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Human Factor vs. Modern Technology in the Teaching Procedure

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Abstract:

This paper delves into the integration of modern technologies such as Learning Management Systems (LMS), gamification, educational apps, and internet-based learning in teaching methodologies. It examines the roles of teachers and educational technologies (ET) within two main approaches: the Teacher-centered and Technology-based approaches. The study underscores the significance of technology in enhancing educational processes while emphasizing the irreplaceable role of talented and adequately trained human educators. It highlights the impact of technology on various stakeholders in education, including teachers, students, and content quality. Ultimately, the research advocates for a balanced approach, leveraging both human expertise and technological tools to optimize learning outcomes. It underscores the importance of recognizing the human factor in teaching, while acknowledging the potential drawbacks of solely relying on digital teaching models.

Keywords: Human factor; Technology; ICTs; keywords; Education.

Introduction

In today's rapidly evolving landscape, where technology serves as a catalyst for productivity and innovation within interconnected information networks, there arises an unprecedented demand for educational systems capable of catering to the multifaceted needs of individuals and societies alike. This necessitates a paradigm shift in education, one that equips individuals with the essential skills to navigate and leverage technological tools effectively. Indeed, as Kim and Jung (2021) emphasize, teaching and learning stand as the cornerstone elements of this transformative process.

Central to this educational overhaul is the recognition of information technology's pivotal role in shaping the educational landscape of the third millennium. A dynamic educational framework, steeped in a culture of adaptability and innovation, is essential to prepare individuals to thrive in an increasingly digitalized world. As such, the integration of information technology into educational programs becomes imperative, heralding a new era of educational paradigms characterized by smart schools and digitally-enhanced learning environments.

Crucially, within these educational contexts, the teacher-student relationship emerges as a linchpin for successful learning outcomes. A positive and supportive rapport between educators and learners fosters an environment conducive to meaningful dialogue, collaboration, and exploration of course content. Students, feeling valued and supported, are more likely to engage actively with their studies, leveraging these relationships as platforms for deeper understanding and intellectual growth.

However, navigating this transformative educational landscape poses challenges for educators. With the rapid evolution of technology, teachers must continuously adapt and upskill to remain effective in their roles. The effective integration of information and communication technology (ICT) into teaching practices becomes paramount, empowering educators to enhance their professional competencies and cater to the diverse learning needs of their students.

In essence, the contemporary educational landscape demands a holistic approach that intertwines technology, pedagogy, and human interaction. By embracing this interdisciplinary perspective, education can fulfill its mandate of preparing individuals for the challenges and opportunities of the future, equipping them with the skills and knowledge necessary to thrive in an increasingly digitalized society.

1. Human factors: What Are They?

Human factors, a multifaceted field of study, delves into the intricacies of human capabilities, constraints, behaviors, and processes to inform the creation

of human-centered designs. Also referred to as human factors psychology and human factors engineering, this discipline prioritizes designs that incorporate the human perspective throughout the design process. By applying human factors concepts, systems and gadgets are crafted to be safer, more user-friendly, and more efficient, ultimately aiding individuals in completing their intended tasks effectively.

Furthermore, the rapid pace of technological advancement in the contemporary era has not only transformed our daily lives but has also served as a catalyst for revolutionary shifts across various industries. Modern innovations such as blockchain, artificial intelligence, and the Internet of Things have not only opened up new possibilities but have also disrupted established conventions. According to Arthur (2009), technological innovation is indispensable for meeting societal needs, achieving goals, and surmounting obstacles encountered by its adopters. It is not merely a byproduct of scientific discoveries.

The dynamism of technological innovation extends beyond individual enterprises, permeating broader scopes of influence encompassing corporate landscapes, industrial frameworks, economic structures, and social dynamics. In navigating the complexities of the 21st century, technological innovation emerges as a cornerstone for fostering competitive advantages for both businesses and nations alike. The ability to adapt to and harness technological advancements has become synonymous with success in a globalized and interconnected world.

An insightful perspective offered by Coccia (2019) underscores that technological innovation comprises a complex system composed of multiple interconnected subsystems. These subsystems operate collaboratively, forming intricate relationships crucial for achieving specific objectives. Thus, technological innovation transcends the development of singular technologies; instead, it involves the synergistic collaboration of various components within a larger system.

The significance of this interconnected system becomes apparent when considering the interplay between technological innovation and overall human progress. Coccia and Bellitto (2018) posit that technological innovation is intricately intertwined with the broader concept of human advancement. Consequently, technological advancements are not pursued in isolation but are intrinsically linked to the overarching goal of advancing society as a whole.

In conclusion, Coccia (2012) elucidates that the intricate web of technological innovation is characterized by its capacity to address significant issues, fulfill evolving human needs, and empower humanity to utilize scientific advancements to exert control over nature. Technological innovation serves as a beacon of hope for a future where scientific advancements and their positive effects on societal advancement will serve as indicators of progress as we navigate the ever-changing terrain of the twenty-first century.

2. How Contemporary Technology Affects Education

In the fast-paced landscape of the 21st century, education is undergoing a transformative revolution driven by modern technologies. The traditional model of teaching, centered on physical classrooms and textbooks, is evolving to embrace a digital era characterized by innovation and connectivity. This paradigm shift is not only altering the methods of instruction but also reshaping the entire learning experience for both educators and students. As we delve into the intricate web of modern technologies, it becomes evident that their integration into education is not merely a trend but a fundamental reimagining of how knowledge is imparted and acquired. In this exploration, we will unravel the ways in which these technologies are fostering a dynamic and interactive educational environment, transcending the limitations of time and space to prepare learners for the challenges of an ever-changing world.

As Green (1999) argued, the rise of information technology has enhanced accessibility to higher education. The increasing participation of adults in lifelong learning is causing a transformative shift in American higher education, as technology facilitates flexible learning opportunities and the expansion of online courses and resources. This integration of technology has led to significant changes, making education more widely available and challenging traditional educational norms:

“Technology brings new, rich resources to the learning of content; creates new contexts for interaction between and among instructors and students; and can fundamentally change the way students and institutions approach assessment and certification” (Morey, 2004, p. 14).

For instance, the internet has become the preferred technological tool in higher education, serving as a key means to enhance instructional methods, broaden access to education, and boost overall productivity. Within the higher education landscape, numerous universities, regardless of whether they are public or private institutions, have incorporated online courses that either provide additional educational opportunities or contribute to earning degree credits. It's worth noting, however, that the prevalence of such online courses remains relatively limited in some educational institutions. In contrast, certain for-profit entities, exemplified by the University of Phoenix, have adopted a more pronounced reliance on the internet as a primary instructional medium within their curriculum. These institutions, particularly those operating with a profit-oriented model, have strategically utilized the internet to deliver courses to students dispersed across various geographical locations. For institutions like the University of Phoenix, internet-based instruction has evolved into a central and effective method for reaching and educating a diverse and geographically scattered student population (Peterson et al., 2010).

The rapid advancement of technology has significantly impacted various aspects of our lives, including education. Among the numerous technologies that

have been introduced in the educational landscape, the internet stands out as the most transformative force. Its emergence has revolutionized the way we access information, connect with others, and approach the learning process.

Soares et al. (2019) highlight the transformative impact of the internet on education, emphasizing its role as a catalyst for innovation and accessibility. The internet has opened up a vast network of opportunities for sharing knowledge and fostering connections, enabling the development of online learning platforms. These platforms have paved the way for novel learning concepts, such as blended learning and the flipped classroom, which seamlessly integrate traditional classroom instruction with online resources. This integration allows students to reap the benefits of both offline and online learning environments, enhancing their overall learning experience. The internet's influence on education extends far beyond the realm of online learning. It has revolutionized the way teachers access and utilize educational resources, providing them with a wealth of materials to enrich their teaching practices. Moreover, the internet has facilitated communication and collaboration among educators, enabling them to share ideas and best practices, fostering a more connected and supportive professional community.

Thereon, the internet has undoubtedly transformed the landscape of modern education, acting as a driving force for innovation, accessibility, and collaboration. Its impact is evident in the development of online learning platforms, the enhancement of teaching practices, and the fostering of connections among educators. As technology continues to evolve, the internet's influence on education will only grow stronger, shaping the future of learning for generations to come.

3. The Impact of Technology on Students

Students now use technology for everything from communication to research, making it an essential component of today's education. Technology has significantly changed education, both positively and negatively affecting it. On the other hand, there are many advantages of technology for students. Students' learning has been improved by technology by making it more dynamic and engaging. Students' ability to retain more information has also improved. Using discussion and collaboration tools to bring students together who may not have previously considered working together is one of the main advantages of technology in education.

3.1 Positive Impacts of Technology on Students

3.1.1. Nurturing Minds: Fostering Intellectual Growth in Students

Students benefit from technology since it fosters mental development in them. As a result, the majority of students think that using technology in the classroom enhances their education. Depending on the technology employed,

critical thinking abilities can also be improved by it. Technology can also foster a more active learning environment and increase student participation in the classroom. The most notable benefit of technology for students is that it greatly facilitates and improves their learning process. Additionally, technology aids in personalized learning by identifying students' initial proficiency levels and matching them with relevant course materials. Bay Atlantic University (2022) highlights how appropriate classroom technology can boost students' academic achievement, self-confidence, motivation, and attendance. It engages multiple senses and facilitates a transition from passive listening to more hands-on learning.

3.1.2. Unlocking Knowledge: Students' Abundant Access to Data

The fact that technology makes a vast amount of information easily accessible to students is one of its benefits. Students can quickly and accurately find information with search engines and e-books. Traditional textbooks have been partially replaced by this. Additionally, thanks to technology, students can now receive one-on-one assistance whenever and wherever they choose through educational videos and massive open online courses (MOOCs). Additionally, technology promotes engagement and interactivity in the classroom, which improves comprehension overall. Students are consequently more involved and frequently retain more material. With the use of technology in the classroom, students can learn more quickly and have fun applying what they have learned.

3.1.3. Education without Borders: Technology Empowers Students Globally

The integration of technology into education has transcended geographical limitations, providing students worldwide with access to a vast array of educational resources. From early learners engaging with technology alongside adults to advanced online programs, individuals across all levels of education stand to benefit. Numerous studies have demonstrated that information technology and the internet directly contribute to improved academic performance. This empowerment of students through technology has created a world of opportunity and enhanced learning experiences, regardless of geographical location.

However, as highlighted by the UNESCO Global Education Monitoring Report Team (2023), technology also has the potential to exacerbate existing disparities in both access to and the creation of educational content. Currently, privileged groups tend to be the primary producers of content, with research indicating that nearly 90% of Open Educational Resources (OER) originate from Europe or North America. Additionally, approximately 92% of the materials available in the OER Commons global library are in English, significantly limiting access for non-English speakers.

One notable example of this disparity is seen in Massive Open Online

Courses (MOOCs), which tend to benefit educated learners disproportionately, with around 80% of participants on major platforms already holding tertiary degrees, mainly from wealthier countries. This imbalance stems from variations in digital literacy, internet accessibility, language barriers, and course design. While regional MOOCs strive to address local needs and languages, they may inadvertently contribute to widening inequality in educational opportunities.

In summary, while technology has expanded access to education on a global scale, it also poses challenges in terms of equity and inclusion. Efforts must be made to ensure that technological advancements benefit all learners, regardless of their background or location.

3.1.4. Promoting and Strengthening Learning: The Role of Technology in Education

Technology facilitates and improves learning, which benefits students' academic performance. Some of the ways that technology has enhanced education are through increased engagement, interactivity, and collaboration. Additionally, technology makes the learning environment more engaging and aids in increasing student retention of material. Practical advantages of technology use in education include improved time management and merged learning approaches. Therefore, technology greatly facilitates and improves students' learning.

3.2 Negative Impacts of Technology on Students

Although technology is now a necessary component of modern education, there are drawbacks for students as well. Technology can help with communication and provide easy access to information, but it can also cause distractions and have detrimental psychological effects. Let's take a closer look at the detrimental effects of technology on students.

3.2.1. The Impact of Technology: Debunking Creativity and Motivation in Students

Students who use technology they are, poorly risk, becoming lazy and losing their creative spark. Pupils who constantly use computers or smart phones run the risk of becoming overly dependent on it and failing to come up with original ideas. Technology use has been linked to a decline in students' reading and writing abilities, according to research. Others contend that restricting internet access can hinder students' creativity, despite the fact that some schools have outright banned particular technologies or made an effort to teach responsible use.

3.2.2. Technology's Disconnection from Real-World Learning: A Concern for Students

Students' use of technology can have detrimental effects, such as isolating them from experiential learning. Technology use has been linked to a decline in students' reading and writing abilities, which are critical for effective

communication in the real world. Furthermore, because technology use reduces children's social and behavioral interactions, it can lead to behavioral and social issues in young people. Technology in the classroom has its uses, but it's crucial to make sure that students don't become overly dependent on it and that they continue to acquire the critical thinking and communication skills that are needed for learning in the real world.

3.2.3. Deceptive Disinformation Targeting Students

One of the negative effects of technology on students may be misinformation. Misinformation is false or deceptive information that can lead students astray and interfere with their ability to learn. Because there is so much information available online, it can be challenging for students to discern between factual and false information. This may cause misunderstandings and confusion, which will ultimately harm their academic achievement. Furthermore, students now see education as a commodity rather than as a chance for personal development because digital technology has turned education into a means to an end. Therefore, in order to prevent misinformation from having a detrimental influence on students' learning, educators must teach students how to critically evaluate sources and recognize false information.

3.2.4. The Technological Influence on Students' Mental and Physical Well-Being

Students' physical and mental health may suffer as a result of technology. Overuse of technology can cause physical problems such as eyestrain and trouble focusing on important tasks. It can also lead to behavioral issues, addiction, depression, anxiety, and other mental health issues. Given how much more technology permeates students' lives, it is critical to comprehend how it impacts their mental health. Due to the detrimental effects of technology on students' academic performance and physical health, educators also confront difficulties. To avoid these detrimental effects, it is crucial to monitor and restrict students' use of technology.

3.2.5. Distracting Impact of Technology: A Notable Cause of Diversion

The utilization of smart-phones, laptops, and other electronic devices in classrooms has become increasingly prevalent, but it raises concerns regarding students' focus and learning capacity. According to UNESCO Global Education Monitoring Report Team (2023), student engagement with technology, both in class and at home, poses a significant distraction, disrupting the learning process. Extensive research across 14 nations, encompassing students at various educational levels, suggests a slight negative impact on educational outcomes, particularly noticeable in university settings. Additionally, studies using PISA data indicate an inverse relationship between information and communication technology (ICT) usage and student performance, especially beyond a moderate threshold. Teachers commonly perceive tablets and phones as disruptive to

classroom management, with the 2018 ICILS survey reporting agreement among one-third of teachers across seven countries.

Moreover, online learning places a heavy emphasis on students' self-regulation, potentially leading to disengagement among low-performing and younger learners. The extensive screen time associated with technology use can also have adverse health effects on students. While technology offers opportunities for learning enhancement and increased productivity, it also presents communication difficulties and information accessibility issues.

In light of these challenges, it is crucial for educators and parents to recognize the dual impact of technology on students. While it can enhance learning, engagement, and information retention, an excessive reliance on technology may reduce actual learning time. Striking a balance between leveraging technology for educational improvement and being mindful of its potential drawbacks is essential for fostering effective learning environments.

4. Recommendations and Implications

In today's rapidly evolving educational landscape, technology plays an increasingly integral role in shaping teaching and learning experiences. The advent of digital tools, online resources, and communication platforms has transformed traditional educational practices, offering new opportunities for engagement, collaboration, and access to information. However, along with these opportunities come challenges related to technology integration, digital literacy, and responsible usage. To navigate this complex terrain effectively, educational institutions must develop comprehensive strategies and policies that leverage the benefits of technology while addressing its potential drawbacks. This paper explores key recommendations and implications for educators and policymakers to consider in harnessing the power of technology to enhance student learning outcomes, promote digital citizenship, and create inclusive and engaging learning environments.

4.1. Establish Clear Technology Policies

Educational institutions should develop clear policies regarding the use of technology in classrooms and at home. These policies should address appropriate usage, limitations, and guidelines for integrating technology into teaching and learning activities. By establishing clear boundaries, educators can mitigate distractions and promote responsible technology use among students.

4.2. Provide Professional Development

Teachers require ongoing professional development to effectively integrate technology into their teaching practices. Training sessions, workshops, and resources should be provided to enhance educators' digital literacy skills, pedagogical approaches, and classroom management strategies. By investing in teacher training, institutions can ensure that educators are equipped with the

necessary skills to leverage technology for optimal learning outcomes.

4.3. Foster Digital Citizenship

Educators should prioritize teaching students about digital citizenship, including responsible technology use, online safety, and digital etiquette. Incorporating digital citizenship lessons into the curriculum can empower students to navigate the digital world responsibly and ethically. By promoting digital citizenship, schools can help students develop critical thinking skills and resilience against misinformation and online threats.

4.4. Implement Screen Time Guidelines

Schools should establish guidelines for screen time and device usage to prevent excessive exposure to technology. Balancing technology use with offline activities, physical exercise, and face-to-face interactions is essential for students' overall well-being. Educators and parents should collaborate to monitor and regulate students' screen time, ensuring a healthy balance between digital and offline activities.

4.5. Promote Student Engagement

Technology should be used to enhance student engagement and active learning experiences. Educators should leverage interactive educational tools, multimedia resources, and collaborative platforms to create dynamic learning environments. By incorporating student-centered approaches and inquiry-based learning activities, educators can foster creativity, critical thinking, and problem-solving skills among students.

4.6. Encourage Diverse Content Creation

Educational institutions should prioritize the creation and dissemination of diverse educational content to address disparities in access and representation. Teachers and students should be encouraged to create and share educational resources that reflect diverse perspectives, languages, and cultural backgrounds. By promoting inclusivity and diversity in educational content, schools can empower all learners to succeed in a globalized and interconnected world.

4.7 Foster Collaboration and Communication

Technology should be used to facilitate collaboration and communication among students, teachers, and parents. Educational institutions should leverage digital platforms, online forums, and communication tools to foster meaningful interactions and partnerships within the learning community. By promoting collaboration and communication, schools can create a supportive and inclusive learning environment that encourages active participation and mutual support among all stakeholders.

4.8. Evaluate and Adapt

Continuous evaluation and adaptation of technology integration strategies are essential to address emerging challenges and opportunities in education. Educational institutions should regularly assess the impact of technology on student learning outcomes, engagement levels, and well-being. Based on feedback and data analysis, schools should adapt their technology policies, teaching practices, and resource allocation to meet the evolving needs of students and educators.

By implementing these recommendations and implications, educational institutions can maximize the benefits of technology while mitigating its potential drawbacks, fostering a supportive and inclusive learning environment that empowers all students to thrive in the digital age.

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