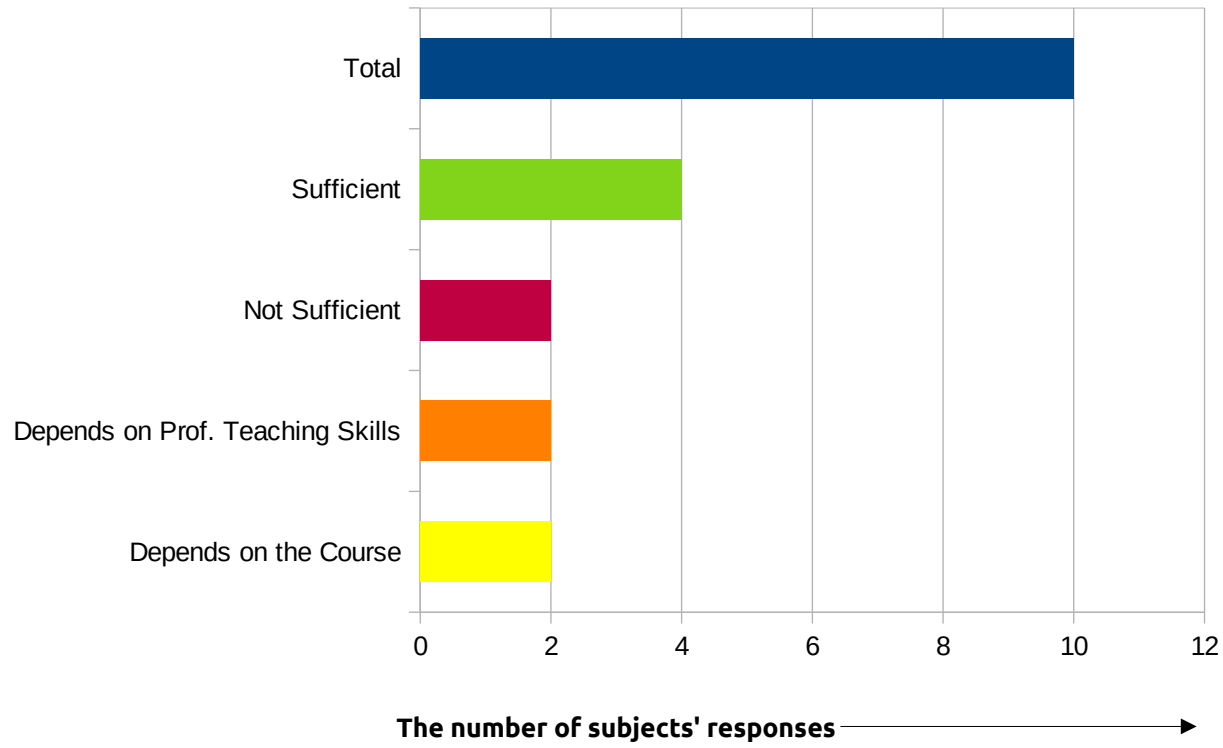

Figure 13 - Remote Learning for Comprehension

Legends	The number of subjects' responses
Depends on the Course	2
Depends on Prof. Teaching Skills	2
Not Sufficient	2
Sufficient	4
Total	10

Table 10 - Data Coding Statistics for Remote Learning Comprehension

In responding to this question, most students posited that the answer depended on the course, as well as the teaching experience and skill of the instructor (2 responses), but 4 responses of participants identified e-learning as a sufficient method of study. Many identified the positive quality of instructors who make use of media and technology, and that e-learning is good as a supplemental method of learning. Only 2 responses identified e-learning as a totally insufficient method of study. Common points mentioned among the latter respondents were that e-learning alone was not adequate to assist them to prepare fully for exams, and that e-learning takes a toll on students' health.

The effectiveness and choice of e-learning is determined by a number of factors. Previous research declared that an effectively designed course creates a higher acceptance by students, which invariably improves their academic performance through acquired knowledge and skills (Mtebe & Raisamo, 2014; Almaiah & Alyoussef, 2019; Khan & Yildiz, 2020; Mohammed et al., 2020). When the online learning course is not effectively designed, it might result in low usage of the platform by students (Almaiah & Almulhem, 2018). Another critical factor is the quality of the instructor's teaching skills, which impacts students' satisfaction and can also affect the outcome of the educational process (Arambewela & Hall, 2009; Munteanu et al., 2010; Masserini et al., 2019).

In further declaring the importance of course design and teaching skills, Subject 1 stated,

> “When the professors are using the video based lectures, then I would say yes, that’s sufficient to understand the lessons. But the professor has to be very specific in providing the lecture. If the instructor uses the keyword and highlights the crucial points of the lessons, then it might not be that much hard to follow the course through online.“

Subject 3’s responses included:

> "According to my own experiences, the lecture was easy to understand. Because I could follow the lecture as expected. If I raise my hand for repeating something which wasn't clear, then our professor does it. The teacher's virtual demonstration was not too difficult to understand the lectures. I am happy with the lecture capturing into my brain."

According to Subject 7,

> “It depends on the instructor who teaches in which way. For example, in the first online course, the teacher was excellent at explaining the lecture materials. I used to catch the lessons properly. But when I experienced another lecturer’s course, I faced difficulties in understanding the course content. So, it varies from teacher to teacher because everyone has their style of teaching.”

In terms of determining if e-learning is a sufficient or insufficient method of learning, Kamsin (2005) declared that e-learning is good as a supplement for conventional learning and may not entirely replace classroom learning, depending on students’, institutions’ and developers’ ability to adapt. Subject 9 said:

> “I would say it might not be sufficient for some courses. Maybe for some modules, it might be applicable. I am not willing to take all courses online. There are some modules where I experienced that online learning is enough to understand the lessons. Still, it was difficult to follow in some other courses, especially the core content of the learning materials.”

Subject 5 said:

> “It works but not supporting too strongly. Because when a traditional way of learning is converted into online completely, it might not be that easy for some individuals. I find the e-learning is partially sufficient for getting to know about the lessons but not completely sufficient for becoming ready to sit for the exams.”

4.4.4 Finding: 04 (Question 9)

What do you think about Traditional Learning Methods?

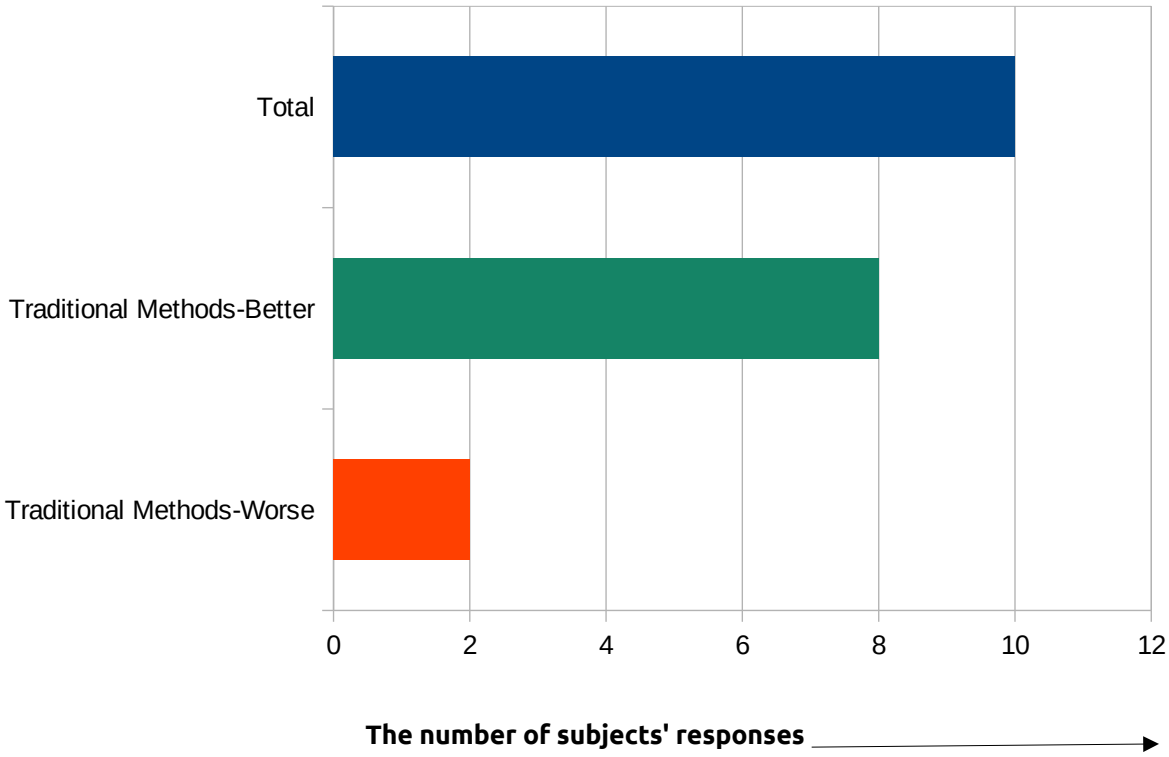

Figure 14 - Opinion on Traditional Learning Methods

Legends	The number of subjects' responses
Traditional Methods-Worse	2
Traditional Methods-Better	8
Total	10

Table 11 - Data Coding Statistics for Opinions on Traditional Learning Methods

A majority of the participants (8 responses) strongly agreed that the traditional methods of learning were way better in certain aspects, as outlined below. This finding supports the view of OECD (2005) that full online learning in campus-based institutions will remain a lessor component.

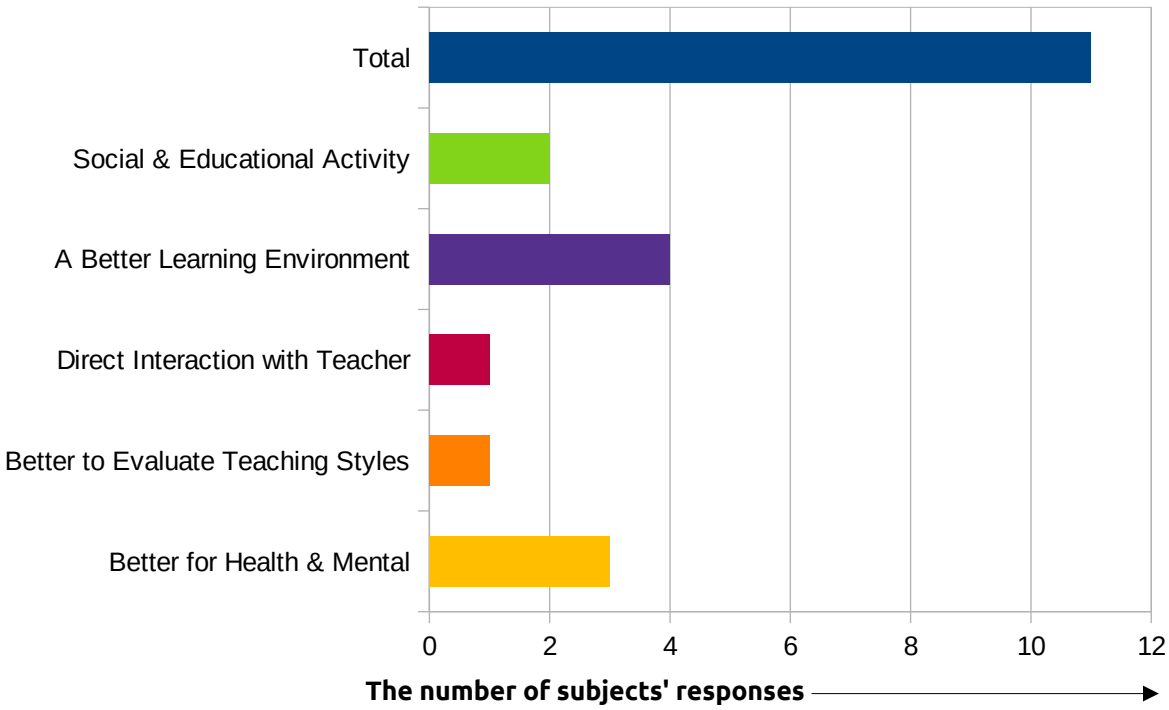

Figure 15 – Benefits of Traditional Methods

Legends	The number of subjects' responses
Better for Health & Mental	3
Better to Evaluate Teaching Styles	1
Direct Interaction with Teacher	1
A Better Learning Environment	4
Social & Educational Activity	2
Total	11

Table 12 - Data Coding Statistics for Evaluation of Traditional Methods

As stated by the respondents, the areas in which the traditional method of learning were considered better included students' mental and physical health (3 responses), and for maintaining balance between social and educational activities (2 responses).

Other key points mentioned were that it ensures more contact and interaction with instructors (1 response), provides a better learning environment (4 responses), and a greater overall opportunity for course materials and instructors to be effectively evaluated (1 response).

Regarding students' physical and mental health, Chu and Li (2022) declared that in the traditional learning method, there is no increase in learners' life stress and psychological distress. But in online learning, Sawhney et al. (2021) stated that students face many health challenges, such as vision issues due to prolonged screen time, difficulty falling asleep, and depression due to the isolation, which can affect their mental functioning.

Examinations on an e-learning platform may be challenging because, as stated by Zalat et al. (2021), Hannafin et al. (2003) and Oncu and Cakir (2011), in the absence of face-to-face interaction, informal assessments, as well as observational and participatory evaluations can be difficult and challenging for instructors and learners, since most online tests are multiple-choice questions, which evaluate a large number of students quickly on a lot of content, versus what can be provided, for example, in essays.

In tradition learning, students can ask for responses or clarifications to questions or areas where they need further explanation in the classroom (Paul & Jefferson, 2019), and have personalized interactions, which allows the teaching process to be modified and adjusted to a student's level of knowledge, and provides a flexible formula that enables free discussion (Ilie, 2019). Subject 5 said,

> "I think learning in the presence of a professor is much better. Because if I am in front of the teacher, that helps to understand the instructor's lecture content. Eye contact is beneficial for the students, then the teacher can try to realize the gesture of the learners. In online, it becomes difficult to do that."

To this point, in other findings, students complained about the difficulties encountered trying to engage with faculty and classmates in online classes (Zheng et al., 2021).

Additionally, Lade and Patil (2021) stated that the majority of students prefer the traditional learning method, because they have accurate and useful study material, a comfortable learning environment, and can learn better, since they can socialize with and learn from fellow students.

According to Subject 2,

> "On-campus study is far better than online learning. Since I can get to the university for a lecture and many other aspects, for example, meeting friends and discussing the lecture after the class then going to the canteen, so, at home, I can't do anything I would love to do. There are missing face-to-face discussions and emotional exchanges while doing everything online. So, my opinion about on-campus learning is that it is far better."

Subject 10 had this to say,

> "It is better from different perspectives. Because staying at home all the time for every online lecture makes people mentally sick and completely monotonous. If a student gets bored while learning, then it may become difficult to concentrate on the study. I think while learning at the campus is always highly appreciated."

In terms of contrary viewpoints to traditional learning being a better method of learning, as mentioned earlier, Gana (2017) stated that the traditional forms of delivery - lecture, on-campus attendance and tutorials - are no longer appealing to all learners, since they no longer meet their preferences and access needs, while technology-based learning liberates them from the time and place restraints associated with the former. Bali and Liu (2018) also posited that even though e-learning is perceived as lacking communication, social presence and social interaction, it actually has a number of advantages that are beneficial to students.

4.4.5 Finding: 05 (Question 10)

Would you prefer off or on-campus study in the future?

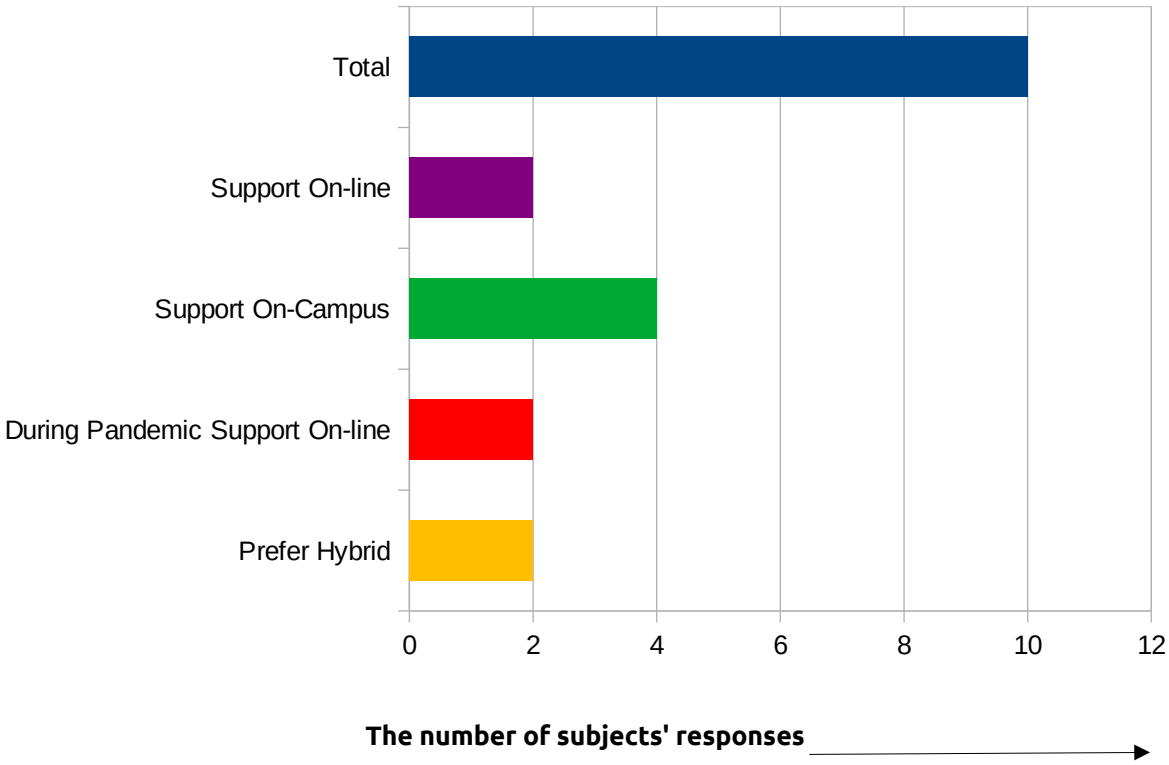

Figure 16 - On-Campus vs. Off-Campus Study

Legends	The number of subjects' responses
Prefer Hybrid	2
During Pandemic Support On-line	2
Support On-Campus	4
Support On-line	2
Total	10

Table 13 - Data Coding Statistics for On-Campus vs Off-Campus Study

A number of the participants supported off-campus or e-learning options for study (2 responses). The idea of an ongoing hybrid environment was supported by 2 responses of the participants while 2 responses considered it a good backup solution for special circumstances, such as a pandemic or other community disruptions. The on-campus idea was supported by 4 responses of the participants.

These responses indicate that depending on which factors are most important, students' preferences fall between on-campus, on-line and hybrid methods of learning. These results aligned with previous studies in terms of the reasons why students prefer each method. O'Byrne and Pytash (2015) as mentioned earlier, declared that the hybrid learning method, for example, can be implemented in different ways, allowing students to control the pace, path, time and place of learning, as well as provide personalized instruction. Subject 9 stated,

> "I would say 50% on-campus and 50% off-campus is OK because off-campus is helping for saving time and cost. On the other hand, on-campus is good for social interaction and face-to-face learning from the teachers and friends."

The worldwide COVID-19 pandemic allowed the online learning platform to gain substantial ground (Ilie, 2019), and ensured that learning continued during the ordeal. Morgan (2020) declared that online learning was the best approach. Students prefer online learning because it is cost-effective, can be easily accessed in some remote or rural areas (Dhawan, 2020), more students can utilize learning materials simultaneously without impacting classroom capacity, and they can easily fit their learning time into their schedule (Arias et al., 2018). Subject 1 confirmed,

> "I would like to stick to e-learning because I am satisfied with the system. I don't have any major complaints against the online education system. Day by day, I am getting more used to it. So, it works fine with me."

Subject 4 had this to say,

> "If Corona exits, then e-learning fits with me; otherwise, I want to go the campus because the on-campus study is always my first choice. Now e-learning is the available option for fighting against the pandemic. I am just trying to be safe as per protocols."

In on-campus classes, students are said to have the most engagement, better connection to instructors, effective group work, more motivation (Tu & Adkins, 2022), and tasks that are complex and require in-depth communication and subsequent processing are more easily completed (Becker-Beck et al., 2005). More dynamic information processing and extensive interaction between students in a face-to-face class encourages them to study course-related content, compared to the online class format (Antes et al., 2009). Subject 5 said,

> "I would go for the campus study, not e-learning. Since it has more advantages than e-learning, going to the university for the traditional way of learning is an ideal way to learn the lessons. Because e-learning is not always as transparent as on-campus study."

4.5 Is e-learning here to stay?

Digital learning platforms are rapidly changing the education system, as a result of technological advancement, high speed internet and the numerous advantages of e-learning, which may outweigh its shortcomings. The many benefits of e-learning have seen it implemented not only in learning institutions, but in other types of organizations as well, since it provides the quickest and cheapest means of information sharing. As stated by Bezhovski and Poorani (2016), e-learning is widely adopted by 80% of learning institutions, as well as 77% of companies and the military. The recent pandemic forced the global education system to include online formats in its operations, since learning was severely curtailed during this time. The continuous

popularity of e-learning according to Keksela et al. (2016) can be attributed to the fact that it is becoming more attractive to students, because it provides equal access to knowledge, and creates more free time for self-development and research.

E-learning is seen as an effective tool for the transfer of knowledge and may have the potential to overtake traditional learning methods. E-learning may well become more popular by making users feel more comfortable and secure with their instructors and mentors (Al Rawashdeh et al., 2021). Research suggests that the e-learning trend which includes blended learning, e-learning in the cloud, micro learning, personalized and continuous learning, MOOCs, and gamification will continue to grow and shape the online learning landscape (Bezhovski & Poorani, 2016). Constant diversification, thanks to ongoing improvements in technology, also supports this. Its increasing popularity makes it more attractive to students, providing open access to knowledge, and more free time for self-development, research, and information search.

Chapter 5

Conclusion

In this study, the researcher has examined the history and progress of e-learning globally, analyzed the technological implications, and attempted to predict its possible outcomes for future generations. The objective of the study was to show how the concept of e-learning and the use of information technology in university education are coming together, by providing a broad view of the intricacies involved in all types of learning, including via electronic media. In this qualitative study, a case study approach was employed to investigate these issues. The purposive sampling technique was used and included 10 students involved in a bachelor's or master's program, from seven different universities, and who may or may not have experienced exposure to e-learning. Structured questions were used and in-person interviews were conducted. The responses of students who experienced the transition from face-to-face learning to e-learning in various ways were collected. Participants expressed their preference for either classroom learning, e-learning or a combination of both, and also stated the benefits derived and difficulties encountered with each method. Data collected from the interviews was transcribed and then analyzed using MAXQDA (MAX Qualitative Data Analysis) software.

5.1 Key findings

The results from the participants' interview data revealed that:

1. The participants (6 respondents) have experienced e-learning, and it was helpful despite its unique challenges, while 2 respondents of the participants had no prior experience.

2. Participants had both positive and negative opinions about e-learning. Those who had a positive opinion (5 responses) reported that the platform offers little or no need to commute to a classroom/campus, offers flexible scheduling and enhanced study/life balance. Those with a negative opinion (7 responses) declared that it increases passivity, lacks the benefits of in-person learning, and negatively impacts students' social capital.

3. Some students (4 respondents) suggested that e-learning is sufficient for helping students understand lectures, but that it depends a lot on an instructor's teaching skills and experience, as well as the course material. On its insufficiency in aiding the understanding of lectures, 2 of the participants stated that e-learning does not adequately prepare them fully for exams and that it can also affect their health.

4. Almost all students (8 respondents) believed that the traditional method of learning was better in terms of their physical and mental health, for balancing educational and social activities, for more enhanced levels of interaction, and that evaluation of course materials with instructors was more useful.

5. On the choice of a preferred platform, 2 of the participants declared support for e-learning, 4 respondents supported on-campus learning, while 2 respondents wanted a mix of both (hybrid).

5.2 The impact of technology on education

Over the years, education has been significantly impacted by the innovations and expansive influence of technology. One of the areas that has felt this impact is the adoption of e-learning across various learning concepts, whether online or on-site, formal or informal, academic or non-academic. Technology has provided multimedia devices that facilitate students' learning by promoting interactivity, collaboration, and affording them a form of control of the learning process (Collins & Halverson, 2009; Pozo et al., 2021). The integration of technology into the curriculum enables students to acquire important competencies such as collaboration, autonomy, critical thinking and problem-solving skills, that have been linked to the current and evolving global proficiency requirements, and may affect how education will be defined in the future (Ananiadou & Claro, 2009; Ertmer et al., 2015).

The results of this study are in line with the results obtained in most of the research on the impact of technology in education. Tamim et al. (2011), in a study, found a significant positive effect from the use of technology in learning over the traditional, technology-free method. There are three main applications or functions of the computer in education; 1) for basic computer skills, 2) as a learning tool, and 3) as an information tool (Tondeur et al., 2008). The use of technology in education promotes student-centered learning, which is a welcome alternative to the teacher-centered model, synonymous with the traditional method. According to Tondeur et al. (2017), the integration of technology in education requires the assumption of a constructivist learning concept, in which students are actively building their knowledge rather than just absorbing information, and the adoption of a student-centered approach, which enables (and requires) learners to manage information through ICT.

The education system would have suffered a huge setback during the COVID-19 crisis if the use of technology had not already been integrated somewhat into learning beforehand. This integration experienced an upsurge during this period and based on that, learning was sustained during the confinement. Though this crisis created a

massive disruption in the education system, it also sparked the digital transformation of higher education and challenged its ability to respond to it swiftly and effectively (Barrot et al., 2021). Even though the efficacy of learning with technology has long been recognized by the education community (Cavanaugh et al., 2009; Kebritchi, et al., 2017; Barrot, 2021), there are challenges, as previously outlined, to implementing it effectively (Boelens et al., 2017; Rasheed et al., 2020).

5.3 The probable future of e-learning

The global adoption of the internet, the development of advanced technologies, the evolving digital economy, and the need to learn without the barriers of time and distance have resulted in the various forms of online education experiencing rapid and steady growth worldwide. The significant surge in the usage of e-learning platforms during the pandemic led Acharjya and Das (2022) to predict that this will continue, because of its accelerated adoption by learners and educators.

One of the most dramatic factors that is impacting the future of learning in higher education is Big Data and analytics, which may help to optimize e-learning tools, by generating even more relevant information (Garcia & Secades, 2013). Interaction is also considered one of the most important factors in online learning to determine learners' perceived outcomes (Fredericksen et al., 2000). The social distancing that was observed during the pandemic reduced many forms of interaction, as people gave more importance to saving lives, and chose ongoing learning via online platforms rather than socializing (Baber, 2022). The challenge of the absence of social interactions in e-learning can be addressed by the introduction of more interactive tools into the process and facilitate networking among learners (Pavin, 2022). Furthermore, Baber (2022) stated that as time and distance isolate learners from instructors in e-learning, advanced technologies have made it possible for them to interact through content sharing and live classes, using Learning Management

Systems. So, the concern about e-learning's future, because of the absence of social interactions, may not be as significant as these changes are implemented and adopted.

Globally, technology plays a significant role in the current state of education and is expected to play a more prominent role in the future of e-learning. The widespread take-up of digital education during COVID-19 amplified the importance of digital technologies in e-learning (Facer & Selwyn, 2021). Today there is already an enormous dependence on technology for continuous learning and has been found to positively impact learners' motivation towards learning in many instances. Technology shifts and exposure to it are critical factors in students' achievement, their motivation to be at school, and may also become the catalyst needed by academic institutions to assist learners to be more engaged in learning, in order to increase their level of academic success (Harris et al., 2016). Based on these factors, the idea that students may lose the essence of education as a result of being technology dependent is probably unlikely.

5.4 Research contributions

This study has identified how the use of technology and online learning greatly impacts learners and educators within higher education in both positive and negative ways. The study provides data and information on the concept of e-learning and how technology can be effectively used in university education, by providing an in-depth view of the elements involved in learning, and the associated use of electronic media. The findings of this study provides an understanding of the different challenges faced by students in online learning, why some may be ambivalent about it, and relevant information on the possible strategies that could be employed to address these issues. The changes brought upon learners by e-learning can be transformative, and those who are resistant are bound to adjust to it poorly, blaming its shortcomings for their dissatisfaction. The findings of this research, therefore, suggests an

understanding of the importance of technological proficiency, the interdependence of learning tools, and the learning outcomes associated with e-learning, which invariably includes several perspectives of electronic learning. This study has also revealed the importance of institutional support in the areas of effective policy making, decision-making and the future implementation of e-learning, which all play a vital role in the successful integration of e-learning in education. For the success of this integration, higher education needs to support the process by making e-learning a part of their institutional identity. According to Allen and Seaman (2011), even though an increasing number of institutions have indicated their intention to incorporate e-learning into their strategic planning process, only a few have taken decisive steps towards achieving it.

5.5 Practical application

The findings of this study have a number of significant practical implications. The positive impacts of e-learning on students and the education system as a whole point to the fact that this learning platform should be considered as a valid option for students, while the negative impact is an indication that there is still a lot more to be done. First, the findings suggest that there is sufficient evidence demonstrating that incorporating e-learning into the education system can be of immense benefit to students, in line with ongoing advancements in technology and the evolving times. There is a need, therefore, for educational stakeholders, institutional leaders, university management and administrators to pay increased attention to exploring approaches that facilitate increased student participation and deployment of e-learning platforms in academic institutions. Additionally, learners should be provided with the necessary training and support on how to effectively make use of e-learning platforms with confidence, in order to enjoy all of its benefits. Ongoing support and regular assessments should also be provided, to monitor learners' progress and ensure that the challenges encountered while using the platforms are minimized.

Lastly, some of the study participants still indicated their preference for the traditional mode of learning as opposed to e-learning, which they attribute to benefits such as its established, longtime usage, and the physical interaction it provides. Based on this, it is necessary to make students understand that the idea is not to replace one with the other, but to use an approach to learning that is more convenient, flexible, effective, and incorporates the use of technology while saving time, cost, and ensuring that learning continues, even in the face of an unexpected pandemic, as recently experienced.

5.6 Future research

In order to build on the existing body of knowledge, future research should be conducted in other continents, countries, universities and with a larger sample size. Owing to the study being restricted to 10 participants in Germany, learners' views outside the chosen grouping were not represented. This would allow for a broader perspective and additional samples might yield different results. The study made use of a qualitative approach and used structured interviews. Future research should attempt to use a quantitative approach or a mixed-method approach, to cover a combination of closed and open-ended questions, in order to gain a more in-depth understanding of the subject. E-learning is likely here to stay and it is influencing learners, educators and the educational system in remarkable ways. Understanding the nature of these influences is a critical step towards a more seamless integration into higher education. Future research should also, therefore, examine the subject matter from the standpoint of educators, in terms of how they are being impacted by technological advancements and the transition from the traditional mode of learning to e-learning.

Appendix A

A.1 Interview Questions

(I) German version

1. Wie heißen Sie?

2. Wie alt sind Sie?

3. Woher kommen Sie?

4. Wo studieren Sie?

5. Welches Fachbereich?

6. Haben Sie bereits einige Online-Kurse absolviert oder machen Sie gerade welche?

7. Was halten Sie von e-learning, sehen Sie das positiv oder negativ?

8. Glauben Sie, dass Distanz/Fernunterricht ausreicht, um die Vorlesungen zu verstehen?

9. Was halten Sie von traditionellen Lernmethoden?

10. Unterstützen Sie weiterhin das Fern- oder das Präsenzstudium?

(II) English version

1. What's your name?

2. How old are you?

3. Where are you from?

4. Where do you study?

5. What is your area of study?

6. Have you already done some online courses, or are you currently doing any?

7. What is your opinion about e-learning, positive or negative?

8. Do you feel remote learning is sufficient for understanding the lectures?

9. What do you think about Traditional Learning Methods?

10. Would you prefer off or on-campus study in the future?

Appendix B

B.1 Question and Answer Sessions

(6) Have you already done some online courses, or are you currently doing any?

[**Subject-1**]

“I don’t have previous experiences but doing currently. I have been excited about the new learning system. Because since my childhood till today, I did follow the traditional way of learning. This kind of e-learning system is something new what I never tried out, even for personal study. Let’s see how it goes.”

[**Subject-2**]

“I have already done some online course in the last semester and till now doing more. This Internet based education is nothing completely new for me since the virus pandemic started all on-campus study converted to e-learning. So, still trying to cope up with the e-learning method.”

[**Subject-3**]

“Yes, I have done an online course. The experiences, in the beginning, were not that comfortable, but I don’t have any other options at the moment, so trying to stick to it. I already experienced the online courses even before admitting to the university for learning technologies. So this previous knowledge about e-learning was an advantage for me.”

[Subject-4]

“I did several online courses. I am also continuing the online courses further. The university online courses are my first experiences. This e-learning method is still ongoing. After completing some online courses, I am learning some new techniques. Hopefully, these strategies are going to support me for ongoing and upcoming courses.”

[**Subject-5]**

“At the moment, I am doing online courses. No, I haven’t experienced the online courses earlier. The current situation put all the students like me in the online system as a starter might confuse but try to adjust with the system. I don’t know about others whether they feel the same as a beginner, so please ask others as well.”

[**Subject-6**]

“I am doing it currently but haven’t done it before. I think after the pandemic got started, many of the students like me are experiencing it newly. I heard of some of my friends who did earn degrees remotely. But that was completely online. For me, it is now a radical change from tradition to online learning method.”

[**Subject-7**]

“Yes, I have already done an online course. This system is not completely strange to me because I did an online course at the university. Some commercial companies are training the employees through e-learning. I do some part-time jobs, so I have gained a similar kind of experience. where I had the similar kind of experiences.”

[**Subject-8**]

“I am doing right now. No, I didn’t have any previous knowledge about e-learning. I heard about some universities that offer completely online courses. But I never tried them out. The current time has suddenly put me in online courses. I don’t know how long do I need to continue this system.”

[**Subject-9**]

“I have been experiencing the online courses and currently doing more. The first time was not too bad to experience. Later on, I tried to go on with it. At the moment, I don’t see any better option than e-learning to continue my study.”

[**Subject-10**]

“I have been doing already online courses from the last semester. The running situation has changed many things so fast that I never expected. I am doing more online courses in the current semester comparing to the last semester. Every new course is giving new experiences.”

(7) What is your opinion about e-learning, positive or negative?

[**Subject-1**]

“I think if I sum up all the aspects, then it feels positive to me. Since I don’t have any problem with time management, I can immediately prepare myself for the lecture. I can also manage private appointments like doctors or banking activities during the day and can re-watch the video based lecture after getting home.”

[**Subject-2**]

“I would say the positive on the major side because it is cost and time saving. I don’t need to visit the campus every day by using the local transportation. I can choose any flexible time for a particular lecture that fits my schedule. I have the opportunity to get a professor appointment within a short time which wasn’t possible on-campus study and so on.”

[**Subject-3**]

“I find the e-learning is positive. There are different reasons behind it. For example, sometimes I study till late at night, then it becomes difficult for me to wake up in the morning to go to the university. E-learning-based education brought the lecture at home on the computer. So, I can sometimes wake up late. I usually prefer to cook food at home for lunch. Now I can do it any time. But while studying at the campus, I had to take something from the canteen at the university.”

[**Subject-4**]

"I find it negative because I miss the social contact with people. We are human beings, and we need to be in touch with society to become social. But due to the virus pandemic, we are maintaining the social distance that's true, but if it exists forever, it would be a severe problem for studying at the campus."

[**Subject-5**]

“Some parts are positive, and some are negative. If I could go to the university to take the lectures, it is more fruitful to learn something directly from the teacher, which is face-to-face interaction. But in online, I can do only virtual interaction where I miss the actual feelings of talking to someone who reacts after the questions. On the positive side, I would say I can enroll myself in many courses compared to on-campus studying since I can attend several lectures within a short interval. Which is helping me faster graduation.”

[**Subject-6**]

"I would say not so bad. I think everything is according to order. But a couple of things work positively and negatively at the same time. For example, sometimes, due to server problems and Internet speed, I face technical issues, which slows down the process sometimes since it is entirely technology dependent. The on-campus study doesn't rely on the technology as e-learning which is the more flexible handle."

[**Subject-7**]

“I think it is not very good, but I prefer on-campus study. Because going to the campus brings me joy and feels like I am actually in a place where I can learn something actively. At home, laziness grows inside me because of the proper study environment. I also lose the mental spirit in e-learning which makes the mind monotonous.”

[**Subject-8**]

“It might be OK to hear the lectures, but it is not working as an on-campus lecture. Sometimes the teachers try to present something, but we fail to follow what the teacher says because the live demonstration is missing in online education. So, I find e-learning has more negative effects than positive sides.”

[**Subject-9**]

“There are many disadvantages. But still, there some benefits because I can access many learning materials online. I don’t have to go to the university to print the soft copies to get hard copies all the time. But negatively, I am missing the direct exchange with the teachers. The content of the lecture is discussed less online. If I could be on the spot, that would be much better.”

[**Subject-10**]

“I think positive and negative both. I have to stay home for every lecture, which is not comfortable for me. Because I think staying in a comfort zone can’t be the ideal way to achieve such an educational degree. But still there some positive sides as well, for example, the teachers are providing us the visual lecture materials immediately after lecture which can be studied again and again.”

(8) Do you feel remote learning is sufficient for understanding the lectures?

[**Subject-1**]

“When the professors are using the video based lectures, then I would say yes, that’s sufficient to understand the lessons. But the professor has to be very specific in providing the lecture. If the instructor uses the keyword and highlights the crucial points of the lessons, then it might not be that much hard to follow the course through online.“

[**Subject-2**]

“Not completely. It might be possible to get along, but the usual lecture is not so good to understand. I sometimes faced puzzling during the lecture. Since it seems to me everything is going too fast to follow. But some teachers do make the students understand the lecture at a medium pace then it is not too hard to follow. So, I am somewhere in the middle of sufficiency or insufficiency of understanding the lessons.”

[**Subject-3**]

"According to my own experiences, the lecture was easy to understand. Because I could follow the lecture as expected. If I raise my hand for repeating something which wasn't clear, then our professor does it. The teacher's virtual demonstration was not too difficult to understand the lectures. I am happy with the lecture capturing into my brain."

[**Subject-4**]

“I think it is not too hard to follow the lecture. Because the teachers are pretty good at delivering the lectures, all the students could get to the teacher back for further virtual consultation if something was not clear enough to understand. But the virtual environment is not completely sufficient for handling the course modules in every aspect.”

[**Subject-5**]

“It works but not supporting too strongly. Because when a traditional way of learning is converted into online completely, it might not be that easy for some individuals. I find the e-learning is partially sufficient for getting to know about the lessons but not completely sufficient for becoming ready to sit for the exams.”

[**Subject-6**]

Yes, usually it works. In the beginning, I was a bit nervous about the e-learning system. But when I did a couple of courses, then it became easy for me. I am getting used to it day by day. The lecture materials are presented with graphical representations. Which makes the course material more understandable for following."

[**Subject-7**]

"It depends on the instructor who teaches in which way. For example, in the first online course, the teacher was excellent at explaining the lecture materials. I used to catch the lessons properly. But when I experienced another lecturer's course, I faced difficulties in understanding the course content. So, it varies from teacher to teacher because everyone has their style of teaching."

[**Subject-8**]

"I started e-learning which is a mandatory option at the moment for the pandemic. If the lockdown gets over, then I would go for the campus study. Though e-learning is creating a virtual learning environment where I can learn many things even by myself, and instructors' advice is helping me to go ahead in the right direction. So, e-learning is not too bad."

[**Subject-9**]

"I would say it might not be sufficient for some courses. Maybe for some modules, it might be applicable. I am not willing to take all courses online. There are some modules where I experienced that online learning is enough to understand the lessons. Still, it was difficult to follow in some other courses, especially the core content of the learning materials."

[**Subject-10**]

"I must concentrate on the monitor all the time, which I find a bit stressful. Our eyes shouldn't be locked the whole day within the computer. I would like to see people and listen to the lecture without a computer. But this e-learning is forcing me to look at my laptop consistently, which is not good for my eyes and causes mental pressure. It may also cause other physical problems."

(9) What do you think about Traditional Learning Methods?

[**Subject-1**]

“Well, if I compare the traditional method of learning by visiting the campus was not so much good because when the lecture was over, then I couldn’t ask the teacher to repeat the same topic several times. But in online learning through the video-based lecture is better because I can watch the same video multiple times for a better understanding.”

[**Subject-2**]

“On-campus study is far better than online learning. Since I can get to the university for a lecture and many other aspects, for example, meeting friends and discussing the lecture after the class then going to the canteen, so, at home, I can’t do anything I would love to do. There are missing face-to-face discussions and emotional exchanges while doing everything online. So, my opinion about on-campus learning is that it is far better.”

[**Subject-3**]

“The on-campus study invites the students to visit the campus for learning, which is nice to study because I get the actual environment to learn. If I stay in the room at home, it doesn’t feel like a proper learning environment. I miss the actual interaction among the students and teachers. If I go to the campus, it excites me to do the study very well.”

[**Subject-4**]

“As per my opinion, if someone provides the lecture on the spot, then it is better to understand the lessons, and I can also go to the library for further studying. I think going to the lecture and afterward collecting books from the library to clarify the lessons for myself are important since electronic books (e-book) are not comfortable for me.”

[**Subject-5**]

"I think learning in the presence of a professor is much better. Because if I am in front of the teacher, that helps to understand the instructor's lecture content. Eye contact is beneficial for the students, then the teacher can try to realize the gesture of the learners. In online, it becomes difficult to do that."

[**Subject-6**]

“It was better. I am currently doing everything online since I don’t have a choice. If I get the chance to start going to the university, I will prefer to go to the campus to take the lectures and make real time interactions with everyone. But e-learning is pushing the students away from realistic learning zones.”

[**Subject-7**]

“I find on-campus is good. I was happy about the traditional method. Since every lecture was different from each other, I gained different kinds of experiences by attending in person. But online, everyone uses digital materials to teach the students, so it is getting harder to differentiate who teaches the best.”

[**Subject-8**]

“I want to vote for studying at the campus. Why shouldn’t it be? Because there are multiple reasons and logic for supporting the on-campus study. For instance, at the campus, I would study, making gossips during lunchtime even which are not relevant to our study for recreation and fun. After the lecture, I could be going for swimming and workout on the campus and so on.”

[**Subject-9**]

“I find learning at the campuses is good. Many facts need to be under consideration. Why do I say so? First of all, going to campus a great joy for me. From my childhood till university education, I went to an educational institution for studying. When I see other students like me who are also busy visiting campus for studying, they inspire me more to be like them.”

[**Subject-10**]

“It is better from different perspectives. Because staying at home all the time for every online lecture makes people mentally sick and completely monotonous. If a student gets bored while learning, then it may become difficult to concentrate on the study. I think while learning at the campus is always highly appreciated.”

(10) Would you prefer off or on-campus study in the future?

[**Subject-1**]

“I would like to stick to e-learning because I am satisfied with the system. I don’t have any major complaints against the online education system. Day by day, I am getting more used to it. So, it works fine with me.”

[**Subject-2**]

“It depends on the situation. Due to this pandemic situation, I would accept that I prefer to go to the university without any viral problem. Because going to the university can’t be a complete alternative to the on-campus education system.”

[**Subject-3**]

“I want to go to campus for study but not totally against the e-learning. If there was a mix-up of on-campus and off-campus, then it would also be nice. Because both teaching systems have merits and demerits.”

[**Subject-4**]

“If Corona exits, then e-learning fits with me; otherwise, I want to go the campus because the on-campus study is always my first choice. Now e-learning is the available option for fighting against the pandemic. I am just trying to be safe as per protocols.”

[**Subject-5**]

“I would go for the campus study, not e-learning. Since it has more advantages than e-learning, going to the university for the traditional way of learning is an ideal way to learn the lessons. Because e-learning is not always as transparent as on-campus study.”

[**Subject-6**]

"I would like to visit the campus for the traditional method of study because that's the way of old school method. An online learning system might not be welcome by every student. My mind is connected to campus for studying."

[**Subject-7**]

“Till the Corona pandemic, e-learning is OK, but on-campus is the first preference as soon as possible. Because due to the virus pandemic the situation has become too critical to visit the campus and taking lecture.”

[**Subject-8**]

“I guess on-campus study is good. I can move from campus to campus for different activities to earn dynamic kinds of knowledge. By staying at home, everything is much restricted to access what I could have done in person.”

[**Subject-9**]

“I would say 50% on-campus and 50% off-campus is OK because off-campus is helping for saving time and cost. On the other hand, on-campus is good for social interaction and face-to-face learning from the teachers and friends.”

[**Subject-10**]

“I want to go to campuses. I never expected to have a complete online study due to a virus pandemic suddenly. Now we all are bound to follow the possible education system, which is e-learning, but I do want to go to the university for core education.”

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