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CHALLENGES AND OPPORTUNITIES IN ONLINE LEARNING DURING THE COVID-19 PANDEMIC

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RESEARCH ARTICLE

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Abstract
The COVID-19 pandemic has significantly disrupted global healthcare systems and socioeconomic activities, including education. However, rather than being viewed solely as a period of instability, the crisis has also acted as a catalyst for the rapid adoption of digital technologies. This surge in digital integration has driven a profound transformation within the education sector. This paper explores the extent to which the COVID-19 pandemic has accelerated digital transformation in education. The study draws on theoretical research, encompassing a comprehensive review of literature and formal reports, with a particular focus on higher education's shift toward digitalization during the pandemic. The insights presented aim to guide higher education institutions in reimagining their strategies to address the challenges and opportunities posed by this accelerated digital transformation. Furthermore, the findings may also offer valuable perspectives for startups and established businesses seeking to explore or leverage opportunities within the evolving digital education landscape.

Keywords: *Digital transformation, Digital transformation in education, Education 4.0, Covid-19*

Introduction

COVID-19, also known as SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2), is a novel coronavirus linked to the disease initially identified in Wuhan City, China, toward the end of 2019. The pandemic has triggered widespread disruptions, leading to the physical closure of businesses, sporting events, and educational institutions across the globe. These closures necessitated a swift transition to online platforms, marking a significant shift toward digital transformation. Digital transformation, while not a novel concept, has long been associated with higher education institutions. It encompasses the integration of all digital processes necessary to drive transformation within these institutions, alongside the ability to apply digital technologies effectively and optimally (Adedoyin, & Soykan, 2020). It is essential to distinguish the digitization of higher education institutions from e-learning, as remote learning represents just one aspect of the broader digital transformation process. During the COVID-19 pandemic, two prominent trends have emerged within the education sector: the rapid expansion of remote education and an unprecedented surge in innovations within educational technology. Educators, compelled by the pandemic, have had to explore and adopt remote learning strategies at an unprecedented scale. Although remote learning methods existed before the pandemic, they were infrequently utilized, with most teaching and learning traditionally conducted within physical classroom settings.

Background Study

In the context of higher education, digital transformation can be understood as the collective digital activities required to achieve a comprehensive transformation process, enabling institutions to leverage digital technologies effectively and optimally. The digital transformation of higher education has been previously examined in areas such as digital content creation and lifelong learning. However, the COVID-19 pandemic has accelerated the transition of educational processes to online platforms, particularly after March 2020.

To establish a foundational understanding, it is essential to define key terms related to digital education. Online learning refers to scenarios where the majority of course contents – typically 80% or more – is delivered online. Blended learning, on the other hand, combines face-to-face and online instruction, with 30% to 79% of the program delivered online (McKinsey & Company, 2022). The terms e-learning and digital learning are closely related to online learning, broadly encompassing any educational experience facilitated by digital tools and technologies.

The rapid shift to digital modalities has necessitated the reorganization of teaching and learning processes within an online environment. This raises an essential question: What specific changes are required to ensure the effectiveness and efficiency of teaching and learning in this new paradigm?

What is Digital Transformation?

Digital transformation refers to the profound shift in how an organization leverages technology, moving from a traditional support function to embedding technology into every aspect of its operations and strategy. This process fundamentally redefines business practices, enhances operational efficiency, and transforms how value is delivered to customers, stakeholders, and society. Unlike business process re-engineering – which focuses on streamlining and automating existing workflows – digital transformation is centered on rethinking and redesigning organizational models, processes, and interactions to embrace innovation and adaptability.

At its core, digital transformation is driven by the convergence of emerging technologies that enable organizations to innovate, optimize, and remain competitive. These technologies include:

- **Social media**
  Facilitates communication, brand engagement, and data-driven marketing strategies.
- **Internet of Things (IoT)**
  Connects devices and sensors to gather real-time data, driving automation and improved decision-making.
- **Big Data and Analytics**
  Provides insights into consumer behavior, operational inefficiencies, and market trends through advanced data analysis.
- **Cloud Computing**
  Offers scalable and cost-effective platforms for data storage, collaboration, and application hosting.
- **Artificial Intelligence (AI) and Machine Learning**
  Powers predictive analytics, intelligent automation, and personalized customer experiences.
- **Blockchain**
  Enhances transparency, security, and traceability in processes such as supply chain management and digital transactions.
- **Cybersecurity**
  Safeguards data, systems, and networks from evolving threats, ensuring trust and operational continuity.
- **Robotic Process Automation (RPA)**
  Automates repetitive tasks, freeing up human resources for higher-value activities.
- **Quantum Computing**
  Introduces unprecedented computational power, enabling breakthroughs in optimization and complex problem-solving.

These technologies collectively act as enablers, transforming industries, reshaping global value chains, and fostering innovation (Bloomberg, 2021). The widespread adoption of digital technologies has also led to significant shifts in workforce demands, requiring new skills and competencies. This paradigm shift has brought about the Fourth Industrial Revolution (4IR), also known as Industry 4.0 – a period characterized by the fusion of physical, digital, and biological systems.

Digital transformation is not merely a technological upgrade; it represents a strategic and cultural change. Organizations must adopt a mindset of continuous improvement and innovation to fully harness the potential of these technologies, ensuring they remain resilient and competitive in a rapidly evolving global landscape.

What Does Digital Transformation Mean for the Higher Education Sector?

The higher education sector has undergone significant transformations in recent decades, with the adoption of the Fourth Industrial Revolution (4IR) marking a pivotal shift. This movement, often referred to as Education 4.0, represents the sector's unique journey toward digital transformation.

The COVID-19 pandemic has acted as a powerful catalyst, accelerating the pace of digital transformation in higher education. Since March 2020, universities and colleges have been rapidly adopting new pedagogical approaches, including synchronous and asynchronous lectures, online learning communities, and virtual assessments. Institutions have also increasingly relied on data analytics to monitor and enhance student engagement. While much of this transformation was driven by necessity rather than choice, it has nonetheless yielded significant benefits (Schallmo, et al., 2017). For instance, digital transformation has expanded participation, improved access to education for underserved populations, and better prepared students for navigating the complexities and uncertainties of a rapidly changing world.

However, genuine digital transformation in higher education goes beyond merely transitioning from traditional to online methods. For example, shifting from paper-based to computer-based exams, while valuable, represents only a superficial change. True digital transformation occurs when institutions fundamentally reimagine their processes and leverage technology to create more robust, efficient, and future-ready systems.

Consider assessments as an example

- **Authentication**
  Utilizing biometrics and AI to verify the identity of exam candidates ensures integrity and security.
- **Data-Driven Improvement**
  Analyzing data from online assessments allows institutions to refine future exams and address performance gaps.
- **Advanced Exam Tools**
  Incorporating features such as question randomization, algorithm-based optimization of question mixes, prohibition of backtracking, browser search prevention, and remote proctoring ensures exam rigor and fairness.

These innovations highlight the transformative potential of technology to not only digitize existing processes but to fundamentally restructure them in alignment with future demands. Importantly, digital transformation is not limited to technological upgrades – it also requires a cultural shift within institutions. Universities must cultivate an environment that embraces continuous innovation, adaptability, and resilience to meet the evolving needs of students, educators, and society.

In essence, digital transformation in higher education signifies a comprehensive overhaul of traditional systems and practices. It is about leveraging technology to create a dynamic and inclusive learning ecosystem that prepares students to thrive in a world increasingly shaped by digital advancements and global challenges.

Technologies and Trends in Education

In response to the unprecedented challenges posed by the COVID-19 pandemic, countries worldwide were compelled to develop and implement educational continuity plans rapidly. These plans were designed to maintain the pedagogical connection between students and instructors during temporary school closures (Yulia, 2020). The primary objectives were twofold: to help students retain existing knowledge and to facilitate the acquisition of new knowledge.

However, ensuring educational continuity was not without challenges. Key barriers included maintaining socio-emotional support, understanding and effectively utilizing technological tools, ensuring access to reliable internet connectivity, and providing suitable computer equipment. These obstacles underscored the disparities in digital access and preparedness among nations. According to the Organization for Economic Cooperation and Development (OECD), 95% of students in Austria, Norway, and Switzerland had access to a computer for their coursework, compared to only 34% of students in Indonesia.

To address these challenges, higher education institutions increasingly relied on various programs, platforms, and instructional tools for synchronous and asynchronous distance learning. The following technologies and trends have become integral to the education landscape:

- **Digital Learning Management Systems (LMS)**
  Platforms like MOODLE exemplify robust digital learning management systems. MOODLE is an internationally supported open-source platform with over 60 partners across regions such as Asia-Pacific, Europe, the UK, the Americas, and Africa. These platforms enable the creation, delivery, and management of online courses, facilitating seamless communication and resource sharing between educators and learners.
- **Massive Open Online Courses (MOOCs)**
  MOOCs offer access to a wide variety of subjects, including engineering, medicine, economics, arts, and culture. During the COVID-19 pandemic, around 200 higher education courses were made available globally at no cost. These platforms have democratized education by offering high-quality content to learners irrespective of geographical or financial constraints.
- **Self-Directed Learning Content**
  Platforms like Khan Academy provide interactive and self-paced learning resources. Since its inception in 2008, Khan Academy has offered thousands of courses across various scientific disciplines. During the pandemic, it became a vital resource for students worldwide, helping them continue their education independently.
- **Collaboration and Communication Tools**
  Tools such as Google Meet, Microsoft Teams, and Zoom have played a pivotal role in maintaining real-time interaction between educators and students.
- Google Meet: Offers secure video conferencing integrated with Google Workspace.
- Microsoft Teams: Combines chat, video, and collaborative features, including document sharing and teamwork tools.
- Zoom: Provides web-based video and audio conferencing, collaboration, chat, and webinar capabilities.

These platforms have enabled institutions to foster interactive and engaging online learning environments despite physical distance. The pandemic has not only accelerated the adoption of these tools but also highlighted the importance of leveraging technology to overcome traditional barriers in education.

Impressions of the Virtual Classroom in Higher Education

One key factor for the success of distance education during the COVID-19 pandemic has been the ability to maintain an active connection between students and professors, as well as fostering engagement among students themselves. Recent studies have

shown that interaction levels in virtual classrooms are significantly higher, particularly in synchronous learning environments. Many educators have observed that distance learning can also help reduce absenteeism, as students feel less hesitant to participate and ask questions compared to traditional face-to-face settings.

However, some teaching formats – particularly those involving practical work, hands-on projects, and specialized laboratory equipment – do not lend themselves well to virtual learning. In these cases, the level of human interaction and engagement that occurs in a physical classroom is difficult, if not impossible, to replicate in a digital space.

Despite these limitations, several scholars argue that virtual education, when implemented effectively, has considerable potential. They emphasize the need for innovative teaching methodologies that engage students fully and help them achieve key pedagogical goals, such as successful learning and the acquisition of essential skills. In a virtual environment, instructors must invest considerable time and effort to design dynamic and interactive online courses that can compensate for the absence of in-person engagement.

In conclusion, while distance education is not a new concept and has been used by many prestigious institutions worldwide for years, the extent to which institutions are leveraging collaborative digital platforms and online resources for both synchronous and asynchronous learning has significantly expanded due to the pandemic. The ongoing challenge remains how to keep students motivated and engaged while delivering high-quality education remotely.

Overview of Some Digital Tools Used for Conducting Remote Teaching

Collaborative platforms such as Google Meet, Microsoft Teams, and Zoom, which were originally developed for commercial purposes, have seen significant adoption in the realm of higher education, particularly in the context of the ongoing digital transformation. These platforms have proven to be valuable tools for maintaining connectivity and facilitating remote learning during the COVID-19 pandemic and beyond.

- Microsoft Teams is a highly customizable collaborative platform designed for team communication and productivity. It integrates a variety of features, including video conferencing, scheduling meetings through Microsoft Outlook, and sharing contacts and emails. Teams also enables file storage and transfer via SharePoint, as well as note-taking through OneNote. Its versatility has made it an essential tool for higher education institutions, enabling educators to conduct virtual classes, share resources, and collaborate with students in real-time.
- Zoom, on the other hand, is a widely used teleconferencing tool that combines video conferencing, online meetings, chat, and mobile collaboration. It is particularly well-suited for online teaching due to its ability to create virtual classrooms that can accommodate large groups of participants. Key features include the ability to record video conferences and chats, allowing students to review sessions at their own pace, as well as interactive tools like audio and chat communication, screen sharing, content sharing, and even real-time co-teaching. These features provide a rich and flexible environment for both synchronous and asynchronous learning.
- During the COVID-19 pandemic, Zoom experienced a dramatic surge in usage, with universities around the world, including prestigious institutions like Stanford, Princeton, and Harvard, turning to the platform due to its ease of use and accessibility. The simplicity and user-friendliness of Zoom made it particularly appealing for institutions that needed to quickly transition to online learning.

When selecting digital tools for remote teaching, several factors need to be considered to ensure the success of the learning experience. These include:

- Efficiency: How well does the tool facilitate teaching and learning processes?
- Quality of Service: Does the platform provide a seamless and uninterrupted experience for both instructors and students?
- Data Security: Is the platform secure enough to protect sensitive information, especially when dealing with student data?
- User Ergonomics: Is the platform easy to use for both educators and students, minimizing the learning curve?
- Cost: What are the financial implications of using the platform, particularly for institutions with limited resources?

By carefully evaluating these factors, institutions can select the most appropriate tools for their specific needs, ensuring effective and efficient remote learning experiences.

Literature Review

The use of digital tools for distance learning has raised several important questions, particularly regarding their effectiveness, accessibility, and impact on student engagement and performance. A study seeks to address these questions and proposes a comprehensive approach to remote knowledge acquisition and assessment. This approach is structured around four key phases, each designed to ensure the smooth transition and successful implementation of distance learning.

Phase 1: Student Preparation for Distance Learning

The first phase involves preparing students for remote learning by ensuring that they have access to a range of collaborative platforms and online tools. These may include platforms like Microsoft Teams and Zoom, as well as cloud-based storage services such as Google Drive and other study-related applications. Providing students with the necessary resources is crucial for ensuring

they can participate in the learning process effectively. Additionally, orientation and training on how to use these tools can help minimize technological barriers and increase student confidence in navigating the digital environment.

Phase 2: The Learning Phase

The second phase focuses on the core of the educational process – learning. During this phase, students are expected to acquire knowledge, develop new skills, and build on their existing achievements. This phase typically involves a mix of synchronous and asynchronous activities, allowing for flexibility in how students engage with the material. Whether through live lectures, pre-recorded videos, collaborative projects, or interactive learning modules, the goal is to facilitate meaningful learning experiences that align with course objectives.

Phase 3: Knowledge and Skill Assessment

In the third phase, students are assessed on their understanding and proficiency of the material. This phase often includes synchronous knowledge exams, where students can demonstrate their grasp of the subject matter in real-time. The assessment may take various forms, including quizzes, exams, and project-based evaluations, with digital tools enabling efficient grading and feedback. In the context of remote learning, it is essential to ensure that assessments are secure, reliable, and reflective of students' true abilities.

Phase 4: Online Satisfaction Surveys

The final phase involves gathering feedback from students about their remote learning experience. Online satisfaction surveys are used to assess students' perceptions of the distance learning process, including their satisfaction with the technology, the quality of the learning materials, and the overall educational experience. This feedback can provide valuable insights for improving future online courses and addressing any challenges faced by students during the learning process.

By dividing the distance learning process into these phases, the study emphasizes the importance of a structured and well-planned approach to online education. The successful implementation of digital tools and resources at each phase ensures that students remain engaged, supported, and effectively assessed in a virtual environment.

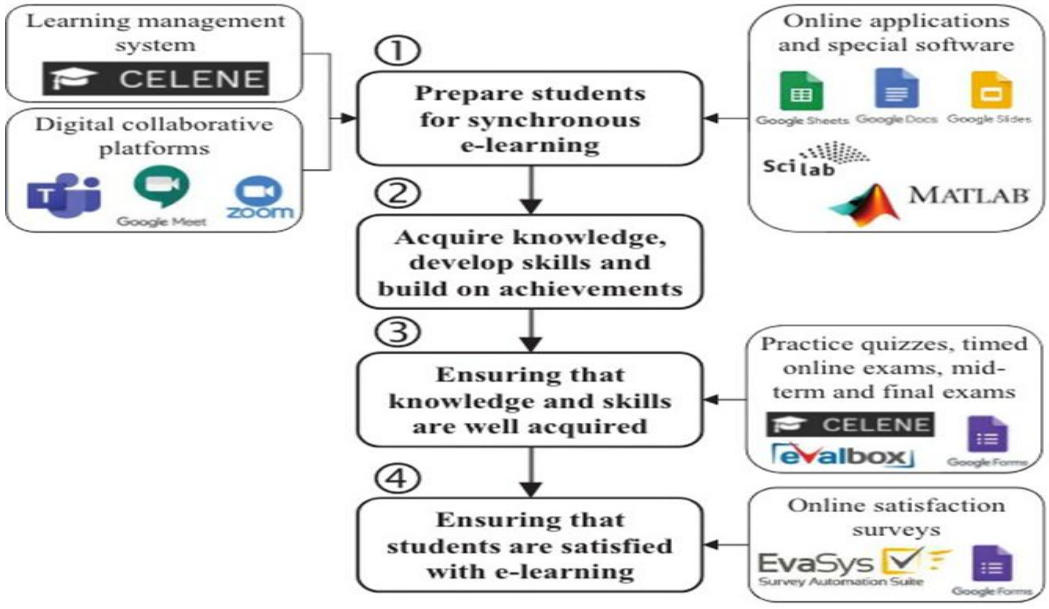

Figure 1: Proposed method for the distance acquisition and evaluation of knowledge

According to a study by, a significant paradigm shift has occurred in university education following several months of online learning experiences due to the COVID-19 pandemic. Even after the peak of the pandemic, online education has gained substantial prominence and is expected to continue evolving as a primary mode of instruction. This research highlights the widespread use of a variety of technological tools and platforms to support online learning, including web-based learning platforms, video conferencing tools, Massive Open Online Courses (MOOCs), streaming conferences, instant messaging applications, and educational apps. The rapid transition to online learning, although necessary in the wake of the pandemic, presented several challenges for the key stakeholders in the learning process – students, instructors, and institutions.

The study notes that the quick shift to online education posed significant hurdles, particularly since it was driven by external circumstances rather than a planned transition. Universities were compelled to adapt swiftly, and in doing so, faced challenges related to technology infrastructure, digital literacy, and the development of effective online teaching strategies. The research suggests that to successfully address these challenges, universities need to be aware of the obstacles and dedicate resources to overcoming them. Specifically, there is a need for targeted efforts to digitalize learning processes, as well as provide adequate technical training for faculty, administrative staff, and students. To enhance students' learning experiences and meet their

expectations in the digital era, the study emphasizes that universities should adopt a blended learning approach, combining face-to-face and online learning.

Further insights into the barriers and opportunities presented by digital transformation in education are provided by the research in, which offers a detailed examination of the obstacles and the agents driving the accelerated digital transformation in education. This study presents a framework for understanding the rapid pace of digital transformation, offering a clearer view of what constitutes digital transformation and how institutions can manage such transitions effectively. The research identifies four key types of digital transformation agents that play a crucial role in this process. It also discusses various limitations and provides several recommendations for overcoming them, including the urgent need for ongoing research and development in digital technologies. Additionally, the study advocates for the design of well-being-based systems that prioritize the needs of individuals and organizations, thereby facilitating the swift and successful adoption of digital transformation.

Together, these studies illustrate the complexity of the digital transformation process in higher education. They underscore the need for universities to not only adopt digital tools but also invest in the infrastructure, training, and strategies required to support a sustainable and inclusive online learning environment. Moreover, they emphasize the importance of a thoughtful, well-managed transition that can enhance the overall learning experience for students while addressing the technological and pedagogical challenges faced by educators.

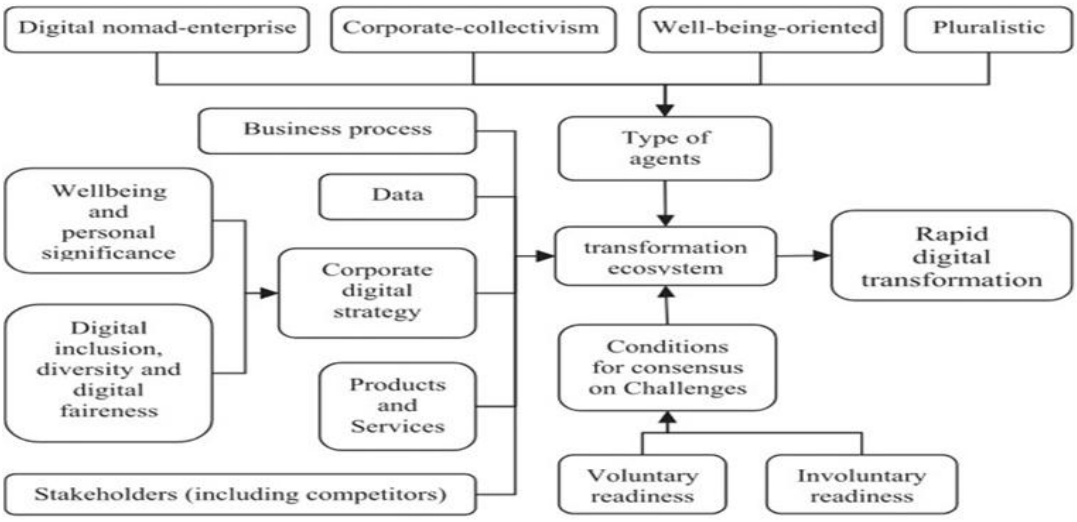

Figure 2: Framework for understanding rapid digital transformation

A secondary research study conducted by investigated the influence of the COVID-19 pandemic on the digital transformation of the education sector, focusing on the adoption of Fourth Industrial Revolution (4IR) technologies during the lockdown phase. The study found that the education sector in South Africa quickly embraced a variety of 4IR technologies, ranging from basic to advanced applications, across all levels of education – primary, secondary, and tertiary. The pandemic and subsequent lockdown served as a catalyst for the development of virtual learning environments, the widespread use of educational apps and websites, and a significant shift toward remote learning. Additionally, the study noted a surge in data traffic between 35 and 60 percent in South Africa's local networks shortly after the lockdown was implemented, indicating a dramatic increase in online activity and digital tool usage within the education sector.

The digital preparedness of the Saudi Arabian education system was examined in a study by, which highlighted the country's long-standing commitment to e-learning initiatives. Saudi Arabia had already established a national school e-learning platform by 2002, well before the onset of the pandemic. The platform provided tailored electronic lessons, and the country's e-learning efforts were continually expanded through collaborations with international partners. In 2017, the establishment of the National Centre for e-Learning by the Ministry of Education (MOE) further reinforced the country's digital transformation in education as part of its Vision 2030 initiative.

By the time COVID-19 struck, Saudi Arabia had already developed a robust e-learning infrastructure across both public and private sectors. The country quickly leveraged its existing resources to support remote learning. Universities conducted webinars and training sessions to enhance faculty members' capabilities in e-learning and digital pedagogy. During one such webinar, the potential of e-learning to improve web-based question banks, enhance electronic resources, foster greater faculty involvement, and reduce operational costs was discussed. The Minister of Education even suggested that remote learning would become a permanent feature of Saudi Arabia's educational system, positioning it as a key component of the future educational landscape in the Kingdom.

Further findings from a survey study on the digital transformation resulting from COVID-19 indicated that, while the transition was not without challenges, a significant number of students (about half) expressed a preference for online education and

expressed their willingness to continue it in the future. The study noted that many students appreciated the flexibility and accessibility that online learning provided, although challenges such as technical issues and a lack of face-to-face interaction remained obstacles to fully embracing this mode of education.

In conclusion, the rapid transition to digital platforms in response to the COVID-19 pandemic highlighted both the opportunities and challenges of digital transformation in the educational sector. While some countries, like South Africa, adapted quickly to new technologies, others, like Saudi Arabia, were already well-prepared due to their ongoing e-learning initiatives. The studies underscore the importance of ongoing infrastructure investment, faculty training, and student support to ensure the continued success of digital education. Moreover, as demonstrated by the survey in, despite the obstacles, the shift to online learning has garnered significant student support, suggesting that online education may remain a preferred option for many in the post-pandemic world.

What's Next?

The COVID-19 pandemic has compelled higher education institutions to rethink and reshape their entire learning environments. While the future of Education 4.0 remains uncertain, it is clear that a fully digitally transformed and futuristic higher education system will likely incorporate several emerging technologies. Below are key technologies that are expected to shape the next phase of education:

- **Chatbots**
  Many universities have already started implementing chatbots to assist with answering the high volume of student queries, particularly during peak enrolment periods. These chatbots direct students to the appropriate departments or web pages and even offer library assistance services. However, if chatbot technology evolves beyond administrative support, it could be used for more educational purposes, such as assisting students with reflective learning or personalized study guidance. The expansion of chatbot functionalities could transform how students interact with educational content, creating more dynamic and responsive learning environments.
- **Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR)**
  AR, VR, and MR are all rapidly advancing fields that are poised to revolutionize the educational landscape. Augmented Reality (AR) enhances the physical world by overlaying digital information in real-time via devices like smartphones or laptops. Virtual Reality (VR) provides a more immersive experience, allowing users to fully interact with a digital, 3D environment through specialized headsets [30]. Mixed Reality (MR) blends both AR and VR, allowing users to interact with both the digital world and real-world elements simultaneously. The AR/VR industry is predicted to grow by over USD 125 billion by 2024, with potential applications in education that range from enriching case studies to replicating real-world job scenarios for hands-on assessments. These technologies could also foster creative and introspective learning by immersing students in simulated environments, improving their problem-solving and decision-making skills.
- **Smart Classrooms and Smart Campuses**
  A smart classroom is a digitally equipped learning environment that incorporates various technologies to support diverse teaching methods. These classrooms are typically furnished with computers, specialized software, assistive listening devices, AR/VR tools, audience response systems for engaging students, and learning analytics to identify areas where students may need more support. Additionally, smart classrooms can use technology to monitor mental health concerns and learning disabilities. Going a step further, a smart campus integrates digital technologies across campus services to enhance both the educational experience and operational efficiency. For instance, AI might be used to optimize resource allocation, such as identifying underused study spaces, or improving cafeteria offerings based on consumption data. A smart campus may even employ sensors to monitor noise levels, recommending quiet zones for students to focus. The potential applications of smart technologies in higher education are vast, with opportunities to create more personalized, efficient, and responsive learning environments.

Conclusion

In conclusion, the higher education sector has made significant strides in its digital transformation, yet much work remains ahead. The need for adaptability in the adoption of digital technologies is crucial, as the sector navigates an evolving educational landscape. A proactive, forward-thinking digital strategy, which integrates a range of well-adapted technologies, holds the potential to revolutionize education by enhancing teaching, learning, and assessment experiences. This strategy can also foster greater collaboration and research opportunities. The growth of distance education is inevitable, with blended learning emerging as a promising model. This approach offers numerous opportunities, providing the flexibility necessary for the future of higher education. As digital transformation continues, it is clear that blended learning will play a pivotal role in shaping the educational experiences of tomorrow.

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References

1. Adedoyin, O. B., & Soykan, E. (2020). Covid-19 pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments, 31*(3):1-13. DOI:10.1080/10494820.2020.1813180
2. Bloomberg. (2021, February 2). $125 billion growth in global augmented reality (AR) and virtual reality (VR) market 2020–2024. Bloomberg. https://www.bloomberg.com/press-releases/2021-02-02/-125-billion-growth-in-global-augmented-reality-ar-and-virtual-reality-vr-market-2020-2024-apac-to-emerge-as-major-market
3. McKinsey & Company. (2022, May 15). Enabling seamless lifelong learning journeys—the next frontier of digital education. McKinsey & Company. https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/enabling-seamless-lifelong-learning-journeys-the-next-frontier-of-digital-education
4. Schallmo, D., Williams, C., & Boardman, L. (2017). Digital transformation of business models—Best practice, enablers, and roadmap. *International Journal of Innovation Management, 21*(6), 1740014. https://doi.org/10.1142/S136391961740014X
5. Yulia, H. (2020). Online learning to prevent the spread of pandemic corona virus in Indonesia. ETERNAL: English Teaching Journal, 11(1). https://doi.org/10.26877/eternal.v11i1.6068