Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 8 Issue 33 (December 2023) PP. 331-360
DOI: 10.35631/JISTM.833024

JOURNAL OF INFORMATION SYSTEM AND TECHNOLOGY MANAGEMENT (JISTM)
www.jistm.com

FOSTERING THE DIGITAL GENERATION: CHALLENGES IN HIGHER EDUCATION INSTITUTIONS DURING THE FOURTH INDUSTRIAL REVOLUTION (IR4.0) EDUCATIONAL LANDSCAPE

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Article Info:

Article history:
Received date: 25.10.2023
Revised date: 15.11.2023
Accepted date: 21.12.2023
Published date: 28.12.2023

To cite this document:

Shah, M. K. M., Kamal, M. H. M., Che Soh, M. A., Saili, J., Jaafar, Q. H., & Othman, I. W. (2023). Fostering The Digital Generation: Challenges In Higher Education Institutions During The Fourth Industrial Revolution (IR4.0) Educational Landscape. *Journal of Information System and*

Abstract:

This paper deliberates on the construction of the digital generation in contemporary times across various aspects of life, emphasizing the imperative for concerted efforts to advance the nation's capabilities for competitive positioning on the global stage. The research objectives explore the role of Higher Education Institutions (HEIs) in fostering digital technology advancements. Steps toward digital technology progression necessitate interventions such as prioritizing technology-centric courses for students. Discussed issues encompass (i) the role of HEIs in advancing technology, (ii) the significance of digital technology utilization, (iii) the impact of digital technology development among students, and (iv) factors influencing the rapid evolution of technology in tandem with the pace of the era. Data for the study were gathered from diverse sources, including research findings in journals, scholarly writings, online news sources, public forums, and reference books. The study successfully identifies means through which the digital generation can be nurtured, guiding them through appropriate channels to discern the positive and negative ramifications of digital revolution actions in the present generation. The use of digital technology holds potential benefits for users,

Journal of Information System and Technology Management
EISSN: 0128-1666
JISTM
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DOI: 10.35631/JISTM.833024

Technology Management, 8 (33), 331-360.

DOI: 10.35631/JISTM.833024.

enhancing individual knowledge and fostering critical thinking skills. The application of digital technology can significantly impact the technological development among graduates, empowering them with digital proficiency. These skills prove invaluable in employment pursuits, given the ubiquitous incorporation of digital technology across various professions today. The rapid technological advancements driven by factors such as high curiosity towards technology have led the younger generation to explore and employ various digital tools, such as smartphones. Amidst efforts to cultivate the digital generation, challenges emerge, with one prominent issue being the misuse of digital technology. Study findings reveal that various initiatives, particularly governmental efforts, have been undertaken to address digital technology misuse, contributing to cybercrimes and online fraud. Consequently, societal perceptions towards digital technology have become increasingly negative. These challenges impede governmental endeavors to foster a digital generation. Thus, in alignment with the identified issues, this study underscores the shared responsibility of all stakeholders in realizing the nation's vision to produce an advanced digital generation in the present era.

Keywords:

Digital Generation, Higher Education Institutions (HEIs), Digital Technology

Introduction

In contemporary society, this paper delves into the formation of the digital generation, underscoring the urgent need for collaborative efforts to enhance the nation's global competitiveness. With a focus on Higher Education Institutions (HEIs), the research probes into their role in driving advancements in digital technology. Advancing digital capabilities involves strategic interventions, notably prioritizing technology-centric courses for students. The paper addresses key issues, including the pivotal role of HEIs in technology advancement, the importance of digital technology utilization, the repercussions of digital technology development on students, and the influential factors shaping the rapid evolution of technology, aligning with the dynamic pace of the era.

Issue 1: The Role of Higher Education Institutions (HEIs) in Advancing Technology

The existence of the digital generation has been a long-standing pursuit, gaining increasing significance not only in Malaysia but globally. The digital era, characterized by comprehensive digital advancements in all aspects of life, has become palpable. The concept of digitalization in higher education in Malaysia is not novel, having been discussed since the launch of the National Education Development Plan in 2013, where blended learning and digital facility upgrading in educational institutions were clearly outlined (Akun & Mohamad, 2020). Alvin Toffler, a renowned digital revolution scholar, once stated, "The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn" (Akun & Mohamad, 2020). In essence, illiteracy in the 21st century does not refer to individual’s incapable of literal reading and writing but encompasses those unable to learn new things, unlearn past knowledge, and lack the ability to relearn.

In 2018, the Ministry of Higher Education introduced guidelines for implementing education based on the Fourth Industrial Revolution (IR4.0) concept (Rahman, Zolkifli & Ling, 2020). This initiative is part of the implementation of the Strategic Plan of Public Universities in Malaysia to elevate the university's reputation as a center of academic excellence internationally (Yusoff et al., 2021a). Despite longstanding discussions, the integration of

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 8 Issue 33 (December 2023) PP. 331-360
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digital technology-based teaching and learning methods remains exclusive, primarily among domain experts. Nevertheless, every Higher Education Institution (HEI) has made significant efforts to enhance digital learning facilities and quality. HEIs play a pivotal role in contributing to the creation of a proficient digital generation (Othman, Mokhtar & Esa, 2022a). To amplify the impact of HEIs, it is imperative to advance research initiatives and leverage intellectual strengths in influencing communities, technology, economy, and society. While technology and education are distinct entities, they converge as necessities for achieving coherence in education during the Fourth Industrial Revolution (IR4.0). This era represents a digital revolution involving the technological development of specific industries, particularly production and automation, to a more intelligent and systematic level.

IR4.0 also refers to disruptive transformations in industries through the integration of physical, digital, and biological realms, impacting all fields, industries, and economies (Taufikurahman & Firdaus, 2020). In addressing the challenges of IR4.0 in education, the Ministry of Higher Education, in collaboration with HEIs, has developed an education system focusing on skills, technology, creativity, and innovation to meet the country's economic needs (Aziz & Sieng, 2019). To realize the IR4.0 era, innovative teaching and learning methods can produce innovative and highly skilled graduates capable of meeting the demands of the job market. The goal is to stimulate the interest of the younger generation in expanding job opportunities beyond the public sector (Mohd Shah et al., 2021). HEIs must ensure that the provided curriculum and courses are relevant and fill the employment gaps anticipated by industries in the future. Moreover, collaboration between HEIs and external entities, especially digital technology companies, is crucial to strengthen HEIs' understanding of digital technology management and research. Currently, for cultivating an outstanding digital generation, HEIs stand as the most appropriate choice, offering students exposure to cutting-edge digital technology insights not easily found elsewhere.

Issue 2: The Importance of Digital Technology Usage

In this era of globalization, the use of digital technology is increasingly prevalent in our society. Virtually every moment, individuals employ digital technology devices for various purposes. Digital technology plays a pivotal role in daily life, with devices such as smartphones and laptops utilized for a myriad of tasks. For instance, utility bill payments are seamlessly conducted using these devices, simplifying transactions, and saving time for individuals. The government has taken various serious steps to instill a culture of digital technology use within society, implementing campaigns and programs to cultivate a tech-savvy and progressive community.

Exposure to technology should commence from early schooling to prepare the upcoming generation for future digital advancements. It is undeniable that digital technology will continue to evolve and progress, rendering its usage increasingly important. The benefits of digital technology use in education, economy, and society are diverse, contributing to the enhancement of the nation's educational quality (Ayob, Hamzah & Aziz, 2021). The educational system becomes more effective, yielding a generation proficient in digital skills. Economically, the advancement and sophistication of digital technology contribute to the country's economic progress, especially when digital technology enables the populace to generate income (Taufikurahman & Firdaus, 2020).

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The sophistication of digital technology also holds great importance in the social life of Malaysian society, transforming their lifestyles and perspectives into more modern ones (Ali, Mohamad Salleh & Mustaffa, 2020). Simultaneously, as we strengthen the sustainability of our mother tongue as a medium for societal unity, it is acknowledged that the use of digital technology is crucial in today's life. It has become a necessity for various segments of society, including children, teenagers, adults, and the elderly (Othman, Ahmad & Esa, 2022c). To realize these benefits, cultivating a digital generation among today's youth is imperative, as they will be the future leaders of the nation. The acquired importance can be harnessed and utilized effectively to advance the country, especially as Malaysia strives to compete globally as a nation with a skilled population adept in technology usage (Ali, Mohamad Salleh & Mustaffa, 2020). This is crucial to prevent the country from being underestimated by other nations. Society needs to be aware of the significance of digital technology usage and harness it judiciously.

Issue 3: Impact of Digital Technology Development Among Students

Technology originates from the Greek word "technologia," signifying skill and knowledge. Initially confined to tangible objects such as equipment and machinery, technology has undergone significant development over time, notably with the advent of digital technology (Mohd. Yusof & Tahir, 2017). Digital technology provides maximum convenience for humans to fulfill various needs, even considered a medium for acquiring self-reliance skills in students' academic achievements (Othman, Rahim & Abu Bakar, 2022d). Digital technology is a tool that no longer relies on human energy but operates automatically through computer systems (Basri, 2004). Essentially, digital technology is a swift calculating system that processes all information as numerical values. In general, technology can be interpreted as a science related to tools or machines created to facilitate problem-solving or daily tasks for society, with the expectation that digital technology's presence will positively influence life (Basri, 2004). The increasingly sophisticated digital technology of today has brought about significant changes globally.

The emergence of educational technology development, beginning with the use of personal computers in the early 1980s, has influenced the teaching and learning processes across all educational institutions. Learning through digital technology was implemented using electronic devices in teaching and learning environments, even before the introduction of the internet. Over time, digital learning has been categorized as a lifelong learning modality and has been well-received globally. The community has become aware of the importance of knowledge and information, embracing the concept of E-Learning as a temporary learning model for the future (Nordin & Bacotang, 2021). Humans have been facilitated in accessing information through various means and enjoying the conveniences offered by digital technology. The continuous development of knowledge over time has influenced various aspects of the world, particularly the ongoing progress of digital and virtual technology in line with the advancement of knowledge. Coupled with various sectors competing to produce the latest technologies, digital technology has permeated various aspects of life, including education, transportation, healthcare, economy, and many others. However, as digital technology advances, it will inevitably impact the modern digital generation, especially students, whether positively or negatively, affecting society, families, religion, and the nation.

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JISTM
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Issue 4: Factors Accelerating Technology Development in Line with the Times

The rapid development of technology in line with the times primarily refers to the increased use of technology, especially after the outbreak of the Covid-19 pandemic in late 2019 (Mokhtar et al., 2021). Since then, most activities have predominantly relied on technology. During the pandemic, everyone was confined to their homes following government directives such as the Movement Control Order (MCO) (Ationg et al., 2021). People were unable to go anywhere, disrupting daily routines, work, shopping, appointments with public servants, and more. Consequently, everyone had to use technology for these activities, despite facing challenges or obstacles. Individuals learned, adapted, and enhanced their skills in using technology for daily life. This shift is crucial for everyone, as trends and contemporary changes in technology use must be followed to avoid falling behind. Students, in particular, must learn to use technology to participate in remote learning (PdPR) (Rahman et al., 2021). If they do not learn, they risk falling behind in the curriculum taught by teachers. To engage in PdPR, students need to have the latest technology, such as tablets, laptops, smartphones, and others, to learn effectively using technology. Teachers must also learn to use technology from students and play a crucial role in teaching students how to use technology.

Moreover, some individuals, such as the elderly, may not be adept at using technology, with some being entirely unfamiliar with it (Zainal Abidin & Firdaus, 2016). Therefore, their children or grandchildren should teach them about technology and explain why technology is essential in daily life. Encouragement should also be given to the elderly to enable them to use technology. Furthermore, for young children under 12 years old or those who have not reached puberty, they must understand how to use technology correctly. If they are not taught to use technology properly, they may misuse it and deviate from the correct path (Nahar et al., 2018). It is evident that the use of technology is crucial for all layers of society, from young children to the elderly, as the world becomes increasingly modern, and anyone who is not proficient in using technology will be left behind. Therefore, various factors contribute to the rapid development of technology in line with the times, as this development aligns with technological advancements in other developed countries. Additionally, our country can build a technologically savvy generation for the future.

Literature Review

This paper embarks on a comprehensive literature review, delving into the evolution of the digital generation in contemporary society. It underscores the critical need for collaborative endeavors to propel the nation's competitiveness on the global stage. Research objectives focus on understanding the pivotal role of Higher Education Institutions (HEIs) in driving advancements in digital technology. As the progression of digital technology becomes paramount, interventions such as prioritizing technology-centric courses for students emerge. The literature review addresses key facets, including the substantial role of HEIs in technology advancement, the significance of digital technology utilization, the impact of digital technology development on students, and the influential factors shaping the rapid evolution of technology in sync with the dynamic era.

Issue 1: The Role of Higher Education Institutions (IPT) in Advancing Technology

The concept of digital integration in Malaysian higher education is not novel, as blended learning and digital facility upgrades in educational institutions have been clearly outlined. Examples include the establishment of a consortium among academics, sharing knowledge through virtual platforms. This encompasses the delivery of teaching through synchronous and

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EISSN: 0128-1666
Volume 8 Issue 33 (December 2023) PP. 331-360
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asynchronous approaches, the use of online applications with the potential to assist in teaching processes and student performance assessment. A study conducted to assess the readiness of Vocational College teachers in teaching Electronic Technology in Pahang aimed to identify their readiness levels in terms of knowledge, technical skills, and attitudes. The analysis revealed that the readiness levels of electronic teachers were moderate in terms of knowledge and technical skills, while attitudes were high (Jamaludin, 2014).

Another highlighted aspect is the impact of digital technology on students' involvement in high school co-curricular activities, which is said to influence future university studies. This study covers all types of electronic devices, gadgets, and applications using digital information, including laptops, smartphones, and other high-tech devices. Despite the benefits of digital technology, it is noted to have a negative impact on students when they become overly engrossed, sidelining co-curricular activities that emphasize the mastery of the mother tongue as a more humane communication medium. Consequently, high school students tend to neglect the importance of co-curricular activities, affecting their personal development and educational progress (Othman, Abu Bakar & Esa, 2022e).

Furthermore, a study on the effectiveness of study tours in enhancing students' understanding of migration and web publishing aimed to identify the effectiveness of study tours in improving students' understanding. The program not only serves as a competition but also provides participants with the opportunity to learn about the latest risk and technology in earthquake engineering through its visits, technical presentations, and the competition itself. Such exposure fosters interest in research activities, particularly in the field of earthquake engineering. By structuring programs in this manner, it is possible to produce creative, knowledgeable, and broadly skilled students who contribute to various fields and develop the personal qualities and human capital of these students. Sharing experiences with other competition programs is also essential.

Moreover, multimedia, particularly 3D animation, is identified as having significant potential for development in line with the growth of electronic media and digital technology. However, the production of 3D multimedia animation in Malaysia lags far behind other countries, leading to the inability of graduates in this field to meet market demands. Studies on the performance of graduates in 3D animation design conducted in Malaysian higher education institutions aim to identify existing problems and examine the role of collaboration between educational institutions and industry players in enhancing teaching quality and skill training. The perception of graduates, academic staff, and industry representatives is investigated to assess the performance of graduates in 3D Animation design in Malaysian higher education institutions. The study questions whether there is an impact on the improvement of the quality of the curriculum taught in educational institutions to enhance the quality of capable graduates and the cooperation between institutions and the animation industry in line with current environmental needs.

The effectiveness of technology use in teaching and learning science, and the role of teachers as knowledge authorities, emphasizes the awareness of teachers' knowledge competence in using technology effectively in the teaching and learning process, especially in science-related courses (Akun & Mohamad, 2020). Technological advancements can significantly change the way science is taught and learned, offering opportunities to explore natural phenomena that may be difficult or impossible to observe, allowing students to conduct experiments that are

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EISSN: 0128-1666
Volume 8 Issue 33 (December 2023) PP. 331-360
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challenging, too expensive, or hazardous to be performed in conventional ways. However, teachers need knowledge of what, where, and how science should be taught by applying technology. The Technological Pedagogical Content Knowledge (TPACK) model is applied in this study to articulate teachers' abilities to connect technology-related knowledge, pedagogy, and subject matter.

The TPACK model provides a clear mechanism to assess and understand teachers' cognitive aspects in identifying technological competence features to help improve teaching delivery effectiveness. Therefore, professional development involving In-Service Training should not only focus on mastering educational technology skills but also on teachers' competence in integrating technology with teaching strategies and subject matter. In recent years, the rapid development of the internet and communication technology has led to the emergence of various interactive multimedia networks, including digital learning. Awareness of the importance of digital learning is heavily emphasized as without it, students will lag far behind. The importance of information technology to adolescents and students focuses on the ease of technology and motivation in shaping students' awareness of digital learning (Rahman, Zolkifli & Ling, 2020). There is a significant relationship between technology ease, motivation, and student awareness of digital learning. Thus, it is the duty and goal of institutions and educators to help students embrace technology and motivation to shape awareness of digital learning. Information and communication technology is the backbone of the digital information era.

Visibility of integrated infrastructure systems and university accountability interconnect in generating a sustainable and internationally competitive conducive learning environment (Othman et al., 2021e). However, various parties are urged to take on roles in controlling and curbing the negative aspects of technology (Nahar et al., 2018). This necessitates a physical method as an addition—complementary technology, technology paired with another to control the negativity it brings. The next question is whether existing technology or existing research and development related to complementary technology is something that should be a requirement in this digital information era. The level of community use of complementary technology is a necessity, but its use in society is very low. In other words, the development and research of complementary technology need to be more aggressive, where each technology must be accompanied by complementary technology and become a law mandated by authorities.

Furthermore, the issue of social media literacy among polytechnic students regarding digital entrepreneurship aspirations is said to be related to the level of social media literacy concerning digital entrepreneurship career choices (Khalil, Buang & Othman, 2021). There are several important implications in emphasizing more social media-based teaching and learning activities to encourage students to choose digital entrepreneurship fields after completing their studies. Overall, there is a significant relationship between social media literacy among students and the choice of a digital entrepreneurship career. The advantages of digital technology skills also refer to the demand for information and communication technology (ICT) workforce by firms. Several studies are related to the tendency of employers to select workers associated with the demand for skilled ICT workers in the ICT industry in Malaysia (Abdullah, Domil & Rahman, 2012). This is due to the need for human resource managers or company executives who face difficulties in finding skilled, experienced ICT workers with good personalities (Abdullah, Domil & Rahman, 2012). The urgent need for firms based on the background and size of the firm is identified as having a significant relationship with the

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EISSN: 0128-1666
Volume 8 Issue 33 (December 2023) PP. 331-360
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demand for ICT labor. Furthermore, the implications of the study for those involved in offering human resources in the labor market are relevant to overcoming the problem of mismatch and meeting the needs of ICT manpower in the country in the future.

Issue 2: The Significance of Digital Technology Utilization

The importance of digital technology usage is associated with the presence of the digital economy as part of the Fourth Industrial Revolution, opening new opportunities in trade and aligning the interests of producers, consumers, and markets without constraints of time and space. The impact of digital technology usage in the trade sector on productivity, labor, and economic growth has been explored (Taufikurahman & Firdaus, 2020). The digital economy contributes to the development of the country by enhancing skills and technology in producing a workforce capable of improving job quality and productivity. Technology serves as a tool influencing contemporary life, particularly in the employment sector, where its application aids in enhancing worker performance (Ahmad, 2018). Its effectiveness is measured by increased productivity and acceptance of using this system to improve the quality of work products. It also significantly aids in communication, enhances worker integration, improves productivity, and facilitates information delivery.

According to the study by Aziz & Sieng (2019), the impact of technology-based education on the academic performance improvement at UKM demonstrates that the use of media technology in the educational system among students can meet teaching and learning needs in line with the nation's progress. The importance of digital technology use benefits education, especially public universities, making it a primary platform in the teaching and learning system. Questions arise regarding the extent of students' usage and mastery of technology as a learning aid to obtain information limitlessly. This leads to discussions indicating that adolescents exposed to information technology are more inclined to engage in online sharing through social media and learn grammar and vocabulary (Aziz & Sieng, 2019). The progress in technology use is crucial to enable a country to keep pace with developed nations and produce highly knowledgeable human capital contributing to advancements in the education and socio-economic systems.

Meanwhile, Abdul Aziz's study (2016) examines the role of communication technology and its contribution to effective organizational communication development. The study highlights how the development of communication technology in organizations has various effects. Presently, the use of communication technology in organizations is not just about facilitating interaction among colleagues but has evolved as a mediator in conveying information and streamlining organizational tasks. Considering the current development of communication technology in the country, the study emphasizes the usage and role of communication technology that has contributed to effective communication processes within organizations. In other words, an organization proficient in using communication technology achieves its objectives more quickly and competes effectively with other organizations.

Communication technology is vital in ensuring the effectiveness of communication within an organization. According to Mad Noor Madjapuni, critical thinking skills through digital games in a social constructivist learning environment are crucial for the transformation of education. The implementation of educational transformation requires new approaches and strategies to equip each student with the necessary skills in the 21st century. Therefore, to ensure the development of educators' creativity, teaching and learning methods need to consider students'

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EISSN: 0128-1666
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tendencies, abilities, and maturity levels, enabling them to think critically at higher levels. The increasing popularity of using computer and communication technology in daily human life, especially in simulations and digital games, has attracted researchers to delve into it, improving critical thinking skills among students.

In Noraznida Husin's study, she states that the ease of online shopping, which has become a new norm in society, has facilitated daily routines (Husin & Roslan, 2021). This is because it meets the current needs and desires. The trend of online shopping has changed the lifestyle of busy consumers, fulfilling the needs and desires of today's society living in a rapidly advancing world. According to Munohsamy (2014), the integration of information and communication technology into education is significant in this information explosion era where information and communication technology (ICT) become increasingly vital in everyday life. This technology has widespread usage, with people using it almost every moment, allowing them to control and manage almost everything at their fingertips (Munohsamy, 2014). The use of information and communication technology has brought many benefits to all areas of administration within a country. The field of education is no exception, with information and communication technology being integrated into the teaching and learning process.

Additionally, the need to integrate information technology in education and the use of information and communication technology in education in various countries are followed by strategies for integrating this technology and the issues and solutions for integrating technology. Overall, the integration of information technology in education brings many benefits in shaping an intelligent and knowledgeable learner that directly contributes to a country's development (Ayob, Hamzah & Aziz, 2021). In Nahar et al.'s study (2018), the discussion revolves around the influence of information and communication technology on the quality of life among youth, where the use of information and communication technology (ICT) can have positive and negative effects on the quality of life in the youth group. There are two effects: advantages and disadvantages arising from the use of ICT on youth quality of life, especially in the context of the use of mass media and social media, which can help youth improve their quality of life by adding various knowledge and skills.

Moreover, Marzuki, Tahir & Nasri's study (2020) investigates the mastery of information and communication technology (ICT) skills and their impact on job efficiency. The study emphasizes that technological advancements are increasing in the current era of globalization, impacting almost all systems worldwide, especially those needed for data processing. Every job sector, whether public or private, has its challenges. ICT skills and proficiency are a priority in the current era. The study demonstrates that the use of digital technology is crucial in opening various career opportunities in the technology field.

Finally, according to Siti Noor Ismail's study (2020), the use of mobile technology for digital learning during the Movement Control Order (MCO) in Malaysia is explored. She states that due to the impact of the COVID-19 pandemic, the Malaysian government enforced the Movement Control Order (MCO) nationwide. All organizations, including schools, had to be immediately closed, and the Ministry of Education Malaysia (KPM) issued instructions to conduct digital teaching to ensure students continue learning sessions even at home. Therefore, this study identifies the factors that drive teachers to use mobile technology as a digital teaching medium during the implementation of the MCO regulations.

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Issue 3: Impact of Digital Technology Development Among Students

The use of technology among educators and students in teaching and learning is crucial for the current educational needs of the country. This paradigm shift is seen to have a significant impact on education, especially in public universities that consider this technology a primary necessity for both educators and students. This continuity demands students and educators to master information technology and use digital technology in teaching and learning. Nevertheless, it is undeniable that there is a need to maintain a national identity through the teaching of national subjects while simultaneously mastering current technology fields (Othman et al., 2021a). To assess the importance and necessity of digital technology use in current learning and teaching, the primary digital technology mediums used, and the impact of digital technology development among students and educators, it is essential to examine the main usage of technology media for systematic exploration, mastery, and deepening of knowledge. The use of digital technology is crucial in teaching and learning as it can be a catalyst for sustainable teaching and learning processes. In line with the advancement of Science and Technology in education, it also provides an easy learning process (Fitri Mulyani & Nur Haliza, 2021). Since the development of Science and Technology, the education process has become more advanced.

Much has changed over time due to technological advancements, such as the way teachers teach, students learn, and learning materials are constantly updated. Usually, learning processes are face-to-face, but now learning can be done online through applications like Zoom, Google Classroom, and other media. Furthermore, well-designed learning media also significantly aids students in digesting and understanding learning materials. The development of information technology in the current era of globalization and information has driven the advancement of learning media. The use of Information and Communication Technology (ICT) as a learning medium is a necessity (Fitri Mulyani & Nur Haliza, 2021). Although ICT-based media planning requires specific expertise, it does not mean avoiding or abandoning media. ICT-based learning media can be in the form of the internet, intranet, mobile phones, and CD Room/Flash Disk. The advancement of Information Technology has led to many changes, including in the field of education, which has given rise to the concept of e-learning (Mohd. Yusof & Tahir, 2017). With e-learning, the implementation of learning becomes more effective and efficient.

Starting from early childhood to higher levels, the government has allocated substantial funds to preserve the culture of ICT integration in early childhood education. Therefore, early childhood education should embrace this pure effort to realize the government's desire. In this regard, educators should be aware of current issues and trends in the use of ICT in early childhood education to ensure that the handling and use of ICT in the context of early childhood teaching and learning are more effective. The issues and trends discussed in this article are the health and safety of children, infrastructure, educator competence, the use of ICT as a teaching aid, communication media, and collaboration with parents (Nordin & Bacotang, 2021). Information and communication technology as a necessity to boost motivation in learning activities. Therefore, the cultivation of ICT use in early childhood education is considered a reasonable initiative (Nordin & Bacotang, 2021). Information and communication technology are basic needs in human life, including educational activities. In this context, the understanding of the true meaning of information and communication technology in more detail and the meaning of integrating this technology into education has become a national agenda today (Mohd. Yusof & Tahir, 2017).

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DOI: 10.35631/JISTM.833024

Furthermore, the motivation in learning activities is a crucial dynamic aspect. In this context, students' academic underachievement is not caused by a lack of ability but by efforts to direct all abilities that are not optimal. The continuity of the benefits of digital technology in improving students' learning motivation in higher education is seen. Students who have a basic understanding of various sources, using ICT in the learning process, benefit from ICT skills in previous learning. For example, Ez i-Think is a contribution of ICT to learning that combines the i-Think mind map with the Quizizz and Google Classroom applications (Ab Rahman, Che Omar & Daud, 2022). 21st-century learning emphasizes teaching and learning techniques (PdP) using digital technology. In line with the aspiration of the Malaysia Education Development Plan in the Third Wave, which aims to enhance innovation among teachers, ez i-Think becomes an idea for using i-Think mind maps in online or offline teaching and learning. This can serve as a guide for schools and the Ministry of Education to enhance the use of i-Think mind maps to align with the aspirations of the Malaysia Education Development Plan 2013-2025 (Ab Rahman, Che Omar & Daud, 2022). The world has undoubtedly created many advanced technologies to facilitate users' access to information using various network media according to their preferences. The use of social media is a current platform favored by all its users. This is because the applications in this sophisticated social media can attract the attention of Malaysian youth, leading to addiction to social media use and directly influencing their lifestyles. Therefore, the main factors that lead to addiction to social media use and influence the lifestyle of youth refer to factors that drive youth addiction to social media use, such as internet use, gadget use, widespread social networks, dependence on information sources, entertainment source use, online game use, and dependence on communication through social media (Andrew et al., 2020). The addiction to social media indirectly affects the lifestyle of youth in terms of activities, interests, opinions, and time allocated in their daily lives. Therefore, the problem of addiction to social media use needs to be emphasized by all parties so that it does not affect the development of youth in the future. Moreover, social media users, mostly consisting of youth, should take advantage of this situation to transform these benefits into more beneficial aspects such as entrepreneurship using digital technology like TikTok, WhatsApp, Facebook, Telegram, and others (Othman et al., 2021b). Thus, addiction to social media use can be turned into something beneficial by generating income, thereby reducing the unemployment rate among youth.

Issue 4: The Swift Development of Technology in Alignment with the Progression of Time: An Intellectual Exploration

The overarching goal of information and communication technology (ICT) in education is to cultivate a comprehensive understanding of ICT devices, including computers (literacy), and information literacy among students (Al-Rahmi et al., 2020). However, the rapidly evolving factor of technological development, synchronized with the era's evolution, introduces multifaceted perspectives on the role of ICT in education. Debates often arise, particularly from a religious standpoint. For instance, the Quran contains numerous directives, statements, suggestions, and implications that substantively connect Islamic teachings with science and technology. Thus, the role of ICT in education not only aids students in learning but also significantly influences teachers, utilizing facilities to enrich teaching skills. The Quran, serving as a guide for the development of science and technology, strengthens faith and enhances human well-being (Al-Rahmi et al., 2020). Advances in computer and telecommunication technology have transformed how people can meet and make group decisions, transcending physical, social, and psychological boundaries, with secondary effects on group behavior and decision-making.

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EISSN: 0128-1666
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DOI: 10.35631/JISTM.833024

Comparatively, computer-mediated discussions, as opposed to face-to-face meetings, result in delays, clearer and more assertive advocacy, more equitable participation among group members, and decisions that are more extreme, unconventional, or risky. For example, individuals with technical skills gain more influence when they begin to control organizational processes. Collaboration has been socialized as common behavior among student communities and encouraged by social media. However, open sharing practices lead to unintended consequences in academic and professional contexts. There is also limited awareness of how students misuse Internet-based functionality unethically or detrimentally to their education (Andrew et al., 2020). Students appear to struggle in distinguishing socially acceptable personal sharing from ethically or professionally appropriate behaviors in educational or organizational settings. In this perspective, the transformative and self-acclimatizing elements of the first-year university experience are vital facilitators of students' academic achievements (Othman et al., 2021f). Educational approaches to academic integrity need expansion to develop critical evaluation skills regarding the appropriateness of shared file behaviors to address academic piracy and better prepare individuals for their professional lives beyond university (Akun & Mohamad, 2020).

Methodology

This study employs a qualitative and literature-based research design. Following Creswell's (2014) definition, literature review encompasses activities such as collecting literature data, reading, note-taking, processing, and analyzing research materials. The research utilizes two approaches: the library method and the reference method. The library method involves gathering primary and secondary sources related to the study, analyzing various articles to determine the technologies used in education and the impacts arising from the advancement of science and technology in the educational field. The library method also involves obtaining information from written sources, whether in print or digital form, such as journal articles, books, theses, proceedings, newspaper reports, government reports, non-governmental organization reports, and dictionaries, to gather relevant information on the significant issues related to the impact of digital technology development on students in the country. From both types of sources, the researcher clarifies related issues and interprets them objectively and scientifically.

Discussion: Issues and Challenges

The study adeptly discerns avenues for nurturing the digital generation, guiding them through channels to understand the positive and negative implications of digital revolution actions. The use of digital technology offers potential benefits, enhancing individual knowledge and fostering critical thinking skills. Its application significantly impacts technological development among graduates, endowing them with digital proficiency crucial in today's diverse professions. The rapid technological advancements, fueled by factors like heightened curiosity, prompt the younger generation to explore and employ digital tools such as smartphones. Despite efforts to cultivate the digital generation, challenges surface, with a notable concern being the potential misuse of digital technology.

Issue 1: The Role of Higher Education Institutions (HEIs) in Advancing Technology

The contemporary generation significantly differs from its predecessors, with the most notable distinction being in the realm of digital technology. The rapid development of technology stands out as one of the most dynamic advancements in the present era. The current generation is immersed in various digital technologies, including smartphones, laptops, and televisions,

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EISSN: 0128-1666
Volume 8 Issue 33 (December 2023) PP. 331-360
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even within the confines of their homes. Parents actively encourage the use of technology at home to facilitate the healthy growth of their children. In Malaysia, the Malaysia Digital Economy Corporation (MDEC), the leading agency for the country's digital economy, organized the #mydigitalmaker Carnival to foster skills and talents among youth, contributing to the burgeoning digital economy in Malaysia (Astro Awani, 2021). The carnival, held from October 11 to November 21, 2021, spanned five regions nationwide, starting with the states in the East Coast of Peninsular Malaysia, followed by Sabah and Sarawak, Northern, Southern, and concluding with the grand finale in Kuala Lumpur (Astro Awani, 2021). Designed to provide a direct digital experience for students and educators, the carnival offered diverse programs focusing on digital technology, including digital skills workshops, career awareness sessions, competitions, and exhibitions covering coding, animation, drone technology, robotics, and more.

The Ministry of Communications and Multimedia (K-KOMM) concentrated on three main aspects in its efforts to position Malaysia as an information and communication technology (ICT) hub, aligned with the Malaysia Digital Economy (MyDIGITAL) initiative (Rahman, Zolkifli & Ling, 2020). The then Minister of Communications and Multimedia, Tan Sri Annuar Musa, emphasized three key aspects: strengthening communication infrastructure, attracting digital investments, and developing the workforce and human capital in the digital technology sector. To enhance the interconnected ecosystem, K-KOMM implemented the National Digital Network Plan or Jalinan Digital Negara (JENDELA) to expand coverage and improve the overall quality of broadband services through various initiatives, preparing the country for the transition to 5G network technology (Berita Harian, 2022). For digital investment, K-KOMM, through MDEC, devised a five-year strategy (2021-2025) focusing on five core objectives to attract investment and advance the country's digital economy (Berita Harian, 2022).

These objectives include targeting RM50 billion in digital economy investment, creating 50,000 job opportunities in the digital industry, attracting 50 Fortune 500 technology companies to operate in Malaysia, and enabling five global unicorn companies to operate in the country (Berita Harian, 2022). Strategic action plans implemented by MDEC to attract foreign direct investment (FDI) and domestic direct investment (DDI) and position Malaysia as the ASEAN digital hub include strengthening the Digital Investment Office (DIO), a collaborative platform with the Malaysian Investment Development Authority (MIDA) as a single window to streamline digital investment processes. International and state-level collaborations to expedite digital investment and stimulate domestic demand for strategic investment are also conducted to accelerate the transformation of digital companies in Malaysia by promoting market opportunities within the Malaysia Digital initiative. These initiatives underscore Malaysia's commitment to developing digital technology in the country.

Moreover, the integration of digital technology into education is essential to nurture the digital generation. The current generation of students readily embraces change and is more open-minded. This concept is rooted in the students' preference for novelty and freshness. Given the decline in interest in printed materials, digitalization is aptly provided for this generation. Characteristics of suitable digital materials include being concise and compact. Learning through video, audio, interactive multimedia, platforms, AR and VR applications, among other digital elements, is considered essential (Akun & Mohamad, 2020). Immediate or non-immediate delivery should be brief, concise, and compact. Fast-paced and dynamic learning provides enjoyment for active and dynamic students. Importantly, learning outcomes must be

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effective, as students have the right to assess and choose according to their preferences. The accessibility of Web 2.0 features at their fingertips enhances their interest in exploring information and services globally, both free and paid, without flipping through physical books. Preparedness for digital materials is crucial in this era. Transforming printed materials into digital ones is no easy feat but is a contemporary necessity. Hence, academics are currently investing intellectual and emotional effort to enhance information and communication technology (ICT) skills and digitize materials.

Lecturers need to delve into new technology knowledge more effectively to communicate with students, coupled with periodic monitoring by parents to ensure their children are not overwhelmed by the adjustment. The development of independent learning and sustaining academic performance begins with self-confidence nurtured at home (Othman et al., 2020). This pure effort is not easily explored and requires high skills with various up-to-date applications. Furthermore, institutions are working to enhance ICT facilities to make digital learning more efficient. Initiatives such as establishing technology clubs in higher education institutions (HEIs) are wise steps to cultivate interest and talent among students in digital technology. For instance, at Keningau Vocational College, they have a Digital Maker Club that plays a significant role in making the college a high-skilled institution in ICT and media technology (Jamaludin, 2014).

The current generation is also strongly encouraged to explore and learn digital technology freely. Therefore, it is the responsibility of HEIs to meet these needs. One effective approach is to build more collaborations with external companies or corporations. For instance, the strategic collaboration between Universiti Teknologi Malaysia (UTM), KRU Entertainment Sdn Bhd (KRUE), and Yayasan KRU (YKRU) involved the signing and exchange of Memorandum of Understanding (MoU) documents, aiming to promote KRUE's creative industry and digital economy forum to UTM staff, students, and alumni periodically. KRUE, in return, will assist in commercializing UTM products, especially for sales and distribution in both physical and digital formats. UTM will also promote KRUE's eCommerce platform to UTM staff, students, and alumni as part of entrepreneurial development and commercialization initiatives. This collaboration benefits both parties, especially the current generation of students, encouraging the role of HEIs in supporting students to choose careers in digital technology. As technology introduced globally advances daily, job opportunities in this field are expanding, as every industry and sector requires the services of workers in technology. Employment opportunities in computer and digital fields are among the top eight specializations in demand. Therefore, for school students, university graduates, or job seekers seeking a secure future, considering a career in digital technology is a prudent choice. If the interest in working in digital technology is cultivated, the digital technology generation will continue to evolve over time.

Issue 2: The Importance of Digital Technology Utilization

In the endeavor to cultivate a digital-savvy generation among the Malaysian populace, a myriad of challenges must be confronted. These challenges not only impede efforts to foster a digital generation but also hinder this generation from reaping the benefits derived from the use of digital technology. Within the education sector, digital technology is seen as instrumental in enhancing the effectiveness of the teaching and learning process. The shortage of devices such as laptops, smartphones, tablets, and various other ICT tools in schools poses a challenge to establishing an effective education system. The deficiency of these devices arises when the

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government fails to adequately supply digital technology devices to schools under the purview of the Ministry of Education Malaysia (Omar, Ismail & Rathakrishnan, 2021). Consequently, many students are unable to access these devices, some resorting to sharing them with peers. This predicament adversely affects the teaching and learning processes and hinders students' exposure to digital technology. At the higher education level, some students lack the means to possess their own digital technology devices. It is widely acknowledged that higher education relies heavily on technology for teaching and learning. A considerable number of students depend solely on the facilities provided by their institutions, and the scarcity of devices jeopardizes their academic performance. Numerous assignments given by lecturers often remain incomplete before the submission deadline.

The importance of digital technology use is also considered a contemporary necessity, particularly in raising awareness among the younger generation about cybercrime, which has been on the rise in recent times (Taufikurahman & Firdaus, 2020). Cybercrimes are challenging to prove or detect as they occur in the virtual realm, beyond physical verification. Moreover, there is a lack of stringent legal enforcement and penalties against cybercriminals, fostering skepticism and fear in society regarding the use of digital technology. Online fraud, a prevalent cybercrime, involves perpetrators sending false messages and information to deceive victims, typically for monetary gain. Accessing victims' online banking information through exposed personal data, these criminals can cause significant financial losses, reaching hundreds of thousands of ringgits. This situation heightens concerns among the public about using digital technology, despite the inevitability of engaging with it in the current era. However, individuals must remain vigilant against becoming victims of cyber fraud.

The younger generation's lack of interest in pursuing careers in digital technology poses another challenge to the dynamism of higher education in building international human capital (Othman et al., 2016). Many young people are not inclined to study digital technology, perceiving proficiency in digital technology as challenging. This mindset disqualifies a significant number of them from meeting the criteria and qualifications required for employment. In the employment sector, utilizing technology while working can enhance employees' performance (Marzuki, Tahir & Nasri, 2020). The effectiveness of this can be measured by increased productivity and the acceptance of using systems to enhance the quality of work products. Technology assists significantly in communication, team integration, productivity improvement, and information dissemination. Consequently, many employers set hiring criteria based on the level of digital technology proficiency (Ahmad, 2018). In the current job market, competition is fierce and challenging, where the moratorium and financial management become new norms in inspiring and educating leadership in higher education communities capable of producing dedicated graduates in financial management.

Moreover, reducing dependence on foreign labor can cut national expenditure, and it is crucial for the public to recognize that proficiency in digital technology skills is essential. This proficiency affects qualification in job searches. For example, using digital technology tools can increase costs such as electricity bills and financial expenses. The digital technology's development facilitates communication, with platforms like WhatsApp, Facebook, Instagram, and Twitter making it easier for individuals to communicate. However, some irresponsible parties misuse social media for the spread of unverified information, leading to cyberbullying, with negative comments being a prime example. This behavior adversely affects the importance of digital technology use. Ethical use of social media can help the youth understand

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EISSN: 0128-1666
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friendship values more expansively without borders, simultaneously improving socialization skills.

In the economic field, the lack of skills in using digital technology in conducting business hampers successful entrepreneurship in the digital economy (Othman et al., 2021c). In engaging in digital economic activities, various techniques and skills need to be learned before entering the field. Mastery of this digital-based economy can open new opportunities in national trade, bridging the interests of producers, consumers, and markets without being constrained by time and space (Taufikurahman & Firdaus, 2020). Through digital technology, online businesses have been established by various segments of society, not just adults but also school students seeking additional income (Husin & Roslan, 2021). This contributes to the development and advancement of Malaysia's economy. The lack of skills in conducting digital economic activities results in many entrepreneurs failing in the field. Furthermore, some dishonest traders deceive customers by selling counterfeit goods.

In this era, information, and communication technology (ICT) are crucial. This technology has permeated the global sphere extensively, with people using it almost constantly. For instance, information searches can be conducted more easily using Google, enabling individuals to gain and enhance knowledge, especially students (Omar, Ismail & Rathakrishnan, 2021). The importance of using digital technology presents a challenge when certain individuals misuse the facility for inappropriate searches. For example, watching explicit content and violent films that influence the minds of the public, especially the younger generation. This behavior should not occur because the facilities provided for information searches should be used wisely. Another challenge is the problem of video game addiction among the younger generation (Madjapuni & Harun, 2019). Video game addiction negatively affects children's brain development and consequently impacts their health. The light emitted by digital technology devices like smartphones affects their eyesight. Digital video games should ideally cultivate critical thinking skills, especially in children who enjoy playing them.

In response to the impact of the COVID-19 pandemic, the Malaysian government enforced the Movement Control Order (PKP) nationwide (Mokhtar et al., 2021). All institutions, including primary and secondary schools and institutions of higher education, had to be immediately closed. The Ministry of Education Malaysia (KPM) issued directives to conduct digital teaching, commonly known as online classes, to ensure students continued learning even while at home (Mokhtar et al., 2021). The use of digital technology facilitated digital teaching and learning. Online platforms such as WhatsApp, Facebook, Telegram, Zoom, Google Meet, and Google Classroom were employed for online learning throughout the pandemic (Mokhtar et al., 2021). While this method greatly assisted educators in delivering online teaching and conducting co-curricular activities such as competitions, it faced various problems and challenges. One such challenge was internet connectivity issues faced by students, especially those in rural areas (Mokhtar et al., 2021). Students struggled with internet issues, with some having to travel to urban areas to access online classes and prevent falling behind in their studies.

Issue 3: Impact of Digital Technology Development Among Students

The use of technology has been advocated since 2013, but its significance in Malaysia became apparent after the emergence of the pandemic in early 2020 (Ationg et al., 2021). It is not merely due to the pandemic that we succumb to technology, but the times necessitate a shift to

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modernity and high technology. Since then, we have faced the threat of a pandemic that limits many face-to-face activities, making the internet and digital space the sole platform for society to stay connected, work, and alter the patterns of educational learning during this era of modernization. The Internet User Survey 2022 by the Malaysian Communications and Multimedia Commission (MCMC) found that internet users and digital space increased by 2.2 percent in 2022 to 89.6 percent compared to 87.4 percent in 2018 (Ayob, Hamzah & Aziz, 2021). Online activities conducted include messaging at 98.1 percent, social media at 81.1 percent, video watching at 87.3 percent, voice and video communication at 81.1 percent, and information retrieval at 74.3 percent.

One of the issues associated with the digital generation is the information overload. This condition, if not addressed, allows anyone to impersonate a professional simply by accessing information from the internet. If left unhandled, this situation can lead to immoral activities, such as viewing inappropriate images conflicting with religious teachings and exposing individuals to threats in the cyber era. The fraud conducted indirectly contributes to the spread of inaccurate information or fake news, risking various negative implications for society. More unfortunate is when users fail to analyze information and blindly believe what is presented, making them victims of cybercrime (Nahar et al., 2018). Therefore, in addition to the government and law enforcement providing appropriate guidelines and ethics to prevent the misuse of digital technology and the internet, the current scenario of rapid digital technology development demands parents and the community to educate and monitor, especially the younger generation handling digital platforms.

Although the internet era provides a space to search for and verify information, users typically adopt a simplistic approach in making decisions without considering the long-term impact on themselves, which can inadvertently disclose their identity to others. While the past recommended consumer education at certain levels, the current scenario necessitates universal consumer education for all students, including primary and secondary schools, as well as higher education institutions, to enhance proper digital literacy. This aligns with the emerging new norms of life. Changes demand the implementation of new delivery methods in teaching and learning (PdP) to adapt to current conditions (Rahman et al., 2021). The adoption of technology and applications is now widely open to all education levels. Now, the endemic life seems to push global society, including Malaysia, toward the comprehensive use of technology and digitization of materials. On average, universities and all education levels also actively deliver PdP online. The preparation towards digital materials is crucial in this era. Transforming print materials into digital content is not an easy task, but it is a current necessity.

It is not surprising that academics are currently striving to enhance Information and Communication Technology (ICT) skills and digitalization of materials (Mohd. Yusof & Tahir, 2017). This pure effort is not easy to explore and requires high skills with various up-to-date applications. Moreover, institutions are also working to enhance ICT facilities and amenities to make digital learning more efficient. For educators, not everyone can use technology, and many still adhere to traditional teaching concepts. Various new approaches are being attempted to teachers to achieve the goals of digital learning. However, not everyone can accept the impact of this surge. Many consider that only the digital or younger generation, born and raised in a digital environment, is more inclined towards digital technology. In reality, those born before the internet era are also familiar with and actively involved in technology, making the

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issues of digital or cyber rights more challenging. This new norm has made society more accustomed to online learning, functioning through a digital or cyber environment.

However, from one perspective, digital era issues can also expose them to various risks and challenges. For example, nearing the end of the 8th Malaysia Plan, all schools are expected to have computer labs. This means that the teaching and learning process can be implemented by integrating computers. Similarly, by having internet access and accessing specific web labs, especially in education, teachers can have various resources to use in classroom teaching. Student information is no longer limited to schools or libraries alone. Students can easily access any information, whether educational or entertainment, with such ease. The prevalence of adult content on the internet today is an issue that is difficult to address. In addition to the benefits of integrating computers into education, there are also downsides. The possibility for these students to be negatively influenced by the internet is high. Therefore, teachers should expose their students to the ethics and laws of using computers. The 1997 Computer Crimes Act, which already exists, can assist teachers in establishing computer usage ethics at the school level to prevent negative internet influences on students (Omar & Sedon, 2014). This task is quite challenging because internet access today is not limited to schools alone.

In addition, the digital generation also faces challenges in bearing high costs to obtain computer hardware and software, which are still high even though they are expected to decrease (Rahman, Zolkifli & Ling, 2020). We are concerned that with the rapid development of information technology, companies or individuals are always introducing new and expensive hardware and software. Research work usually takes a long time. Therefore, high costs are required in terms of system maintenance, labor, support equipment, and especially the necessary hardware. Because the field of information technology in education is still new and in high demand, educational institutions have increased fees for these courses. Students need to have their computers to avoid competition in the institution's computer labs. There are also staff assigned to operate software or enter data that can result in reports processed or analyzed by inaccurate software. This can happen, for example, with the continuous entry of large amounts of data. Errors can also occur in research results if there is negligence in entering data or errors in the development of the research system itself due to its complexity. The emergence of computer viruses can also result in errors in data analysis. This allows for the leakage of personal identity to outsiders.

Behind the rapid development in computing, there is also a group of people who are incapable or unable to keep up with the rapid development of information technology. These people may be afraid of computers or reluctant to use them due to their lack of confidence in computers. The effects of these shortcomings can indirectly create a sense of low self-esteem when among individuals who are computer-savvy. This challenge is also difficult to address because the solution depends on a person's confidence in trying new things. Moreover, the Internet is not owned by anyone. Every Internet user is free to input any information they want to convey to other users. Therefore, it is difficult for the education sector to filter out only good and appropriate content for students. In conclusion, the rapid development of digital technology driven by the government, which emphasizes the practice of digital technology in life to meet globalization demands (Ali, Mohamad Salleh & Mustaffa, 2020).

Although this pure intention also faces challenges that are hidden in making digital technology a normal culture in this country, especially in the education sector. The role of educators is not

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only to teach but educators are the heart of Education. Without the active involvement of teachers, the Education system will falter. This is because educators will implement every innovation in the national Education policy at the grassroots level. As agents of transformation, educators must always be prepared and adapt to current issues and tend to accept any changes. The challenges of the present and future decades in the Education sector, all parties must work together to handle and make it a normal culture practiced in this country. Although there are negative impacts related to digital technology development, it has many benefits and advantages, especially for students and educators in this country. Therefore, this matter should be seen as a mission that has a significant positive impact on individuals, society, the country, and even beyond the country.

Issue 4: The Rapid Development of Technology in Alignment with the Passage of Time

The current use of technology holds immense significance in the daily lives of individuals, particularly students in both public and private higher education institutions. Technology is frequently employed in the processes of teaching and learning within higher education institutions (Mohd. Yusof & Tahir, 2017). Several factors contribute to the swift development of technology in tandem with the progression of time, such as the curiosity instigated by technology. This phenomenon arises as many students ponder upon events occurring inside and outside educational institutions, contemporary issues, and more. With technology, students can effortlessly access desired information within a short period. They can also retrieve information through advanced digital technology in accordance with the contemporary era. Furthermore, this curiosity in technology broadens, and the access to information expands beyond previous limits. This is attributable to the uploading of novel content by individuals regarding historical matters, current developments, or future expectations.

Subsequently, the demand for employment is a factor propelling the rapid growth of technology, especially in the era of globalization, where most jobs necessitate proficiency in technology (Marzuki, Tahir & Nasri, 2020). Currently, employers seek individual's adept at using technology such as machines and computers, with some even imposing requirements for technological skills on labor applicants. Consequently, students must learn the basics of using technology, prompting higher education institutions to encourage technology use during teaching sessions. For instance, before the global Covid-19 pandemic, student attendance was manually recorded by signing attendance books. Presently, attendance is taken through barcode scanning or accessing specified websites provided by lecturers, showcasing a stark difference in technological development.

Educational requirements represent another factor driving technology development in line with the passage of time, with the educational system advancing significantly by integrating information and communication technology (ICT). The use of technology is advocated from the school level to tertiary education, aiming to cultivate a technologically savvy generation for the future. At the primary school level, teachers provide barcodes or QR codes to students for attendance purposes (Omar, Ismail & Rathakrishnan, 2021). Students regularly employ technological tools such as laptops and teaching aids to enhance their understanding of various subjects, encouraging them to adapt to existing technology. At the university level, students' complete assignments using laptops, tablets, and smartphones, submitting them through websites designated by lecturers. Therefore, students must be proficient in using technology to fulfill educational requirements.

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Trends and lifestyles also influence technological development concurrent with the passage of time. This is evident as individuals, especially students, are often influenced by the changing lifestyles of others. If others adopt something new and it gains popularity, those who have not yet embraced the novelty are likely to follow suit. In the realm of technology, the increasing number of students using the latest mobile phones and laptops prompts others to acquire similar or nearly identical devices. Additionally, changing trends serve as a catalyst for technological adoption. Trends closely align with lifestyles, representing sequential occurrences leading towards a particular direction. Students easily succumb to peer pressure, adopting the latest technological trends observed on websites and social media platforms.

Furthermore, the flexibility of learning is a significant factor contributing to the escalating development of technology (Omar & Sedon, 2014). This flexibility allows both students and lecturers to enhance their technological skills. Lecturers and students alike need to use computers, tablets, smartphones, and internet access for online learning. Educators must learn how to conduct classes using the best and most user-friendly video calling applications to facilitate student participation. From the perspective of students, they must be vigilant and prepared to engage in all classes provided by lecturers. Flexible learning also renders the teaching and learning process more interactive and accessible. Traditional lecture halls required lecturers to write on black or whiteboards, with students referring to less interactive textbooks. Through online education, lecturers can provide more interactive teaching materials, incorporating Microsoft PowerPoint presentations with video links, images, and animations to captivate students' attention. Additionally, students have the advantage of seeking additional information on the topics they are studying.

The rapid development of the internet and communication technology has given rise to various interactive multimedia networks, providing facilities for students to engage in digital learning (Mohd. Yusof & Tahir, 2017). For example, universities provide free wifi to all residents, positively impacting students' access to learning materials through specific websites. Universities also offer online library facilities for easy reference. Thus, the facilities provided aid students in enhancing their knowledge. Moreover, students learn to use information technology effectively and improve their computer software skills. The desire for information sharing is another factor driving the increasing development of technology over time. Previously, information sharing was predominantly face-to-face, posing challenges for users or students. Difficulties included the need to gather in a specific location, which might be inconvenient, to ensure everyone received the shared information. This also led to fatigue in traveling to a location solely for information sharing. The introduction of current technology has revolutionized the way individuals share and access information, limiting information sharing applications like WhatsApp, Telegram, Facebook, and more (Ayob, Hamzah & Aziz, 2021). Consequently, information sharing can occur anywhere without the need to travel to specific areas.

Additionally, collective decision-making is another factor contributing to the rapid development of technology. In groups, whether formal or informal, collective decision-making is essential. Traditionally, group decisions were made through face-to-face meetings held in specific rooms. However, this posed challenges, as not all members could attend due to various reasons. With the use of communication technology, it is expected that all members can participate in decision-making collectively. Originally face-to-face meetings can be transformed into online meetings, ensuring the involvement of all members. Furthermore, the

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EISSN: 0128-1666
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increasing exposure and application of the importance of technology to the grassroots level play a crucial role in driving technological development. This is vital as the younger generation will lead the country in the future. If they possess limited knowledge about technology, our country may lag others. Hence, instilling the significance of technology at the grassroots level is imperative. Proficiency in using technology is essential for navigating the modern generation that predominantly relies on technology. Awareness of the importance of technology is crucial for individuals to learn about information and communication technology (ICT) to enhance their skills in this domain.

Lastly, the encouragement and endorsement of technology use represent factors contributing to the increasing development of technology (Ayob, Hamzah & Aziz, 2021). This encouragement should come from individuals possessing expertise and experience in technology use. Such encouragement influences individuals to delve deeper into technology. Importantly, it is not only technology experts who should provide encouragement; parents and friends also play a significant role in exposing individuals to technology. This is because individuals spend more time with family and friends than with technology experts. Encouragement from these close relationships is impactful, as they share familial and friendship bonds. In conclusion, there are numerous factors contributing to the escalating development of technology in line with the passage of time. Hence, concerted efforts are necessary to ensure that the upcoming generation is technologically adept.

Conclusion: Future Directions

The study adeptly identifies pathways to nurture the digital generation, guiding them to discern the positive and negative impacts of the digital revolution. Digital technology usage holds potential benefits, enriching knowledge and fostering critical thinking skills. Its application significantly influences technological development among graduates, providing them with digital proficiency crucial for employment across various professions. Rapid technological advancements, driven by high curiosity towards technology, lead the younger generation to explore tools like smartphones. Amid efforts to cultivate the digital generation, challenges arise, notably the misuse of digital technology. Governmental initiatives address this issue, but challenges persist, hindering efforts to foster a positive digital generation. The study emphasizes a shared responsibility among stakeholders to realize the nation's vision for an advanced digital generation**.**

Issue 1: The Role of Higher Education Institutions (IPT) in Advancing Technology

The concept of digitalization in higher education in Malaysia is not a new one. The principles of blended learning and the upgrading of digital facilities in educational institutions have been clearly outlined. Examples include the establishment of academic consortia, where knowledge related to teaching and learning is shared through virtual platforms. This encompasses the delivery of teaching through synchronous and asynchronous approaches, the use of online applications with the potential to assist in teaching processes and student assessment. Gamification elements can also be applied virtually, all without academic staff leaving their residences (Ationg et al., 2021). This, to some extent, aids lecturers in enhancing the quality of the online learning experience for students. Moreover, this is crucial as technology increasingly takes over human jobs in various fields, especially those directed towards the digitization of industries, such as manufacturing, food, construction, and agriculture (Othman et al., 2021d). Therefore, it is the responsibility of IPT to educate students about technological knowledge to

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equip them with the necessary skills. Various approaches can be implemented by IPT to achieve this goal.

One such approach involves establishing close collaborations between IPT and technology companies or industries. As students need hands-on experience working with technology, building relationships between IPT and technology industries can address this issue. This method can also assist confused graduates in finding employment, as they do not need to struggle to secure a job placement. Industry 4.0 (IR4.0) refers to the digital revolution involving the technological development of industries, particularly in production and automation, moving towards smarter and more systematic levels (Fitri Mulyani & Nur Haliza, 2021). IR4.0 also signifies disruptive transformation in industries using technology, combining the physical, digital, and biological aspects, impacting all fields, industries, and economies. IPT must ensure that the provided curriculum and courses are relevant and capable of filling the job vacancies required by industries in the future.

The Ministry of Education aims to involve more industry players in efforts to strengthen the country's education, especially in the field of Technical and Vocational Education and Training (TVET) (Jamaludin, 2014). For the next five years, more opportunities and roles are open to industries to enhance graduates' employability through collaboration with higher education institutions (IPT). Industries often provide feedback on graduates' employability concerning skill mastery, language proficiency, and current knowledge. At present, all IPTs have implemented industrial training as one of the essential components in academic study curricula. One step the government can take is to provide incentives to organizations absorbing students through the Human Resources Development Fund (HRDF), channeled to organizations providing industrial training until, ultimately, organizations will receive a portion of the costs incurred (Ahmad, 2018). The new government through the Ministry of Energy, Technology, Science, Climate Change and Environment will offer more grants to industries for research and development (R&D) projects (Marzuki, Tahir & Nasri, 2020). Through government subsidies to industries, they can contribute to human capital development in IPT by funding research projects for postgraduate students. This is one of the government's pure initiatives to attract more industries to collaborate with universities.

Considering the current technological changes with the emergence of the Fourth Industrial Revolution (IR 4.0), there is a need for industries to establish more research labs on campuses and bring in more industry experts to collaborate with academic staff and students in generating new innovations. Without innovation, the country faces difficulties in generating income through new sources. The relationship between universities and industries also needs to be established. In this context, various collaborations are implemented, such as invention contests and innovation product-related competitions with industry needs to help students' creativity involved in R&D (Marzuki, Tahir & Nasri, 2020). So far, the industrial sector has only supported efforts to employ graduates through open interviews on campuses, which should now be intensified in vocational colleges and small-scale colleges. Industry leaders should proactively give lectures to students at universities without waiting for official invitations or appointments as adjunct professors and public lecturers. Industries are encouraged to provide more scholarships to students, as so far, only large companies have offered scholarships. Apart from scholarships, rewards for excellent students can also be given by the industry (Subri, Baboo & Dolah, 2017).

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From an entrepreneurial perspective, industries can invite students to participate in business to understand real marketing methods. In navigating the currents of contemporary change, universities and industries must work together to realize the new government's pure intentions of enhancing job opportunities and graduate employability. This new framework of collaboration between IPT and industries will significantly improve graduate employability and reduce graduates' dependence on the public sector. The prolonged crisis and recovery period require us to seek more creative and innovative solutions to ensure the sustainability of higher education institutions.

Issue 2: The Significance of Digital Technology Usage

The utilization of digital technology holds paramount importance for both society and the nation. The development and progression of digital technology have elevated it to the status of a necessity. Through digital technology, communication processes can be streamlined, allowing access to a plethora of information with the mere use of smartphones and computers. The rapid advancement of media sophistication ensures that information is constantly at one's fingertips. Nevertheless, issues persist regarding internet connectivity in rural areas, hindering residents from effectively engaging in communication with the outside world. Furthermore, there is a challenge in accessing information, particularly for school students residing in rural areas. Thus, agencies such as the Malaysian Communications and Multimedia Commission (MCMC) and other telecommunications service supervisors must play a role in resolving internet connectivity issues (Zainal Abidin & Firdaus, 2016). Additionally, these entities play a vital role in providing exposure to digital technology for residents in rural areas to enhance their understanding of digital technology.

In the realm of education, digital technology serves as a gateway to globally recognized education. Digital technology is perceived as significantly aiding the enhancement of the effectiveness of teaching and learning processes. The use of technologically advanced teaching aids in classrooms, such as PowerPoint slides, internet access in classrooms, the use of CD-ROMs, and textbooks available on websites, can establish a more effective education system. Students are more likely to enjoy learning without experiencing boredom in such an educational system. This education system has the capacity to educate and produce a generation with high skills in the field of digital technology, enabling them to compete internationally. Teachers should incorporate digital technology in their teaching methods, enhancing their skills in various aspects. Schools need to play a role in supervising teaching techniques employed by teachers in each school. At the peak of the COVID-19 pandemic, estimates from the United Nations Educational, Scientific and Cultural Organization (UNESCO) reported that 90 percent of students worldwide were affected by school closures (Mokhtar et al., 2021).

This resulted in students worldwide having to resort to online learning. Applications such as Google Classroom and Google Meet were utilized by teachers in Malaysia to conduct the teaching and learning process (Mokhtar et al., 2021). However, COVID-19 also created an opportunity to reassess and explore how technology could make our education system more accessible, fair, flexible, and robust. Many schools in Malaysia with their own school education systems became more accessible and improved. The use of digital technology facilitates the daily affairs of society. All payment transactions and purchases can be made online, saving time without the need to queue at counters for payments. Furthermore, banking transactions can also be carried out using digital technology.

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Some individuals in today's society prefer to conduct online payment transactions. This has led to the occurrence of information theft or scams committed by individuals commonly known as 'scammers.' Many cases have arisen, especially among the elderly, and this issue has undoubtedly become a concern for the entire society. The use of digital technology should assist them in their daily affairs, and not the other way around. Therefore, the relevant authorities should seriously address this issue and combat such crimes. Hence, the emphasis on legal literacy synonymous with the self-reliance of students should be instilled as a driver for the younger generation to possess a noble character and high leadership charisma, starting at the university level (Othman et al., 2021g).

In the economic domain, the Malaysian government has taken the initiative to enhance digital economic development. This initiative is embodied in the Malaysian Digital Economy Blueprint Action Framework (Ayob, Hamzah & Aziz, 2021). This digital economy is expected to significantly aid Malaysians in boosting their respective economies. A technology-based digital economy can create new opportunities in national trade, bringing producers, consumers, and markets closer without being constrained by time and space. Through digital technology, online businesses have emerged, driven by various segments of society, not only adults but also school students who are still studying, seeking to supplement their income.

Issue 3: Impact of Digital Technology Development Among Students

The emphasis on digital infrastructure readiness is achieved through the establishment of a 'Smart Digital Infrastructure' component with strategies to enhance internet speed and connectivity, expand internal and external network coverage, and strengthen policies related to cybersecurity and personal data. The government will prioritize the education sector to cultivate a skilled, knowledgeable, and morally upright human capital. Consequently, the quality of teachers, lecturers, curriculum, and educational infrastructure will continue to be enhanced. The national education sector must be prepared to face various new challenges, including increasing the use of technology in virtual teaching and learning. The development of digital and smart infrastructure is a key element in propelling the country towards becoming a smart nation. In line with the technological advancements of the Fourth Industrial Revolution (4IR), the need to invest in digital infrastructure is a priority that requires attention in future development planning (Ayob, Hamzah & Aziz, 2021). The PD 4.1A action strategy accelerates the comprehensive and high-capacity provision of digital infrastructure in realizing the digital economic agenda.

Malaysia must be prepared by ensuring the level of efficiency of digital infrastructure can support the country's economic progress in line with global digital economic developments. This strategy outlines spatial development actions that can enhance the efficiency of digital infrastructure in line with future development trends focused on the use of technology in daily activities. Digital infrastructure coverage needs to be expanded in populated areas, with priority given to rural areas that often experience internet connectivity issues. To reduce the digital divide between urban and rural populations, broadband services need to be provided comprehensively so that they can be enjoyed by all segments of society. Additionally, the provided infrastructure needs to support the latest technology, namely 5G, to ensure Malaysia remains competitive globally. The National Digital Network Plan (JENDELA) introduced is expected to prepare the country to adopt 5G technology (Berita Harian, 2022). The development of digital infrastructure also plays a crucial role in driving digital economic

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growth and supporting digital-based socio-economic activities. The fundamental aspects emphasized include digital education and more comprehensive digital infrastructure.

This can be observed through efforts to find digital education methods capable of shaping practical and competent digital skills in educational institutions. This fundamental aspect is crucial because it can lead to the sustainability of education and address digital inequality issues in line with the national digital development agenda. Development in terms of digital education is the heartbeat of the process of developing skilled human capital proficient in digital knowledge. Producing more individuals with skills and proficiency in digital knowledge represents a new form of vital capital in this era, namely national digital capital. In this regard, the Ministry of Education (KPM) has previously announced a revamp of its digital learning platform for teachers and students through DELIMa, also known as the 'Digital Educational Learning Initiative Malaysia' (Nordin, 2021). This platform is the culmination of KPM's efforts over the past few years, in collaboration with Google, Microsoft, and Apple. It offers all the applications and services needed by teachers and students in the Malaysian school system, including empowering digital learning technologies such as Google Classroom, Microsoft 365, and the Apple Teacher Learning Center (Nordin, 2021). Although a conducive platform for the success of education digitization has been developed, teachers need to be trained as effectively as possible to integrate digital educational applications more efficiently.

This aligns with the fourth Sustainable Development Goal by the United Nations, which advocates for quality and comprehensive education to develop a safe and sustainable society. Moreover, teachers need to undergo reskilling and upskilling training to equip them with the skills necessary for effective digital media use (Rahman et al., 2021). It is essential to create an enjoyable, interactive, and effective learning environment. Investments to enhance teacher skills are critical in line with the goal of modernizing teaching practices and digital education. This is to ensure that all teachers are proficient and remain relevant in the digital education ecosystem. An essential aspect to emphasize is digital pedagogy, including digital citizenship, learning design, diversity, as well as encompassing student, feedback, and assessment, along with lifelong learning. Teachers are also expected to remain innovative in teaching sessions with the application of fresh pedagogical skills designed for the context of digital education, both in physical and digital spaces, to create a conducive learning environment.

Issue 4: Rapid Technological Development Factors Aligned with the Passage of Time

Various entities must undertake diverse initiatives to further enhance technology utilization. On the government's part, there is a need to launch awareness campaigns highlighting the significance of technology use. This is asserted due to the present reality wherein a segment of the population remains unaware of the importance of technology to both individual and national contexts. Particularly for residents in rural areas who seldom venture beyond their localities, there exists a lack of understanding regarding technology. Given this predicament, the government should embark on a comprehensive awareness campaign targeting all segments of society, irrespective of social status, ethnicity, or education. Such an endeavor is crucial to instill an understanding of the pivotal role technology plays in daily life and prospects. The government should also aid, such as distributing mobile phones and SIM cards or offering subsidies related to mobile phone purchases, especially for those residing in rural areas or among the persistently impoverished demographic, facing challenges in accessing technology like mobile phones. This is imperative because they encounter difficulties accessing

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government services, most of which are disseminated through communication technologies such as social media.

Furthermore, employers or company owners play a pivotal role and should prioritize technology adoption within their organizations. When they emphasize the use of technology in their companies, technological advancements thrive and continue to progress. They should possess modern technology to produce goods or services in large quantities and of high quality. This is emphasized because it enables them to maximize profits and minimize the utilized capital. Moreover, they must learn to use this technology before imparting knowledge to their employees. Employers can send their workers to skill institutes to gain further insights into technology use. This approach enables their employees to enhance skills and knowledge to educate others within their sector on technology use. Additionally, schools must undertake various measures to facilitate students' learning of technology. For instance, teachers no longer need to write on blackboards or whiteboards but can utilize Teaching Aids (ABM). Learning aids such as laptops, liquid crystal display (LCD) boards, projectors, and more are employed. Using ABM clarifies abstract symbols and verbal communication, making it easier for students to understand the content of a lesson. Proper and varied use of teaching media can also address passive attitudes among students, as it sparks interest, enhances interaction, and improves students' understanding of the enjoyable and engaging teaching and learning environment (Nordin & Bacotang, 2021). Therefore, various entities can contribute to enhancing technology use in our country. All parties must collaborate to implement technology-based activities so that more people will adopt it. Everyone should cooperate and actively participate when enlightenment or awareness about technology is provided.

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