

Article

Digital Transformation Blueprint in Higher Education: A Case Study of PSU

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Abstract: Digital transformation is a rapidly growing trend that has captured the attention of institutions and stakeholders worldwide. This phenomenon has become a top priority for higher education institutions, as universities play a critical role in the development and empowerment of societies. To address this pressing need, this paper proposes the establishment of a sustainable digital transformation environment based on the best national and international practices and recommendations. The goal of this proposal is to overcome the challenges faced by universities and provide the most convenient mechanisms to achieve their duties. Furthermore, this proposal aims to be a successful part of achieving Saudi Arabia Kingdom's Vision 2030, which seeks to revolutionize the education and scientific research system. By adopting this proposed approach, universities in Saudi Arabia can proactively anticipate and address emerging trends and thereby ensure that they are offering the highest quality education to their students. Digital transformation is a crucial trend that cannot be ignored. By embracing this trend and implementing sustainable digital transformation environments, universities can ensure that they are providing the best possible education to their students and contributing to the development and empowerment of societies.

Keywords: higher education; digital education; digital transformation; technology; teaching and learning



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1. Introduction

Improving higher education in several aspects plays a crucial role in sustainable development. It is considered one of the national issues in light of global growth such as the 4th industrial technological revolution and its smart applications [1]. Digital transformation has become a buzzword in all aspects of life and in particular digitizing higher education in terms of teaching, scientific research, management of resources, etc. [2]. Digitizing higher education is an urgent need to cope with the digital age that the whole world is living in nowadays. Higher education institutions must adapt as technology develops to stay competitive and pertinent [3]. Integrating digital technology into every step of the educational process is known as “digital transformation” in higher education. This includes utilizing cloud-based services, digital classroom tools, and online learning networks.

Increased accessibility is one of the key advantages of digital change in higher education [4]. Online course materials are now available to students who are unable to attend conventional classes due to distance or other commitments. People who previously might not have been able to seek higher education now have more options thanks to this. Personalizing learning is an advantage of digital transformation as well. Teachers can now more accurately understand each student's unique learning requirements thanks to data analytics and learning algorithms, and they can adapt their instruction accordingly. Students benefit from a more effective and efficient learning environment as a consequence.

Additionally, the digital transformation of higher education enables improved student-faculty collaboration and contact [5]. The ability to collaborate on group projects and

assignments with instructors and other students remotely is made possible by online tools and platforms. Digital platforms make it simple for professors to exchange assignments and course materials, which reduces the need for physical classroom resources [6].

However, there are also difficulties with higher education's digital transition. Institutions must make sure that the personal data of students are safe on their digital systems [7]. Additionally, they must make costly investments in the gear, software, and infrastructure required to support digital learning [8]. Furthermore, as a result of digital transformation, people may occasionally become overly dependent on technology, which could harm interpersonal and communication abilities that are crucial for successful learning. Despite these challenges, higher education institutions must embrace digital transformation to remain competitive and ensure that their students are equipped with the skills and knowledge needed for the modern workforce [9]. With the right investments and strategies in place, digital transformation can bring numerous benefits to both students and faculty.

The main contribution of this paper is drawing a framework for a sustainable digital transformation environment that aims to build a comprehensive and flexible framework for universities by addressing these critical components. This will help the institution as a whole get closer to the kingdom's vision 2030 goals, especially in the areas of education and research. Alignment with the institution's strategic goals may be achieved through the establishment of explicit regulations and procedures governing the implementation of digital transformation efforts [10]. Policies regarding the privacy and security of user data, protection of original works, and principles for the responsible application of technology in academia all fall under this umbrella. It is crucial to establish a system of ongoing monitoring and assessment to track the progress of digital transformation initiatives and assess their impact on pedagogical and scholarly outcomes. This will allow for more data-driven decision-making and the flexibility for institutions to fine-tune their plans for the long haul.

2. Digital Transformation

Higher education institutions must now undergo digital transformation in order to keep up with the trends. It entails integrating new technology as well as changing company models, processes, and operational procedures [11]. The creation of new educational approaches and the improvement of current ones are key components of higher education institutions' digital transformation. By utilizing online resources and streamlining the learning process, e-learning was initially used to improve the quality of learning [11]. With more effective administrative procedures, digital transformation can also aid organizations in time and money savings.

Digital transformation has become a necessity for higher education institutions to keep up with the changing times. It involves the incorporation of new technologies and the transformation of practices, business models, and processes [11]. Digital transformation in higher education institutions is about the development of new pedagogical approaches and the enhancement of existing ones. E-learning was originally adopted to increase the quality of learning by using online tools and simplifying the learning process [11]. Digital transformation can also help institutions save time and cost through more efficient administrative processes.

Digital transformation has disrupted many industries, and education is no exception. Digital transformation in higher education refers to the integration of technology into traditional teaching and learning practices to enhance the overall educational experience. In this article, we will explore the concept of digital transformation in higher education, its importance, the tools and technologies being used, the success stories of institutions embracing digital transformation, and the benefits and challenges of implementing it.

By evaluating the digital maturity of the institutes, one may determine the current institutional levels of digital transformation. Using a framework, Rodriguez-Abitia et al. [12] suggested evaluating the digital maturity of higher education institutions. Each educational institution's digital maturity can be assessed by looking at its information technology

infrastructure, namely the digital tools utilized in classrooms, labs, and for administrative tasks [11]. The framework also outlines the difficulties higher education institutions confront as they try to transform themselves digitally [11].

To achieve digital transformation, higher education institutions need to pick a direction and start small [12]. Common goals specific to digital transformation for higher education include aggregating all institutional data under one system, improving student engagement, and enhancing teaching and learning resources [12]. Institutions must ensure that all stakeholders are prepared to embrace the necessary change [13]. The main five components or steps of the Digital Transformation framework in online education are as follows: (1) Digital Strategy, (2) Digital Culture, (3) Digital Organization, (4) Digital Technology, and (5) Digital Competence. The framework can help institutions create a roadmap for digital transformation in higher education [14].

3. Methodology

In this work, we use Design-Based Research (DBR) as our research methodology [15]. DBR is an iterative and collaborative research approach that aims to solve real-world problems through the design, implementation, and evaluation of interventions. DBR is particularly suitable for complex problems that require a deep understanding of context and a flexible and adaptive approach to intervention design. In the context of higher education, DBR can be used to address a range of issues related to digital transformation, such as improving student engagement, enhancing learning outcomes, and promoting equity and inclusion.

The DBR process typically involves a close collaboration between researchers and practitioners, such as faculty members, instructional designers, and IT professionals [16]. This collaboration allows researchers to gain a deep understanding of the context and to develop interventions that are practical and feasible to implement. The iterative nature of DBR also allows for continuous improvement and refinement of the intervention based on feedback from stakeholders and ongoing evaluation. As such, DBR can lead to the development of innovative and effective solutions to complex problems in higher education.

One of the key strengths of DBR is its ability to generate both theoretical and practical knowledge. DBR studies typically involve the development of theories about the phenomenon being studied, such as the relationship between digital tools and student engagement. These theories are then tested and refined through the design and evaluation of the intervention. The practical knowledge generated through DBR can also be useful for practitioners who are seeking to implement similar interventions in their own contexts. As such, DBR can contribute to both the advancement of knowledge in the field of higher education and the improvement of practice in real-world settings.

Digital transformation in higher education is more than the simple vision of migrating paper records to a PC device or utilizing technologies to perform daily operations faster and more efficiently. Digital transformation is a series of cultural, working manpower, and technological transformations that enable new educational and operational models that direct the university strategies to add value across the entire institute [17,18]. A successful transformation needs innovative leadership at different levels and real cooperation between all university units.

A universal solution for developing a prosperous digital university does not exist [19]. However, several crucial strategies are setting the digital goal and producing outcomes. This type of engagement requires re-imagining and streamlining services, enabling richer and deeper conversations, and swiftly identifying emerging needs while anticipating the expectations of your students and employees.

The digital transformation in higher education requires a strategic plan at the university level to design, and implement the integrated systems to provide analyzed data for the decision-makers at the right time. Digital transformation is not a project or initiative, but it must be a sustainable culture that exploits digital techniques and tools to empower the university in achieving its strategic goals.

3.1. Digital Transformation Phases

This section discusses the phases needed for a digital transformation revolution to happen in the higher education context:

- Disseminate the culture of digital transformation [20]: By exposing the importance and benefits of being a digitized university for all parties and beneficiaries.
- Seeking encouragement and support [21]: By seeking moral and financial support from the leadership of the university and all its employees.
- Identifying the requirements for digital transformation: These range from the infrastructure to the empowered employees and legislative aspects of digital transformation towards a digitized university.
- Conducting local and international benchmarking: By reviewing the models and the results of successfully transformed universities. To overcome their challenges and get benefits of the gain opportunities.
- Updating the university vision, mission, goals, and objectives: By adopting the digital transformation strategy. The strategy will translate these visions toward smart digital universities, where the missions will be operated by experts to achieve the goals and objectives behind this strategy.
- Identify the beneficiaries of the digital transformation strategy: Who are these beneficiaries and what is their participation in the implementation? Students, alumni, board members, employers, faculty, and administrators are just a few of the groups that stand to gain greatly from higher education's digital transformation [22]. Higher education institutions can develop a culture of innovation and cooperation that enhances learning outcomes for all participants by involving all stakeholders in the execution of the digital transformation strategy.
- Develop an operational plan: This includes goals, objectives, activities, processes and technical resources, and funding sources that are needed in addition to the time frames.
- Finally, Develop mechanisms and criteria for following up and evaluating the execution plans and milestones: By identifying criteria and indicators to assess the progress and evaluating the process of transformation by the formulated team. Giving periodic feedback until completing the last step in the transformation of the determined university functionalities and services.

3.2. Best Practices

Digital transformation has rapidly changed the landscape of higher education in recent years. However, the implementation process can be daunting without proper planning and implementation strategies. The following best practices (Figure 1) can help colleges and universities effectively implement digital transformation initiatives:

- Engage with Stakeholders Early On: It is important to involve stakeholders early on in the planning process. This includes students, faculty members, staff, and other key decision-makers. Conducting surveys, focus groups, and town hall meetings can help gather valuable insights and feedback on digital transformation efforts. Engaging stakeholders early on can also help build momentum and support for the initiative.
- Ensure Adequate Training and Support for Faculty and Staff: Many faculty and staff members may not be familiar with the latest digital tools and technologies. Therefore, it is crucial to provide adequate training and support to ensure they can effectively utilize these resources. Institutions can offer workshops, online training resources, and coaching sessions to help faculty and staff improve their digital skills.
- Develop a Comprehensive Digital Transformation Plan: A comprehensive digital transformation plan can help institutions navigate the complex implementation process. This plan should outline the institution's goals, identify the necessary resources and budget, and establish a timeline for implementation. By creating a comprehensive plan, institutions can ensure that digital transformation efforts are aligned with their strategic objectives and that all stakeholders are on the same page.



Figure 1. Best Practices for Implementing DT.

3.3. Integration of Technologies

Digital transformation in higher education refers to the integration of technology into various aspects of the higher education system, including teaching, learning, research, administration, and student services. The goal of digital transformation is to enhance the quality and efficiency of higher education by leveraging technology to improve the student experience, increase access to education, and support academic research.

Some examples of digital transformation in higher education include:

- **Online learning platforms:** The use of online learning platforms such as Blackboard, Canvas, and Moodle has become increasingly popular in higher education. These platforms allow students to access course materials and assignments online, interact with their peers and instructors, and participate in discussions and collaborative projects.
- **Online and blended learning:** Digital transformation has enabled the rise of online learning and blended learning, where students can access course materials and lectures remotely. This has increased access to education for students who may not have been able to attend classes in person due to geographic or other constraints. It has also allowed for greater flexibility in scheduling for both students and instructors.
- **Personalized learning:** With the help of data analytics and learning management systems, digital transformation has made it possible to personalize the learning experience for each student. This includes adaptive learning, which tailors the content and pace of instruction based on the student's progress and learning style.
- **Virtual and augmented reality:** Virtual and augmented reality technologies are increasingly being used in higher education to create immersive learning experiences. For example, medical students can use virtual reality to simulate surgical procedures, while architecture students can use augmented reality to visualize building designs.
- **Data analytics:** Higher education institutions are using data analytics to track student performance, identify areas for improvement, and personalize the learning experience. This data can also be used to support research and inform decision-making at the institutional level.
- **Digital libraries and archives:** Many universities and colleges are digitizing their collections of books, manuscripts, and other materials, making them available to students and researchers online. This allows for greater accessibility and preservation of these important resources.
- **Collaboration and communication:** Digital technologies have made it easier for students and instructors to collaborate and communicate, regardless of their location. This includes tools like video conferencing, instant messaging, and collaborative workspaces, which can support group projects and discussions.

- **Research and innovation:** Digital transformation has created new opportunities for research and innovation in higher education. For example, data analytics can be used to identify new research areas or potential collaborations, while virtual and augmented reality can be used to create new tools for research and discovery.
- **Administrative efficiency:** Digital transformation has also improved administrative efficiency in higher education. This includes using digital tools for tasks like enrollment management, financial aid, and scheduling, which can reduce paperwork and streamline processes.

Digital transformation in higher education has the potential to revolutionize the way we teach and learn, making education more accessible, efficient, and personalized. Digital transformation in higher education has the potential to improve the quality and accessibility of education, enable new forms of research and innovation, and increase administrative efficiency. However, it also requires careful planning and implementation to ensure that it is effective and equitable for all students and stakeholders.

4. Proposed Model

Universities have led numerous initiatives to investigate novel digital technologies to improve students' learning experiences, particularly in the information era. Critical business processes that have an impact on the product portfolio, the delivery itself, integration, and corporate structure must be transformed to achieve this [23]. A combination of technical and cultural transformation is necessary for universities. It's difficult to guide the shift to a digital society. The implementation of a digital transformation strategy has changed not only how universities offer their curricula, but also how students think about themselves as demanding a globalized education [14]. Alenezi [24], Addressed the situation of the growth progress of the digital transformation in universities in the Kingdom of Saudi Arabia. The study summarized the most barriers to developing and conducting digital transformation at a sample of KSA universities. These challenges are collected from the studied universities' academic leaders. 161 surveys are collected and analyzed during this study. The results show that the KSA universities are facing high challenges in achieving digital transformation and the progress, in general, could be considered as in the middle rank.

Digital transformation enables higher education institutions to enhance learning experiences, streamline operations, and gain data-driven insights. To achieve digital transformation, universities must modify critical processes that impact their educational offerings, delivery methods, integration of platforms, and organizational structures [9,14]. Both technological and cultural changes are required for a successful digital transformation in higher education.

A model for digital transformation in higher education involves the integration of applications and data, sustainable software architecture, and essential systems and components. Application integration connects platforms to provide a seamless user experience and minimize manual workflows. It enables a single sign-on for students, faculty, and staff to access all systems. Data integration consolidates information from various sources to enable insightful analysis and data-driven decision-making. It provides a holistic view of institutional operations and student outcomes.

Software architecture should align with the strategic goals of improving student outcomes. A well-designed architecture offers personalized learning, enhanced course delivery, and the ability to track student progress. It adapts to new technologies and trends through the use of application programming interfaces, cloud computing, modular design, and digital tools. Integrating existing systems into the architecture provides scalability, customization, and an agile learning environment.

Essential systems for digital transformation include a learning management system, student information system, customer relationship management platform, and robust network infrastructure. These systems are chosen based on institutional needs and objectives. Best practices for system design focus on user-centered and accessible platforms

that are interoperable, scalable, and flexible. Interoperability enables easy data exchange across systems.

Digital transformation in higher education is enabled through the integration of applications and data, sustainable and strategic software architecture, and essential systems. Together, these components provide a seamless user experience, data-driven insights, personalized learning, and an agile environment for innovation. Digital transformation is crucial for universities to remain competitive, enhance student outcomes, and adapt to trends in technology and education.

The proposed model consists of four key components, which are explained in detail below, along with the corresponding best practices for implementation. Figure 2 presents a visual representation of the proposed model.

1. Integration of Applications and Data

- Application integration: Streamlines processes and improves efficiency by connecting disparate applications such as student information systems, learning management systems, and financial management systems. This allows for data sharing, reduces manual data entry, and minimizes errors while providing a seamless experience for students, faculty, and staff.
- Data integration: Consolidates data from different sources to enable meaningful analysis and provide a complete view of the institution's operations. This allows institutions to identify trends, make informed decisions, and improve student outcomes.

2. Software Architecture

- Aligned with the institution's strategic objectives and goals to improve student outcomes.
- Designed to provide personalized learning experiences, enhance course delivery and track student progress.
- Sustainable, adaptable, and capable of incorporating new technologies and trends.
- Utilizes APIs, cloud computing, modular design, and digital tools for sustainability.
- Integrates existing systems for scalability and customization.

3. Essential Systems/Components

- Learning Management System (LMS)
- Student Information System (SIS)
- Customer Relationship Management (CRM) system
- Robust network infrastructure

These systems should be selected based on the institution's needs and goals. Figure 3 summarized the most important systems that need to be integrated to have a full transformation integration.

4. Best Practices for Architecture and Design

- User-centered approach
- Ensuring accessibility for all users
- Scalability and flexibility
- Interoperability for easy data exchange between platforms

By offering empirical insights on how to identify the most significant changes, their relationship to evolutionary learning, and the necessity of developing advantages that can be readily respected to the changing market conditions of the education industry, the development of the higher education model for digital transformation significantly aids the evolution of strategic management practices of universities. To create, control, and maintain a positive student experience, it also emphasizes the value of using scientific models as decision support systems. The synthesis connects theory to practice by providing a pertinent, significant but constrained brief on how colleges could use digital capabilities to change deliveries and the student experience.

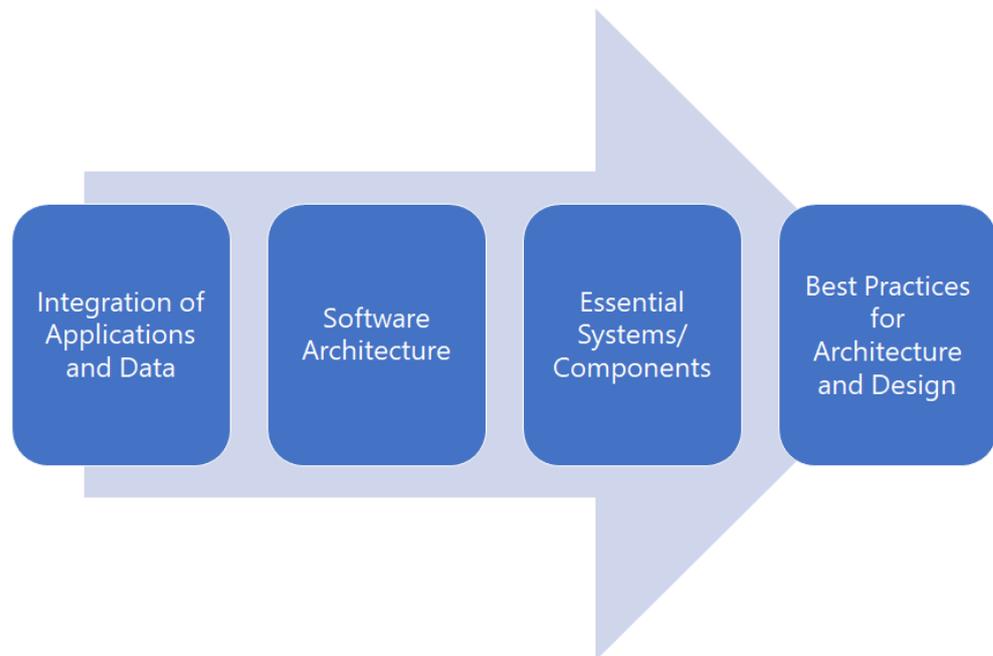


Figure 2. Proposed Model for Digital Transformation in Higher Education.

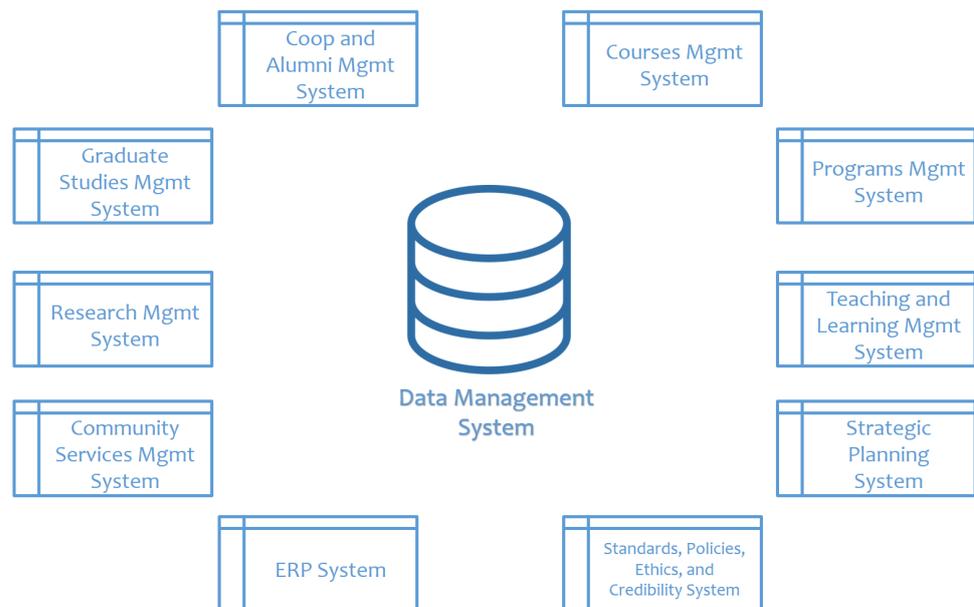


Figure 3. Essential Systems for Digital Transformation.

4.1. Integration Challenges

Integration challenges include data silos, legacy systems, and limited resources. The best strategy for integrating systems is to start with a clear plan and prioritize the systems that will have the most significant impact on student success. Institutions should also consider partnering with vendors that specialize in integration to help streamline the process. Successful digital transformation in higher education requires a strategic approach that prioritizes user needs and integrates systems that support student success.

Due to the development in the previous ten years in the availability of technical solutions to carry out a variety of duties, offices and departments throughout campus invested in micro solutions to satisfy extremely particular requirements. The advantages of reducing digital fragmentation include improving efficient business and operational proce-

dures across the organization, fostering community within and among groups, advancing university goals, and using information and data at hand to inform decision-making.

One of the main objectives of digital transformation is to create a cohesive digital ecosystem that will allow universities to accomplish the following major objectives: achieve the academic objectives in strategic plans, develop the financial resources required to maintain and build excellence, through alumni engagement, and create a cohesive, open-minded, and engaged community of faculty, students, staff, and others who understand and appreciate aspirations and values.

Universities' goal to advance society through their distinctive approach to scholarship and education—open, academically rigorous, and ethically rooted—is supported by a cohesive digital ecosystem. It has never been more important to emphasize cutting-edge, student-centered learning and multidisciplinary, collaborative study. There has never been a more pressing need for their unwavering commitment to advancing knowledge and understanding to have a positive influence on the world.

A comprehensive digital transformation towards Education 4.0 includes preparing students with the technical, cognitive, social, and emotional skills necessary for 21st-century learning and work, equipping faculty with digital skills (do and be) to deal with native digital learners, and adopting organizational processes and practices in line with new social and professional relationships [1,25].

Digital strategy implementation describes how universities turn the developed digital strategy into a practical plan and series of actions, putting the new digitally enabled business model into practice. Therefore, it is essential to execute a digital strategy carefully to ensure consistency between the firm's actions and the goals outlined in the formulation of the strategy [26].

Higher education digital transformation dimensions are teaching, innovative pedagogical methodologies, digital literacy, and digital skills, teaching administration process, digital infrastructure for teaching, curriculum, curriculum modernization, digital curriculum, research, making Informed Decisions, software and data infrastructure, security, administration, financial and technological aspects, marketing, and business process [22].

4.2. PSU Case Study

Prince Sultan University (PSU) is a leading educational institution in Riyadh, Saudi Arabia, which is committed to preparing students for the challenges of the modern world. PSU has recognized the importance of digital transformation and has initiated several programs to enhance the quality of education through technology.

All academic institutions around the world are moving from traditional universities to smart Digital Universities [13]. Although PSU is one of the leading universities in digital transformation, still more innovative work needs to be done to face the challenges posed by the nature of the technical digital age in the twenty-first century. In this proposal, we try to build a model that addresses the needs, requirements, and steps to build a comprehensive model for all university functionalities to gain the "digitized PSU". Moreover, this proposal aims to highlight all elements that are needed to enable the PSU environment to be supporting the digital transformation by providing all technical resources as well as strengthening all importance of participants (students, faculty, administrative, etc.) to have a sustainable successful transformation.

In the era of digitalization, PSU has taken a fruitful initiative by introducing digital transformation in education. The university has developed an online learning management system, which helps students to access course materials, attend lectures, and communicate with instructors from anywhere, anytime. The learning management system also enables the university to monitor student progress and provide feedback on assignments.

PSU has also introduced e-textbooks in several courses, which students can access through their digital devices. This helps to reduce the cost of textbooks, and students can access the material easily on the go. The university has also set up a digitized library where

students can access a wide range of academic resources online, including articles, journals, and e-books.

PSU has also started using technology in the classroom, such as interactive whiteboards, which help to engage students and enhance the teaching and learning experience. The digitalization of campus has led to the introduction of new services, including online registration, online payment of fees, and online application for scholarships, which has made the processes more convenient for students.

Moreover, PSU has actively encouraged students to take part in digital projects, such as developing mobile applications and building websites, which helps to cultivate a culture of innovation and creativity. PSU has also emphasized developing digital skills among students, like programming and design courses, which help to prepare them for the workplace of the 21st century.

PSU has taken a significant step towards digital transformation in education, which has impacted positively on the quality of education and student experience. The university has recognized the importance of technology and has integrated it into the academic structure to make teaching and learning more convenient, engaging, and effective. PSU has indeed set a benchmark for other educational institutions to follow and continuously strives to improve the digital infrastructure on campus.

Integration and platforms are essential enablers of digital transformation. Digital transformation is all about making technology work together to make things easier and more efficient. The Information Technology Center (ITC) has built more than 40 web services that act as an integration layer. This layer enables different systems to talk to each other and feed data between systems. All the relationships between the Student Information System (SIS) and the Learning Management System (LMS) are automated through this layer. The layer is also used to feed the Data warehouse with all raw relevant data that can enable efficient timely KPIs calculations.

There is a complete platform for students which is called EduHub. This platform enables students to access multiple data from different systems in one platform. The student can see all relevant data from SIS like schedules, grades, GPA, advising, and study plans. The student can also monitor deadlines coming from the learning management system. Students can also access educational sources, virtual labs, and any other relevant updates.

There is a dedicated platform for faculty members. This platform gathers and collects services and data in one location. Faculty members can update their profiles, professional development, and community services. Research data is already integrated with external sources such as Scopus and Web of Science. The faculty profile has all the courses that have been taught by him/her and research is pulled automatically through that integration layer. The platform also has an automated service for faculty annual evaluation based on all its available data.

5. Other Higher Education Success Stories

In today's era of technology, the digital transformation in the higher education sector has revolutionized the entire system of imparting education. Educational institutions across the globe have been successful in harnessing the power of technology to enhance the learning experience of students. Here are some remarkable success stories of digital transformation in higher education.

Digital transformation is revolutionizing the face of higher education, enabling institutions to keep pace with the rapid growth of technology while providing a new and innovative learning experience to students. The adoption of new digital tools and technologies has been instrumental in improving learning outcomes, boosting student engagement, and promoting collaborative learning [27]. From online learning platforms to mobile applications, and virtual and augmented reality, the possibilities of digital transformation in higher education are endless. In this article, we will explore some of the success stories of digital transformation in higher education, outlining the benefits and challenges of this trend and identifying the best practices for implementation. Ultimately, we will discuss

the future of digital transformation in higher education as well as its impact on students and faculty.

The University of New South Wales (UNSW), Australia is known for its cutting-edge technology and innovative approaches toward higher education. In 2019, UNSW launched the “Education 3.0” program, which aimed at transforming student learning experiences through the use of emerging digital technologies [28]. The program included the launch of a range of initiatives like the “Futures Learning Lab”, Virtual and Augmented Reality Labs, and the “ACTIVE Learning” program, and has been successful in enhancing the learning outcomes of students.

Another notable success story is that of Stony Brook University, New York, which introduced “iLearn”—an e-learning platform that offers students a personalized learning experience. The platform uses a combination of adaptive learning technologies, such as machine learning algorithms and data analytics, to understand the learning behavior of individual students and curate personalized learning pathways that suit their needs.

The Massachusetts Institute of Technology’s (MIT) OpenCourseWare project is another significant success story of digital transformation in higher education [29]. The project provides free, online access to course materials from over 2000 MIT courses, enabling students across the globe to access high-quality education. The program has been hugely successful, with over 30 million unique visitors accessing the courseware annually.

The University of Phoenix, which is a for-profit institution, rolled out a Digital Classroom initiative in 2017 to provide students with a more collaborative and interactive learning experience [30]. The platform enables students to participate in real-time classroom discussions, access course resources, and collaborate with their peers online.

The University of Pisa in Italy, which works with 20 university departments and has a student body of close to 50,000 students as well as 3000 faculty and staff members, has invested in its digital infrastructure with a focus on technologies like artificial intelligence for large-scale simulations in research as well as block storage for scientific computing applications for medical and biological research. The institution has seen the following improvements thanks to the new solutions: five times faster data processing to satisfy professor, staff, and student needs; 80% better performance on a wide range of crucial applications; no downtime or data loss; and support for cutting-edge teaching and research.

The success stories of various universities and institutions in implementing digital transformation in higher education showcase how technology can revolutionize the process of imparting education. By implementing innovative digital technologies and personalized learning tools, educational institutions can ensure that students have access to high-quality education, irrespective of their location or socioeconomic status. However, it is essential to have well-defined digital transformation strategies in place, which take into account the unique needs and aspirations of stakeholders, to ensure that the technology is being used effectively and sustainably.

Digital transformation in higher education has become a necessity to meet the evolving expectations and needs of students and faculty [31]. The COVID-19 pandemic has accelerated the adoption of digital technologies in higher education. Here are some success stories of digital transformation in higher education:

1. Virtual learning: China’s Ministry of Education put together a system where its 30 million students at 3000 universities and colleges would get all-day TV broadcasts of state-approved lessons in math, language, English, art, and physical education [31].
2. Chatbots and online Q&A availabilities in libraries: Libraries are exploring digital transformation by digitizing periodicals and books so they can be available online to more than one student at a time. This increases the library’s ROI [32].
3. TEC21 Model: Tecnológico de Monterrey’s TEC21 Model is an interesting example of digital transformation. It offers programs in three educational modalities—face-to-face, virtual, and blended learning. The model focuses on authentic problems and cycles [33].

4. Student Success: EDUCAUSE identifies four objectives and their associated “Grand Challenges” of digital transformation, including student success. Digital technologies can help institutions personalize learning, provide real-time feedback, and support student engagement.
5. Financial Health: Digital transformation can help institutions reduce costs, increase revenue, and improve operational efficiency.
6. Reputation: Digital transformation can help institutions improve their reputation by providing high-quality, innovative, and accessible education.
7. Academic Toolbox: The University of Toronto’s Academic Toolbox provides new tools for faculty and students to enhance their teaching and learning experience.

These success stories demonstrate how digital transformation can help institutions improve student success, financial health, reputation, and operational efficiency.

6. Discussion

In today’s fast-paced market, digital transformation has become a crucial aspect for higher education institutions to sustain in the highly competitive education sector. This digital transformation blueprint in higher education case study provides insights for higher institutions seeking to streamline crucial processes, reduce administrative workload, and increase student engagement through the use of technology. Through this approach, institutions can achieve flexible learning and teaching methods, ensuring students’ needs are met while improving educational outcomes. With effective communication between stakeholders, including faculty staff and vendors who provide services such as cloud computing or eLearning platforms, it becomes possible to create a digital ecosystem that delivers value-added benefits and encourages innovation across institutions. Ultimately, a digital transformation blueprint is central to ensuring higher education stays relevant in today’s rapidly changing technological landscape.

The digital transformation of higher education is an ongoing process, and institutions need to continuously evaluate their progress and identify areas for improvement. This study has shown that there are several factors that are critical for building successful digital capabilities in higher education institutions. These include a clear vision and strategy, strong leadership, a culture of innovation, and a focus on student needs and experiences. One area where institutions can improve is in the development of digital skills and competencies for faculty and staff, while many institutions have made progress in this area, there is still a need for ongoing training and professional development to keep pace with rapidly evolving technologies and changing student needs. Additionally, institutions can benefit from greater collaboration and partnerships with industry and other institutions to share best practices and leverage shared resources.

For non-digitalized institutions, the first step towards building digital capabilities is to develop a clear understanding of their current state and identify their strengths and weaknesses. This can be done through a comprehensive assessment of their existing technologies, infrastructure, and processes, as well as an analysis of their institutional culture and readiness for change. Institutions can then develop a roadmap for digital transformation that outlines their goals, priorities, and timelines for implementation. This roadmap should involve all stakeholders, including faculty, staff, students, and leadership, and should prioritize the needs of the institution’s core mission and values.

To build digital capabilities, institutions can also benefit from partnerships and collaborations with other institutions, industry, and government agencies. This can include sharing best practices, co-developing digital tools and resources, and leveraging shared resources and expertise. Finally, institutions must be prepared to continuously evaluate and adapt their digital strategies to ensure that they are meeting the needs of their students and keeping pace with rapidly evolving technologies and changing student needs.

7. Conclusions

This study highlights the crucial role that universities play in promoting social growth and empowerment. It emphasizes the need for digital transformation to be a top priority in higher education. To this end, this article provides a comprehensive approach to developing a sustainable digital transformation environment. Drawing on best practices and advice from national and international sources, this framework not only addresses concerns about digital technology adoption but also equips schools with useful tools to fulfill their responsibilities. Furthermore, this article demonstrates that the suggested framework aligns with Saudi Arabia's Vision 2030, particularly in the fields of education and scientific research. By adopting this blueprint, Prince Sultan University can create a new success story in higher education. This will position the university to reap the benefits of digital transformation, thereby strengthening its ability to train the next generation for a world that is constantly evolving. This study underscores the importance of digital transformation in higher education and provides a practical roadmap for universities to follow. By embracing this approach, universities can empower their students to thrive in a rapidly changing world and contribute to the growth and development of their communities.

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