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Digitalized Curriculums in Architecture: Impact on Student Satisfaction and Engagement

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Abstract

Amidst the swift technological advancements post-COVID-19, architecture has embraced digital tools for online teaching, integrating Industry 4.0 elements to enhance education. This study assesses the impact of digitalized architectural curricula on student satisfaction and engagement. By comparing the perspectives of educators and students, it explores factors influencing satisfaction and engagement in these new curricula. The research evaluates alternative teaching methods, assessments, and their effectiveness in optimal education delivery. Additionally, it examines the perceptions of educators and students regarding digitalized curriculum effects on satisfaction and engagement. Employing a constructivist approach, the study uses the Technology Acceptance Model to measure the efficacy of digital tools in higher education. Survey questions assess students' perceptions of integrating digital tools' ease of use and usefulness. Analyzing these perceptions offers insights into factors influencing students' technology acceptance, impacting satisfaction and engagement. The Flow Theory ensures the alignment of digital tasks with students' skill levels. Findings deepen understanding of the intricate relationship between satisfaction, engagement, and digitalized curricula in architectural education. The study proposes practical strategies, such as involving students in select digital tools, providing comprehensive technology education and fostering a technology learning environment

Keywords
Architecture curriculums, teaching pedagogy, student satisfaction and engagement, student performance, digitalized curriculums

1. Introduction
The architectural education field has encountered many challenges because of the COVID-19 pandemic. Nonetheless, educators have demonstrated proactivity in finding innovative solutions to overcome these difficulties. Consequently, a new vision for the future of architectural education has emerged, with educators exploring novel theories and

concepts to capitalize on opportunities and changes while modernizing the traditional model and transforming the teaching experience. This includes examining alternative delivery modes, evaluation, and assessment to ensure the best possible education for students. The pandemic has compelled a shift to online digital off-campus teaching and learning, which has proved to be a significant change for students, educators, and educational institutions. Nevertheless, despite the challenges, efforts have been made to devise solutions to address them, leading to a future of opportunities and transformation in architectural education. The digitalization of courses in architecture studies incorporates technology and digital tools into the educational curriculum to enhance the teaching pedagogy and student learning experience. This study aims to understand if such curriculums can better prepare students for the challenges of the digital age by measuring students' satisfaction and engagement levels. The paper focuses on the architectural department of higher education institutions in the western region of Saudi Arabia. Nonetheless, the digitalization process presents challenges for educators regarding delivery and competencies, which has led to the development of innovative strategies to adapt to these changes. Since the primary purpose is to examine the impact of such digitalized curricula on students' satisfaction and engagement, the paper compares the educator's perspective and the student's perception to understand the factors of satisfaction and engagement in the newly adopted digitalized curriculum.

Educators have faced challenges in digitally delivering courses and developing competencies in utilizing digital tools. Despite this, they have developed innovative strategies to ensure students receive the best education possible in the digital age. This research study aims to measure the level of satisfaction and engagement of students within the architectural department of higher education institutions in the western region of Saudi Arabia. By comparing the perspectives of both educators and students, the study seeks to understand the factors influencing satisfaction and engagement within the newly adopted digitalized curriculum. The findings of this research study will provide valuable insights for educational institutions and educators, shedding light on the impact of digitalization on students' satisfaction and engagement.

The knowledge gained from this study can guide the development of effective strategies to enhance the digitalized curriculum, better-preparing students for the challenges of the digital age. The integration of digitalization in architectural education holds significant promise for the future, addressing the immediate challenges brought about by the pandemic and offering opportunities for transformative and innovative approaches to teaching and learning. By embracing these changes, architectural education can continue to evolve and thrive, equipping students with the skills and knowledge needed in a rapidly changing world.

2. Literature Review

The Fourth Industrial Revolution (4IR) has significantly transformed the digital landscape, affecting all areas of society, including higher education. With this transformation, higher education institutions face new challenges and opportunities that require them to adapt and evolve to meet the changing needs of students and the workforce. Integrating digital technologies in education can revolutionize how we learn, teach, and conduct research, opening new frontiers of knowledge and innovation. Going back to the historical time frame in 2020, Deoskar highlighted that technology development has progressed through four significant phases, each with unique features and advancements. Industry 1.0, the first industrial revolution, occurred between 1760 and 1820. The shift from manual to machine-based production was powered by steam and water. Industry 2.0, also known as the Second Industrial Revolution, occurred between 1870 and 1914. The introduction of electrical energy-powered machines and the assembly line streamlined mass production. The third industrial revolution, Industry 3.0, took place in the late 20th century and is commonly called the digital revolution. This period saw the extensive use of computer and communication technologies in production. Lastly, Industry 4.0, or "Industry 4.0" in Germany, is a national strategic initiative by the German government to drive digital manufacturing. The concept aims to increase digitization and interconnectivity of products, value chains, and business models, ultimately leading us into the era of digitalization.

The Fourth Industrial Revolution (4IR) was introduced during the World Economic Forum in Davos, Switzerland, in 2016. It marks a significant shift in the way we interact with technology and each other. This revolution has brought about unprecedented changes in every aspect of our lives, from how we work and communicate to how we learn and consume entertainment. The 4IR is characterized by integrating advanced technologies such as artificial intelligence, robotics, and the Internet of Things into every industry. As a result, it can potentially transform the world as we know it (Schwab,2026).

2.1 Pandemic-accelerated Digital Transformation

The ongoing technological revolution has compounded the disruption caused by the COVID-19 pandemic in global education systems, impacting an astounding 1.6 billion learners across over 190 countries and all continents. School and learning space shutdowns have affected up to 94% of the global student population and 99% in low and lower-middle-income countries (UN, 2020). To address this crisis, the Broadband Commission for Sustainable Development has called on governments, private sectors, international organizations, and academia to provide safe digital tools and online training to parents and teachers while also utilizing the broadcasting capacity to disseminate guidance on cyber security measures, data protection, and child online safety to the general population. To support these efforts, the ITU, UNESCO, UNICEF, WePROTECT Global Alliance, World Childhood Foundation USA, the End Violence Global Partnership, and the United Nations Office on Drugs and Crime (UNODC) have released a technical note and resource pack to assist in implementing these measures, ensuring that students have safe and positive online experiences during COVID-19 while mitigating potential risks.

In 2021, Kang's research highlights that the COVID-19 pandemic has forced educators to adopt and implement distance learning methods on a larger scale than ever before. While distance education practices existed before the pandemic, they were not widely used, and most learning activities occurred in the classroom. Initially, when schools and universities were closed in March 2020, most of them postponed their classes for a certain period. However, as time progressed, these educational institutions had to initiate distance learning practices that quickly became the new norm. The emergence of internet-based distance learning directly results from the information revolution. Digital course materials have replaced conventional print materials, enabling students to participate in virtual experiments and simulations through educational software applications. Nevertheless, the third generation of distance learning stands apart from its predecessors in a crucial respect. While the primary objective of the first and second generations was to create and disseminate learning materials to students, the learning activities were predominantly one-way, and communication was restricted. In contrast, internet-based learning provides a platform for collaboration between instructors and students, facilitating two-way interaction.

2.2 Digitalizing Curriculum Development

The term "curriculum" was coined in 1820 and refers to an educational program. However, it was not until the 19th century that the term became widely used in developed countries such as the United States. The curriculum encompasses learning objectives such as skills, knowledge, attitudes, and the subject matter in which learning experiences are embedded. It also includes the sequence in which concepts are presented, the learners themselves, instructional methods and activities, and resources such as materials and settings (Giang, 2021).

Ralph Tyler (1949) defined curriculum as "the total of learning experiences planned by the school to attain educational goals." According to Tyler, the curriculum consists of educational objectives/goals, learning experiences/activities, organization of learning experiences, and evaluation of educational objectives. This definition emphasizes curriculum as both product and process.

Hilda Taba (1962) defined curriculum as "a plan for learning." She viewed curriculum as a plan depicting a logical sequence of learning activities designed to achieve broad instructional objectives over time. Taba's definition highlighted curriculum as an instructional guide comprising systematically organized objectives, content, learning experiences, and evaluation procedures. Peter Oliva (1992) defined curriculum as "the conceptual structure and form given by educators to a set of experiences designed to foster students' learning, growth, development and understanding in agreement with the vision, mission, and goals of that educational institution." This definition underscores curriculum as a coherent structure aligned with educational vision and goals, incorporating various experiences to enrich student learning holistically.

David Giang (2021) extended the definition by outlining that curriculum involves the overall learning objectives, subject matter content, resources like materials and settings, instructional methods, and evaluation of learning outcomes along with the target learners. It refers not only to the subject concepts to be learned but also to the process of learning itself through an intentional sequence of instructional experiences to achieve desired outcomes. This contemporary definition encapsulates curriculum as an educational product and process, continually evaluated and improved upon based on experience.

2.3 Digitalized curriculum

The curriculum involves assessing student learning and adjusting teaching and learning processes based on experience and evaluation. Due to the global crisis of COVID-19, Education is a fundamental human right and a crucial factor in realizing all human rights. The failure of education systems can result in unsustainable societies that are neither peaceful nor productive. To mitigate the potentially devastating effects of the COVID-19 pandemic, governments and stakeholders are urged to take the most important measures to ensure a sustainably developed curriculum. Developing resilient education systems for equitable and sustainable development: Building resilient education systems enables countries to respond to immediate challenges, such as safely reopening schools, and prepares them to manage future crises better. To achieve this, governments should consider focusing on equity and inclusion, strengthening risk management capabilities at all system levels, ensuring strong leadership and coordination, and enhancing communication and consultation mechanisms. The digital transformation in education must consider the training of teachers and the organization of educational institutions (Oliveira, 2021). learners will need to apply their knowledge in many uncertain and developing situations. For this, they will need a range of cognitive and metacognitive skills (critical thinking, creative thinking, self-regulation, etc.), social and emotional skills (empathy, cooperation, ...), and practical and physical skills (using new communication and technology devices, etc.).

2.4 Teaching methods

Integrating digital technologies in architectural education has significantly transformed traditional teacher-centered pedagogies. Various digitalized teaching methods have emerged that actively engage students in collaborative problem-solving and applied to learn. This paper aims to comprehensively review evidence-based digital pedagogies adopted in online and blended learning environments. Problem-based learning (PBL) is a student-centered approach that presents ill-structured problems as a stimulus for study (Choi & Kim, 2022). Architectural programs have embraced PBL to develop students' self-directed learning, critical thinking, and problem-solving capabilities. Through online discussion forums and multimedia simulations, students work in teams to analyze real-world architectural design problems without preset solutions (Gul & Shehzad, 2020). Authentic scenarios motivate cooperative research and brainstorming of multiple solutions (Boud & Feletti, 2013). For instance, students may examine a design brief to propose housing units considering physical, economic, and social sustainability factors in a given environment (Sundstrom, 2019). Educators act as facilitators, assisting teamwork and workflow. PBL has been shown to enhance long-term knowledge retention compared to traditional methods.

Project-based LearningSimilarly, project-based learning (PrBL) engages students in extended research projects related to course content (Bell, 2010). Teams complete a shared production over several weeks, applying theoretical concepts to a tangible outcome such as an architectural model, animated walkthrough, or documentary film (Baran & Al Zubaidi, 2021). Regular online demonstrations ensure continuous feedback and refinement of ideas from educators and peers (Thomas, 2000). This mimics real-world industry practices and builds skills in collaboration, project management, and self-directed inquiry (Mills & Treagust, 2003). For instance, a final-year design studio may employ PrBL for students to propose adaptive reuse concepts for heritage buildings through virtual exhibitions and reports (Ozkar, 2007). Evaluations indicate improved motivation, cognitive skills, and satisfaction levels through PrBL pedagogies.

In conclusion, various digital pedagogies actively engage architectural students by encouraging self-directed, collaborative, and applied modes of learning that mirror industrial practices. Educators should carefully design interactive problem scenarios, extended research projects, and immersive simulations aligned with intended learning outcomes. Blended approaches that thoughtfully integrate online and face-to-face interactions further enrich digital teaching methodologies. Future research should evaluate the impact of specific pedagogical models to establish evidence-based best practices that develop future-ready graduates.

2.5 Industry 4.0 Technological Applications

Integrating Industry 4.0 technological applications in higher education has significantly transformed traditional teaching pedagogy, offering new opportunities for enhanced learning experiences. Scholars have explored the potential benefits of Industry 4.0 technologies such as the Internet of Things (IoT), artificial intelligence (AI), and big data analytics in higher education settings. For example, IoT devices and sensors facilitate real-time data collection, enabling personalized learning experiences and adaptive feedback mechanisms. Educators can tailor their instruction based on individual student needs and provide timely feedback for better learning outcomes. Additionally, AI-powered educational tools, such as intelligent tutoring systems and virtual assistants, have emerged as valuable student resources. These tools provide personalized guidance and support, allowing students to receive individualized attention and assistance in their learning journey. Furthermore, using big data analytics allows educators to analyze vast amounts of educational data, gain insights into student performance patterns, identify areas of improvement, and tailor instructional strategies accordingly. These technological applications create innovative learning environments that promote active student engagement, collaboration, and critical thinking skills, preparing learners for the demands of the digital era.

The integration of Industry 4.0 technologies has the potential to transform architectural pedagogy and provide more immersive, collaborative, and applied learning experiences. This paper comprehensively reviews established and emerging applications of key technologies like IoT, AI, VR/AR, and big data analytics and their learning benefits. For this research topic, the researcher will focus on IOT and AI, which, in their perspective, are the most used tools within the selected study sample.

Secondly, Artificial Intelligence (AI) can be defined as follows: AI personalizes support through automated chatbots and virtual tutors. Instead of lengthy wait times, architecture students can instantly clear conceptual doubts with AI assistants (Corrigan et al., 2017). Automated feedback reviews recognize common errors to recommend individualized remedies (Wang et al., 2019). Adaptive quizzes using AI identify gaps to be addressed, boosting performance on subsequent assessments (Barr et al., 2020). Chatbot logs offer insight into misconceptions about redesigning instruction. In short, reviewing a few Industries 4.0 applications, it is worth mentioning that the student learning experience in the architectural field is capitalized and enhanced through integrating the new revelation. Integration and advanced tools provide students with further knowledge and enhancement of architectural subjects.

2.6 Digital Competencies for Educators

The successful implementation of digitalized curriculums in higher education necessitates the development of digital competencies among educators. Digital competencies encompass the knowledge, skills, and attitudes required to use digital technologies for teaching and learning purposes effectively. The Technological Pedagogical Content Knowledge (TPACK) framework, introduced by Koehler and Mishra (2009), emphasizes integrating technological, pedagogical, and content knowledge. This framework provides a foundation for developing digital competencies among educators, enabling them to design and implement technology-enhanced learning activities aligned with curriculum objectives and student needs. Continuous professional development programs and training initiatives are crucial in supporting educators in acquiring and refining their digital competencies. These programs allow educators to learn about emerging technologies, explore pedagogical approaches that leverage them, and gain hands-on experience integrating digital tools into their teaching practice. By equipping educators with digital competencies, higher educational institutions can ensure the effective integration of digital technologies in teaching pedagogy, promoting student-centered learning, fostering digital literacy skills, and enhancing overall educational outcomes.

Educators can also learn to use social media and collaborative online platforms to connect with students outside the classroom (Trust & Whalen, 2020). This allows for facilitating group discussions, providing feedback, and resolving student queries in an informal setting. Workshops are further helpful for educators to understand learning analytics tools for tracking student progress, identifying gaps, and customizing support (Arnold & Pistilli, 2012). Hands-on experience with diverse technologies builds self-efficacy among educators to incorporate them appropriately in teaching. By equipping educators with digital competencies through various training initiatives, higher educational institutions can ensure the effective integration of digital technologies in teaching pedagogy, promoting student-centered learning, fostering digital literacy skills, and enhancing overall educational outcomes. This ultimately leads to the development of a skilled workforce for Industry 4.0.

2.7 Student Perspectives on Digital Learning Outcomes

Understanding student perspectives on digital learning outcomes is essential for evaluating the effectiveness and impact of digitalized curriculums in higher education. Research has explored students' experiences, perceptions, and attitudes toward digital learning, shedding light on the benefits, challenges, and overall satisfaction with digital pedagogical approaches. For instance, studies have highlighted the flexibility, convenience, and engagement associated with mobile learning. Students appreciate the ability to access educational resources and participate in learning activities anytime and anywhere, using their mobile devices. They find that mobile learning promotes active learning, collaboration, and self-directed learning, allowing them to engage with content in interactive and personalized ways. However, challenges such as technical issues, information overload, and the need for digital literacy skills have also been identified. Students may encounter difficulties navigating complex digital platforms, managing vast amounts of information, and developing the necessary skills to evaluate online content critically. By considering student perspectives, higher educational institutions can gain valuable insights to inform the design and implementation of digitalized curriculums that cater to student needs, address their concerns, and enhance their learning experiences.

By examining the literature on Industry 4.0 technological applications, digital competencies for educators, and student perspectives on digital learning outcomes, this review provides a comprehensive understanding of the impact of digitalized curriculums in teaching pedagogy within higher educational institutions. These insights can inform future research, guide the development and implementation of effective digital learning strategies, and ultimately contribute to improving teaching and learning practices in higher education.

2.8 Student Engagement in Digitalized Subjects

Student engagement is demonstrated and defined by the level of interest demonstrated by the student and his/her interactivity during the course; the increase in engagement is presented by the student's personality, attitude, and motivation during the class work. Though the shift occurred to develop and digitalize academic curriculums, Research has provided valuable insights into students' engagement with digitalized curricula and online learning environments. Interaction and collaboration: Digital platforms allow for rich interactive features that promote peer-to-peer and student-instructor engagement. Tools like discussion forums, group chats, collaborative documents, and virtual classrooms facilitate real-time discussion, feedback, and project-based work (Martin & Bolliger, 2018). This fosters a sense of community and active participation. For example, architecture students engaged in online design critique sessions where they commented on each other's work, asked questions and provided suggestions for improvement in a dedicated collaborative space (Braun, 2020).

Second, content creation: Students demonstrate higher-order thinking when they generate and curate digital content for others rather than consume information. Examples include students recording audio/video tutorials, presentations, and lectures and then sharing via learning management systems (Dabbagh & Kitsantas, 2012). architecture students created 3D models and walkthroughs of proposed building designs. They uploaded these to an online portfolio to showcase their skills and receive peer feedback (Szewczyk, 2020).

Third, Experiential learning: Interactive simulations and virtual and augmented reality experiences allow students to immerse themselves in realistic problem-solving scenarios. For instance, architecture students used VR tools to envision designing and managing a construction site, gaining hands-on virtual experience before real projects (Diegmann et al., 2018). Fourth, gamification: Incorporating game elements and mechanics increases student motivation through competition and rewards. Examples are using leaderboards to track modeling skills or providing badges/certificates of completion for interactive course modules (Rahimi et al., 2021). Architecture students stayed engaged in a digital history course through interactive quizzes and scores tracking their progress.

The above examples demonstrate how digital tools provide diverse avenues for active, student-centered engagement if integrated creatively into the curriculum: these nurture higher-order skills and positive learning experiences. Thus, online learning has made it easier for educators to track engagement by gathering information data through online/ digitalized learning modules. A study has been reviewed by (Gray & Diloreto, 2016) highlighted that online learning nor digitalized courses showed that in these digitalized mediums, educators are now more aware of how to develop the courses and asses the level or academic challenges of each course based upon the effort exported, time invested and interaction level through the digitalized experience.

2.9 Digital Learning Spaces

The concept of the learning space has evolved significantly with digital transformation. Traditional brick-and-mortar classrooms are no longer the only environments where knowledge is acquired. Digital learning spaces encompass physical and virtual realms, creating flexible, personalized arenas for engaging with educational content. Some critical aspects of digital learning spaces are blended learning classrooms, which integrate online and in-person learning modalities. They have wired and wireless connectivity, interactive displays, and multimedia technologies. This allows the blending of synchronous virtual sessions with on-campus discussions and activities (O'Byrne et al., 2020). Architecture studios now function as blended learning hubs where students research concepts online and work on physical models under instructor guidance.

Virtual Learning Environments (VLEs): Learning management systems and application platforms transform the internet into an immersive digital learning arena. VLEs house course materials, provide communication tools for collaborative work, and enable access to any digital device anywhere (Kirkwood & Price, 2014). For example, architecture students utilize VLE portfolios to curate digital project files, receive remote assessments, and engage in 24/7 critiques.

Online Communities: Social media, networking sites, and messaging applications facilitate learning beyond physical or platform constraints. Learners interact through hashtags, follow interesting profiles to gain knowledge on the go and collaborate over long distances (George, 2020). Twitter architecture communities allow peer discussions on trends, while Facebook groups enable coordination for international design competitions.

Hybrid learning is a method of teaching that combines the most vital aspects of classroom and online learning. In 2022, Kazu and Yekcin conducted a research study that defined hybrid learning as an ideal approach for developing the knowledge and communication skills necessary for success. In this learning process, face-to-face lessons are taught with in-class activities, while some activities and practices continue outside the classroom (kazu & Yalçın, 2022). To manage the distance education process, auxiliary web tools such as Moodle, Blackboard, Edpuzzle, blogs, Camtasia Studio, E-learning Platform, Google Docs, Learning Management Systems, Khan Academy, Prezi, Storyline, and YouTube are handy. The study conducted by the researchers focused on analyzing the academic achievement of 45 participants who learned through hybrid learning. The results indicated that hybrid classes significantly impacted scientific subjects and improved student academic achievement.

The fusion of physical and digital environments enables anytime, multimodal engagement with educational resources. It prepares learners for self-directed, collaborative, and career-integrated industry working modes.

2.10 Success Factors for Curriculum Digitization

Successful digital transformation of any curriculum depends on overcoming challenges through prudent strategizing and execution. Critical success factors include:

Change Management: Sustained change requires comprehensive strategies to manage the human factor through capacity building, stakeholder buy-in, and cultural adjustment (Lopez-Ferreiro, 2020). Staff training on the pedagogical use of technology facilitates smoother adaptation.

- Effective Planning: Goal setting, needs analyses, resource mapping, and involvement of technical experts help chart an implementable roadmap. Piloting innovations systematically avoids abrupt shifts that overwhelm (Harward et al., 2014).
- Flexibility: A flexible design allows for iterative refinement as evolving needs emerge. Feedback incorporation and flexibility to cope with disruption prevent rigid, inflexible models from becoming obsolete (Conole, 2014).
- Student Experience: Enhanced learning is the core goal. Curating engaging multi-modal content and activities facilitates student-centric, active learning (Kirkwood & Price, 2014). Flexible access nurtures inclusivity.
- Support Systems: Helpdesks for tech assistance, instructional designers for pedagogical guidance, and progress trackers ensure continuous support (Harasim, 2017). This sustains motivated engagement from users.
- Strategic Partnerships: Collaborating with industry boosts the relevance of curriculum upgrades. Advisory boards provide implementation feedback (Scott et al., 2014). Joint research bolsters faculty skills/facilities.
- Outcomes Assessment: Monitoring the achievement of learning outcomes through data-driven evaluation facilitates continuous improvement initiatives (Arnold & Pistilli, 2012). Feedback integration from assessments leads to better outcomes over time.

Adherence to principles like these has aided seamless digital transitions, improved flexibility in prioritizing needs, and consistent achievement of projected benefits. It sustains elevated learning experiences for students and educator satisfaction in the digital era. The digital revolution has opened new possibilities for innovative teaching methods and e-learning experiences. However, it has also brought challenges in creating effective digital curricula. Numerous studies have highlighted the importance of researching the impact of digital teaching methods on student satisfaction and engagement. This underscores the need to improve student satisfaction and engagement in Saudi higher education. To achieve this, we need to evaluate student engagement and assess the success of the new digital teaching methods.

3. Theoretical background

Several theories provide a theoretical foundation for our study. However, the following are more suitable for exploring "The Impact of Digitalized Curriculums in Architecture Teaching Pedagogy on Students' Satisfaction and Engagement." These theories also guided us to develop our research further.

Constructivism, as presented by Piaget (1970) and Vygotsky (1978), posits that learners actively construct knowledge through their experiences. This theory suggests that interactive and student-centered approaches can enhance engagement and satisfaction in the context of digitalized curriculums in architecture teaching. Constructivism, as education theory posits, learners actively construct knowledge through their experiences. Brooks & Brooks (1993) suggest that Piaget emphasized individual cognitive development, proposing that learners assimilate new information into existing mental structures through assimilation and accommodation. Vygotsky (1978), on the other hand, emphasized that social interactions and culture have a role in shaping contextual cognitive development. The study introduced the concept of the Zone of Proximal Development (ZPD), where learners can accomplish more with guidance. Both theories underscore the importance of active engagement, interaction, and the learner's role in constructing knowledge Jonassen (1991).

In the context of our study on digitalized curriculums in architecture teaching, applying constructivism involves creating interactive and student-centered approaches that allow learners to engage with content actively. This aligns with the idea that learning is most effective when it is an active process of meaning-making (Piaget, 1970; Vygotsky, 1978). Bagozzi (1989) argues that the Technology Acceptance Model (TAM) explores how users accept and use technology. In the context of digitalized curriculums, TAM can help understand students' satisfaction and engagement by examining their perceptions of digital tools' usefulness and ease of use.

The TAM is a widely adopted theoretical framework for understanding user acceptance of technology. TAM posits that users' acceptance of technology is influenced by two perceptions, i.e., ease of use and usefulness (Lergis et al. (2003). Perceived ease of use refers to the user's perception of the system's usability, while perceived usefulness is the belief that using the technology will enhance performance. In the context of digitalized curriculums in architecture teaching, TAM can provide valuable insights into students' perceptions of the usability and effectiveness of digital tools, influencing their satisfaction and engagement.

Applying TAM involves assessing how students perceive digitalized teaching tools' ease of use and usefulness. A positive reception suggests higher acceptance, impacting students' satisfaction and engagement in architecture education. The "Flow Theory" has become a prominent concept in academic literature, particularly in psychology, education, and various fields exploring optimal human experiences, emphasizing optimal experience when individuals fully engage in an activity. Csikszentmihalyi's foundational work, "Beyond Boredom and Anxiety" (1975), laid the groundwork for understanding the psychological state of flow—characterized by deep engagement, focus, and a sense of timelessness during activity.

Csikszentmihalyi (1990), in an important work, "Flow: The Psychology of Optimal Experience," further elaborates on the conditions that facilitate flow, emphasizing the delicate balance between challenge and skill. The book delves into the impact of flow on enhancing individuals' intrinsic motivation and overall well-being. It extends the application of flow theory beyond specific activities, exploring how individuals can experience flow in their daily lives. Csikszentmihalyi's collaborative work, "Flow and the Foundations of Positive Psychology" (2014), compiles his collected works, offering a comprehensive overview of the evolution of flow theory and its integration into positive psychology. Furthermore, in "Flow" (2005), Csikszentmihalyi, alongside co-authors Abuhamdeh and Nakamura, contributes to the Handbook of Competence and Motivation, examining the intricacies of flow experiences within the broader context of competence and motivation.

Creating a flow-like experience can enhance students' satisfaction and engagement in the digitalized curriculum context. The theory is particularly pertinent in examining the impact of digitalized curriculums on students' satisfaction and engagement in architecture teaching pedagogy. The theory posits that individuals experience optimal engagement and satisfaction when the challenge level of an activity aligns with their skill level, resulting in a state of flow characterized by deep concentration and a sense of timelessness. In the context of digitalized curriculums, ensuring an appropriate balance between the complexity of digital architectural tasks and students' skill levels is crucial for fostering flow experiences.

Similarly, another essential framework contributing to our work is Garrison et al. (2000) presented "The Community of Inquiry (CoI) framework". It represents a groundbreaking contribution to the realm of online education. The seminal study introduces a comprehensive model for fostering meaningful online learning experiences. Arbaugh (2007) suggests that the framework identifies three essential elements: social presence, cognitive presence, and teaching presence. Social presence refers to the participants' capability to identify themselves socially and emotionally in a community.

The framework's significance lies in its ability to guide educators in creating a supportive online environment. It emphasizes the need for instructors to establish a presence that fosters intellectual engagement while nurturing a sense of community among learners. Moreover, the CoI framework has proven instrumental in conducting assessments to improve the quality of online courses.

As technology continues to reshape contemporary educational landscapes, the CoI framework remains a cornerstone in understanding and optimizing the dynamics of online learning communities Anderson et al. (2003). Its enduring impact is evident in subsequent research, validating its efficacy and widespread adoption as a guiding framework for online course design and facilitation.

As we explore the impact of digitalized curriculums on architecture teaching pedagogy, the CoI framework provides a valuable lens. The three interconnected elements, social presence, cognitive presence, and teaching presence, offer a comprehensive framework for evaluating and enhancing the quality of online education.

In architecture education, where the tactile and visual nature of learning is crucial, the CoI framework becomes even more pertinent. Digitalized curriculums, when aligned with the principles of CoI, can bridge the gap between physical and virtual learning environments, fostering social interactions, deep cognitive engagement, and effective teaching strategies.

By promoting social presence, digitalized curriculums can facilitate collaborative design discussions and peer interactions, creating a sense of community among architecture students. Cognitive presence, emphasizing critical thinking and reflective discourse, can be nurtured through interactive digital tools that simulate design processes and encourage thoughtful analysis. Teaching presence in the digital context involves effective facilitation, clear communication, and the strategic use of technology to support learning objectives.

Research on the CoI framework has indicated its positive impact on student satisfaction and engagement in online learning contexts (Arbaugh, 2007). Therefore, in the evolving landscape of architecture education with digitalized curriculums, a thoughtful application of the CoI framework can contribute significantly to fostering a rich and meaningful learning experience.

4. Research Methodology and Data Analysis

This chapter provides a detailed outline of the methodology used to address the research questions and objectives posed in the previous chapters. The study is based on the constructivist approach and aims to measure the success of digital tools in higher education. To achieve this, we have used the Technology Acceptance Model to develop survey questions that assess students' perceptions of the ease of use and perceived usefulness of digital tools used in the curriculum. By analyzing these perceptions, we can gain insights into the factors that influence students' acceptance of technology, which in turn affects their satisfaction and engagement. We have also used the Flow Theory to ensure that the complexity of architectural tasks presented digitally is appropriate for students' skill levels. This helps us create optimal engagement experiences, which our study examines regarding satisfaction. Additionally, we have conducted a detailed descriptive analysis of each variable's characteristics, including Perceived Performance, Perceived Easiness, Social Influence, Facilitating Conditions, the Mediator (Student Satisfaction), and the Dependent Variable (Student Engagement). Furthermore, we aim to unveil potential distinctions in opinions between students and teachers by employing t-tests and analyzing the correlation between variables by observing both target participants to evaluate the relationship and capture the key elements shaping the digitalized learning experience in the Architecture Faculty.

4.1 Research Design

This section conducts the research through descriptive analysis of collected data from the western region of Saudi Arabia. The study's objective is to investigate the impact of digitalized curriculums on architecture teaching pedagogy, specifically on students' satisfaction and engagement levels. We aim to determine the factors that significantly affect the impact of digitalized curriculums by examining students' satisfaction and engagement levels with the digitized architecture subjects they learn. By doing so, we hope to gain a deeper understanding of the impact of digitalized curriculums and how they can enhance students' learning experiences in architecture. The analysis will detail each variable, including mean, median, standard deviation, and distribution graphs. Through this analysis, you can gain insights into the independent variables such as Perceived Performance, Perceived Easiness, Social Influence, Facilitating Conditions, Mediator (Student Satisfaction), and the Dependent Variable (Student Engagement). Descriptive statistics offer a clear and concise overview, providing a foundation for more in-depth exploration.

4.1.1 Population and Sampling

The target population encompasses critical stakeholders involved in and impacted by architecture education. This includes faculty teaching-related programs, current students enrolled across different grades, and industry professionals representing firms that hire fresh graduates. The population is spread throughout the western region of Saudi Arabia's higher education institutions, targeting students and educators. It aims to compare the perception of the teacher and receiver whom the students present.

4.2 Data Analysis

The focus shifts towards a comprehensive analysis of the collected data investigating the impact of digitalized curriculum on architecture teaching pedagogy in higher education institutions within Saudi Arabia. Beginning with a detailed examination of respondent demographics, this chapter aims to establish a contextual understanding of the study population. Subsequently, employing descriptive analysis techniques provides a comprehensive overview of the dataset, presenting a clear portrayal of the variables under scrutiny: Perceived Performance (PP), Perceived Easiness (PE), Social Influence (SI), and Facilitating Conditions (FC). The correlation analysis delves deeper into exploring the relationships among these variables, offering valuable insights into their interdependencies. Through these analytical lenses, this chapter unravels the intricate dynamics between these elements and their impact on students' satisfaction (SAT) and engagement (ENG), thus contributing to a deeper comprehension of the evolving landscape of architectural education within the digital realm in Saudi Arabian higher education.

4.2.1Respondent Demographics - Description of Sample

In exploring the demographics of the respondents, this study casts a comprehensive lens on the diverse profile of individuals contributing to the research. The distribution across age categories showcases a varied representation, with a predominant presence in the age brackets of 26-30 and 31-35, each accounting for approximately one-third of the sample. This age distribution underscores the involvement of individuals at pivotal junctures in their academic or professional trajectories. Moreover, the gender distribution highlights a slightly higher representation of females, comprising 57.1% of the total respondents, while males account for 42.9%. This gender balance within the participant pool offers a nuanced perspective, considering potential differences in experiences and perceptions.

Additionally, the occupation breakdown showcases an intriguing mix, with lecturers and students constituting the primary cohorts, providing a multifaceted viewpoint encompassing both the learners and facilitators within the architectural education domain. Furthermore, the distribution across various universities in Saudi Arabia underscores a diverse representation, showcasing the involvement of participants from multiple academic institutions, thus enriching the study with a breadth of perspectives and experiences. This chapter delves deeper into these demographic insights, seeking to understand how these varied profiles might intersect with the critical variables under examination, thereby contributing to a more comprehensive understanding of the impact of digitalized curriculum on architecture pedagogy in higher education within the Saudi context (Figure 1 and Figure 2).

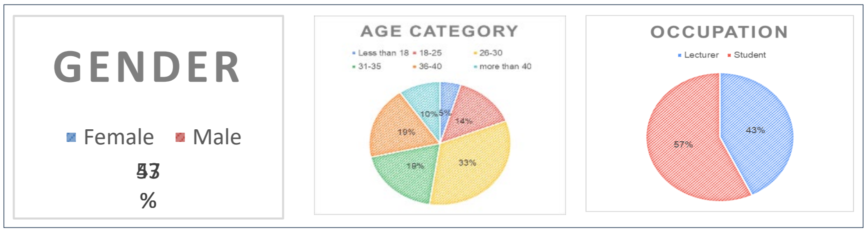

Figure 1. Participant percentage information within the Western region

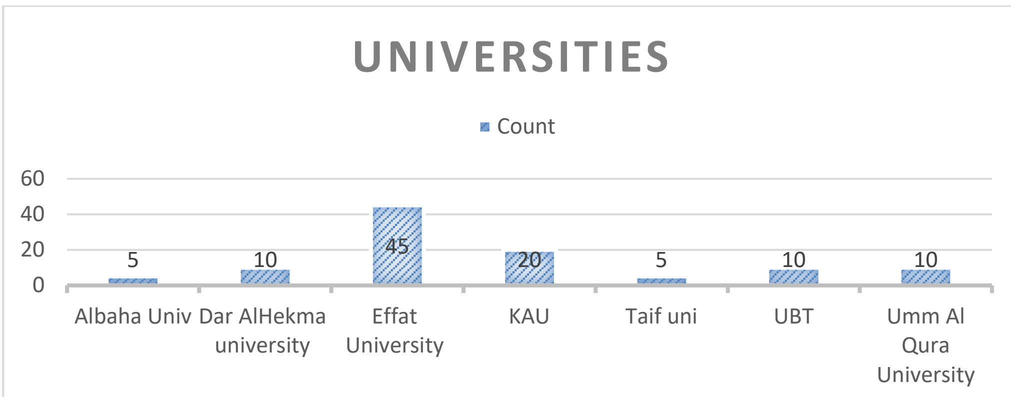

Figure 2. Participant universities, Saudi Arabia

4.2.1 Descriptive Analysis of Independent Variables (IVs)

The descriptive analysis of the collected data across various dimensions highlights that the respondents generally indicated moderately high levels of perceived performance (PP) and perceived easiness (PE) in the digitalized curriculum, showcasing a relatively consistent satisfaction with these facets (Table 1).

Table 1. Descriptive Statistics table

	N	Minimum	Maximum	Mean	Std. Deviation
PP	105	2.20	5.00	3.7333	.78283
PE	105	1.80	5.00	3.8286	.86666
SI	105	2.80	5.00	3.9524	.57481
FC	105	2.40	5.00	3.9619	.71688
SAT	105	3.00	5.00	3.7524	.47192
ENG	105	2.20	5.00	3.6667	.74507
Valid N (listwise)	105				

Influence (SI) emerged as a strong influencer in their educational experience, with respondents showing a higher agreement regarding its impact. Moreover, facilitating conditions (FC) within the digitalized curriculum were perceived favorably, indicating a supportive environment for learning. Furthermore, students expressed a moderately high level of satisfaction (SAT) with the curriculum, denoting contentment with their educational journey. However, while students' engagement (ENG) displayed a slightly lower mean score, indicating a moderately engaged stance, there was notable variability among individual levels of engagement. These insights highlight varying degrees of perception and engagement, laying a foundation for deeper explorations into the relationships between these variables within the realm of architecture pedagogy in Saudi Arabian higher education.

5. Discussion

The correlation conducted for this study offers valuable insights into the relationships between key variables. In the first analysis, exploring the association between Perceived Performance (PP), Perceived Easiness (PE), Social Influence (SI), Facilitating Conditions (FC), and Students' Satisfaction (SAT), compelling correlations emerged. The findings revealed strong positive correlations between SAT and all examined factors—PP, PE, SI, and FC—indicating a significant relationship between students' satisfaction and their perceptions of performance, ease, social influence, and facilitating conditions within the digitalized curriculum.

Expanding the scope in the second analysis, which includes Students' Engagement (ENG) alongside the previous variables, illuminates additional connections. While a robust positive correlation persists between SAT and ENG, a noteworthy relationship was observed between ENG and factors like PP, SI, and FC. However, the absence of a significant correlation between PE and ENG suggests a more nuanced interplay between perceived easiness and students' engagement within the architectural pedagogy context in Saudi Arabia. These correlations underscore the intricate dynamics between satisfaction, engagement, and various facets of the digitalized curriculum, laying a foundation for a deeper exploration of their interactions (Table 2) The correlation analysis between Perceived Performance (PP), Perceived Easiness (PE), Social Influence (SI), Facilitating Conditions (FC), and Students' Satisfaction (SAT) reveals robust and statistically significant relationships. The findings highlight substantial positive correlations between SAT and all measured factors—PP (.465**), PE (.553**), SI (.630**), and FC (.665**).

Table 2. Correlations of student satisfaction

		PP	PE	SI	FC
SAT	Pearson Correlation	.465**	.553**	.630**	.665**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	105	105	105	105

Correlation is significant at the 0.01 level (2-tailed).

These correlations signify that as students' perceptions of performance, easiness, social influence, and facilitating conditions within the digitalized curriculum improve, their overall satisfaction with the educational experience also notably increases. The significance of these correlations, at the 0.01 level, underscores the strong associations between these elements, emphasizing the pivotal role these factors play in shaping students' satisfaction with architectural education in Saudi Arabia, based on the collected data from 105 participants.

The correlation analysis involving Perceived Performance (PP), Perceived Easiness (PE), Social Influence (SI), Facilitating Conditions (FC), Students' Satisfaction (SAT), and Students' Engagement (ENG) reveals notable associations among these variables. The findings indicate a positive and significant correlation between SAT and ENG (.496**), demonstrating that as students' satisfaction with the curriculum increases, their engagement level within the educational experience also shows a noteworthy rise.

Table 3. Correlations of student engagement

		PP	PE	SI	FC	SAT
ENG	Pearson Correlation	.364**	.000	.524**	.617**	.496**
	Sig. (2-tailed)	.000	1.000	.000	.000	.000
	N	105	105	105	105	105

Correlation is significant at the 0.01 level (2-tailed).

Furthermore, significant correlations between ENG and other factors—PP (.364**), SI (.524**), and FC (.617**)—highlight the interrelated nature of perceived performance, social influence, and facilitating conditions with students' engagement. However, the absence of a significant correlation between PE and ENG suggests a more complex relationship between perceived easiness and students' active engagement within architectural education in Saudi Arabia, based on the data collected from 105 participants (Table 3).

Table 4. Correlations Lecturers and students' engagement

		PP	PE	SI	FC	SAT
ENG	Pearson Correlation	.669**	.363*	.790**	.761**	.687**
	Sig. (2-tailed)	.000	.014	.000	.000	.000
	N	45	45	45	45	45

** Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Table 5. Correlations Lecturers and students' satisfaction

		PP	PE	SI	FC
SAT	Pearson Correlation	.498**	.509**	.564**	.689**
	Sig. (2-tailed)	.001	.000	.000	.000
	N	45	45	45	45

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 6. Correlations Students

		PP	PE	SI	FC
SAT	Pearson Correlation	.456**	.621**	.693**	.754**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	60	60	60	60

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 7. Correlations Students

		PP	PE	SI	FC	SAT
ENG	Pearson Correlation	.052	-.175	.128	.411**	.344**
	Sig. (2-tailed)	.694	.182	.328	.001	.007
	N	60	60	60	60	60

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 8. Comparison of Students and lecturers.

	Lect. Mean	Stu. Mean
PP	3.6889	3.7667
PE	3.8889	3.7833
SI	3.8000	4.0667
FC	3.9333	3.9833
SAT	3.6222	3.8500
ENG	3.5333	3.7667
Valid N (listwise)	45	60

A comparative analysis was conducted to evaluate the opinions of students and lecturers regarding specific study variables (Tables 4, 5 and 6). The results revealed that students agreed with all variables except "PE," which measures perceived easiness. This variable did not receive as high of a score as "PP," "SI," "FC," "ST," and "ENG." However, it is essential to note that the lecturer views "PE" as a crucial factor, unlike the students' perception. The lecturer aims to ensure that digitalized materials for architecture subjects are user-friendly and practical, facilitating all students' comprehension and knowledge acquisition (Tables 7 and 8).

Table 9. Students' satisfaction comparison

SAT	PP		PE		SI		FC	
	Stu	Lec	Stu	Lec	Stu	Lec	Stu	Lec
Pearson Correlation	.456**	.498**	.621**	.509**	.693**	.564**	.754**	.689**
Sig. (2-tailed)	.000	.001	.000	.000	.000	.000	.000	.000
N	60	45	60	45	60	45	60	45

Pearson Correlation of students' satisfaction data value with the participant's preferences

The Pearson correlations among the lecturer and student-related variables are displayed (Table 9). The findings reveal that PP was rated the lowest by students, yet they perceived the lectures to be more consistent and geared towards enhancing their academic progress. The interpretations differed from the students' preferences. Still, other variables like PE, SI, and FC emerged as the primary determinants for evaluating the impact of a digital curriculum on student contentment.

Table 10. Students' Engagement comparison

ENG	PP		PE		SI		FC		SAT	
	Stu	Lec	Stu	Lec	Stu	Lec	Stu	Lec	Stu	Lec
Pearson Correlation	.052	.669**	-.175	.363*	.128	.790**	.411**	.761**	.344**	.687**
Sig. (2-tailed)	.694	.000	.182	.014	.328	.000	.001	.000	.007	.000
N	60	45	60	45	60	45	60	45	60	45

The Pearson correlation table reveals no significant correlations among student preferences on PP, PE, and SI variables (Table 10). However, it was noted that lectures continue to emphasize these variables when evaluating student engagement levels. This discovery highlights that student engagement cannot always be equated with satisfaction, as perceived by students.

5.1 Theories and Digitalized Curriculum Evaluation

The collected data on students' perceptions of a digitalized curriculum in architecture pedagogy in Saudi Arabian higher education unveils several insights. To comprehensively analyze this data, we can relate the findings to the concepts of "Flow: The Psychology of Optimal Experience," Constructivism, and the Technology Acceptance Model (TAM).

The concept of "Flow," proposed by psychologist Mihaly Csikszentmihalyi, is characterized by a state of optimal experience where individuals are fully immersed and intensely focused on an activity. In the data context, the students' moderately high perceived performance (PP) and perceived easiness (PE) suggest a positive engagement with the digitalized curriculum. The consistent satisfaction across these dimensions indicates that students might be experiencing a sense of flow, where the challenges of the curriculum align with their perceived skills, creating an engaging and satisfying learning experience.

Constructivism is a learning theory emphasizing the active role of learners in constructing their understanding of knowledge. In the context of the data, the positive correlations between perceived performance (PP), perceived easiness (PE), social influence (SI), facilitating conditions (FC), and students' satisfaction (SAT) align with the principles of constructivism. The findings suggest that when students perceive a positive learning environment (SI and FC), it contributes to their satisfaction, emphasizing the importance of a supportive and engaging educational context in line with constructivist principles.

TAM is a model that assesses users' acceptance of technology, focusing on perceived ease of use and usefulness. In the data, the correlations between perceived performance (PP), perceived easiness (PE), social influence (SI), facilitating conditions (FC), and students' satisfaction (SAT) align with TAM. The strong positive correlations between SAT and all measured factors indicate that students' satisfaction is closely tied to their perceptions of the curriculum's performance, ease of use, social influence, and facilitating conditions, echoing TAM principles.

5.2 Interpretation of Correlation Analysis

Correlation analysis provides valuable insights into the relationships between key variables. The strong positive correlations between students' satisfaction and perceived performance, perceived easiness, social influence, and facilitating conditions underscore the interconnectedness of these factors. This suggests that students' satisfaction is significantly influenced by their perceptions of the curriculum's performance, ease, and support provided in the digitalized environment.

Moreover, the positive and significant correlation between students' satisfaction and engagement reinforces the idea that satisfied students are more likely to be engaged in their educational experience. The absence of a significant correlation between perceived easiness (PE) and engagement (ENG) suggests a nuanced relationship, indicating that perceived easiness might not be the sole driver of student engagement.

5.3 Comparison of Students and Lecturers

The comparison between students and lecturers reveals exciting perspectives. While there is agreement on perceived performance (PP), perceived easiness (PE), social influence (SI), facilitating conditions (FC), and students' satisfaction (SAT), there is a discrepancy in perceived easiness (PE). This misalignment emphasizes the importance of understanding and addressing differences in perceptions between educators and students.

Integrating "Flow," Constructivism, and TAM provides a comprehensive lens for understanding the dynamics of students' experiences in a digitalized curriculum. The positive correlations indicate a potential alignment between the principles of these psychological and educational theories and students' perceived satisfaction and engagement in the digitalized architectural education context in Saudi Arabia. Addressing the nuanced relationships between perceived easiness and engagement and understanding the differences in perceptions between students and lecturers offers valuable insights for refining and optimizing the digitalized curriculum.

6. Conclusion

Investigating the factors influencing students' satisfaction and engagement to understand if the digitalized curriculums have positively or negatively impacted the learning method within higher education institutions. The correlation analyses conducted on data from 105 participants within the architectural education context in Saudi Arabia unveiled crucial relationships between key variables. The first analysis showcased solid and significant positive correlations between Students' Satisfaction (SAT) and Perceived Performance (PP), Perceived Easiness (PE), Social Influence (SI), and Facilitating Conditions (FC). This highlights that as students perceive better performance, ease, social influence, and facilitating conditions within the digitalized curriculum, their overall satisfaction with the educational experience notably increases.

Expanding the analysis to include Students' Engagement (ENG) alongside these variables revealed significant correlations between ENG and SAT, emphasizing a positive relationship between satisfaction and engagement. Additionally, ENG showed noteworthy connections with PP, SI, and FC, highlighting the impact of perceived performance, social influence, and facilitating conditions on students' active engagement. However, the absence of a significant correlation between perceived ease (PE) and students' engagement (ENG) indicates a more nuanced relationship between perceived ease and students' active involvement within the architectural education landscape in Saudi Arabia. These findings underscore the complex interplay between satisfaction, engagement, and various facets of the digitalized curriculum, offering valuable insights for enhancing educational experiences in this domain.

This study examined the elements that impact students' satisfaction and engagement in the context of digitalized curriculums in higher education institutions in Saudi Arabia with a specific focus on architectural education. Analyzing data from 105 participants, the study found significant relationships between key variables, revealing the influence of various factors on students' satisfaction and engagement. The research revealed that students' satisfaction positively correlates with perceived performance, easiness, social influence, and facilitating conditions within the digitalized curriculum.

To meet the needs of students in the digital age, higher education institutions must implement these recommendations to ensure their satisfaction and active engagement in the learning process. Educational institutions must adapt to the changing landscape of education and prioritize integrating digital tools and technology to prepare students for future demands. By taking a proactive approach to digitalization, institutions can provide students with an enriching and fulfilling educational experience that equips them with the necessary skills and knowledge to thrive academically and professionally.

6.1 Recommendations

Higher education can employ such analysis to develop criteria and procedures to comply with the digital age revolution. Since students are the primary stakeholders for educational institutions, the following methods shall be considered: first, to guarantee student satisfaction and enhance their learning experience, it is imperative to involve them in the decision-making process for any new digital tool or platform. As such, it is recommended that students actively provide feedback to ensure that the selected tools and platforms align perfectly with their specific learning requirements. This approach will undoubtedly lead to more successful and fulfilling educational journeys for all involved.

Secondly, to ensure students and educators can fully utilize the benefits of technology, higher education institutions need to take a constructive approach to technology education. By providing comprehensive training and support through various resources such as tutorials, workshops, and other helpful materials, students and educators can confidently engage with technology and leverage it to enhance their learning and teaching experiences. This positive and proactive approach towards technology education will empower students and educators to develop the necessary skills and knowledge to navigate the digital landscape confidently, ultimately setting them up for success in their academic and professional lives.

Lastly, creating a conducive learning environment is crucial for students' success. Educational institutions should focus on providing modern, technology-friendly spaces that accommodate the latest digital advancements. By doing so, they can create a more sustainable and resilient environment that fosters innovation and encourages students to reach their full potential. By prioritizing the development of these spaces, institutions can provide students with a more engaging and interactive learning experience that prepares them for future demands.

References

Kümmel, E., Moskaliuk, J., Cress, U., & Kimmerle, J., Digital learning environments in higher education: *A literature review of individual vs. social settings' role in measuring learning outcomes. Education Sciences, 10(3), 78, 2020.*

Chigbu, B. I., Ngwevu, V., & Jojo, A., The effectiveness of innovative pedagogy in the industry 4.0: Educational ecosystem perspective. Social Sciences & Humanities Open, 7(1), 100419, 2023.

Hashim, M. A. M., Tlemsani, I., Matthews, R., Mason-Jones, R., & Ndrecaj, V., Emergent strategy in higher education: Postmodern digital and the future? *Administrative Sciences*, *12*(4), 196, 2022.

Núñez-Canal, M., de Obesso, M. D. L. M., & Pérez-Rivero, C. A., New challenges in higher education: A study of educators' digital competence in Covid times. *Technological Forecasting and Social Change*, *174*, 121270, 2022.

Levano-Francia, L., Sanchez Diaz, S., Guillén-Aparicio, P., Tello-Cabello, S., Herrera-Paico, N., & Collantes-Inga, Z., Digital Competences and Education. *Journal of Educational Psychology-Propositos y Representaciones*, *7*(2), 579-588, 2019.

Al-Salman, S., & Haider, A. S., Jordanian University Students' Views on Emergency Online Learning during COVID-19. *Online Learning*, *25*(1), 286-302, 2021.

Tere, T., Seta, H. B., Hidayanto, A. N., & Abidin, Z., Variables affecting E-learning services quality in Indonesian higher education: Students' perspectives. *Journal of Information Technology Education. Research*, *19*, 259, 2020.

Sepúlveda, A., The digital transformation of education: connecting schools, empowering learners. *TIC EDUCAÇÃO*, *249, 2020.*

Corradi, S., Drąsutė, V., Tampakaki, F., & Biedma, Ó. M., Promotion of Inclusive Education and Wellbeing through Arts. In *Conference Proceedings. The Future of Education 2021, 2021.*

Elumalai, K. V., Sankar, J. P., Kalaichelvi, R., John, J. A., Menon, N., Alqahtani, M. S. M., & Abumelha, M. A., Factors affecting the quality of e-learning during the COVID-19 pandemic from the perspective of higher education students. *COVID-19 and Education: Learning and Teaching in a Pandemic-Constrained Environment*, *189, 2021*.

Azarnoosh, M., Peer assessment in an EFL context: attitudes and friendship bias. *Language Testing in Asia*, *3*, 1-10, 2013

Hafsi, M., & Assar, S., What enterprise architecture can bring for digital transformation: an exploratory study. In *2016 IEEE 18th Conference on Business Informatics (CBI)* (Vol. 2, pp. 83-89). IEEE, 2001.

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W., Assessing Teaching Presence in a Computer Conferencing Context. *Journal of Asynchronous Learning Networks, 5(2), 1-17, 2001*.

Arbaugh, J. B., An Empirical Verification of the Community of Inquiry Framework. *Journal of Asynchronous Learning Networks, 11(1), 73-85, 2007.*

Bagozzi, R. P., & Davis, F. D., Factors influencing the usage of computer-based message systems: An empirical investigation*; Communications of the ACM, 32(3), 277-294, 1989*.

Brooks, J. G., & Brooks, M. G., In Search of Understanding: The Case for Constructivist Classrooms. Association for Supervision and Curriculum Development (ASCD), 1993.

Csikszentmihalyi, M., Beyond Boredom and Anxiety. Jossey-Bass, 1975.

Csikszentmihalyi, M., Flow: The Psychology of Optimal Experience. Harper & Row, 1990.

Csikszentmihalyi, M., Finding Flow: The Psychology of Engagement with Everyday Life. Basic Books, 1997.

Csikszentmihalyi, M., Flow and the Foundations of Positive Psychology: *The Collected Works of Mihaly Csikszentmihalyi. Springer, 2014.*

Csikszentmihalyi, M., Abuhamdeh, S., & Nakamura, J., Flow. Elliot, A. J., Dweck, C. S., & Yeager, D. S. (Eds.), *Handbook of Competence and Motivation (pp. 598-608). The Guilford Press, 2005.*

Davis, F. D., Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340, 1989.

Deci, E. L., & Ryan, R. M., Intrinsic Motivation and Self-Determination in Human Behavior. Plenum Press, 1985.

Jonassen, D. H., Evaluating Constructivist Learning. Educational Technology, 31(10), 28-33, 1991.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? *A critical review of the technology acceptance model; Information & Management, 40(3), 191-204, 2003.*

Piaget, J., Piaget's theory. In P. H. Mussen (Ed.), Carmichael's manual of child psychology (Vol. 1, pp. 703-732). Wiley, 1970.

Vygotsky, L. S., Mind in Society: The Development of Higher Psychological Processes. Harvard University Press, 1978.

Biographies

Maram A. Abuznada is an Operation Manager leading various departments, including construction, maintenance, and facility management. She expertly manages more than ten buildings, ensuring they are always on schedule for preventive maintenance, corrective maintenance, and construction projects. Her primary focus is on meeting clients' needs and providing them with exceptional service. Ms. Abuznada holds a Bachelor of Science degree in architecture and design and a master's degree in the science of urban design from Effat University. She is interested in technology, facility management, operations, organizational strategy, business, and design theories, and her work reflects this passion. In addition to her professional achievements, Ms. Abuznada is a published author. Her paper, "Using VR Technology as an Urban Design Assessment Tool: A Case Study of Jeddah," was received with critical acclaim and has contributed significantly to the field.

Rahatullah Muhammed Khan Associate Professor With an extensive, diverse accomplished professional and academic background spanning more than 30 years, I have garnered substantial expertise as a senior executive and academic. I have expertise in business, entrepreneurship/start-up development and growth, personnel management, and teaching. I have worked across diverse regions including Asia, the Middle East, and Europe. My professional journey traverses' sectors including heavy industry, process management, services, real estate, and higher education, where I have successfully nurtured and developed numerous start-ups. Adopting the philosophy of economic gardening, my approach centers on catalyzing the creation and development of start-ups, as well as fostering the growth of first and second-stage entrepreneurs. I provide robust and enriched support, offering guidance that empowers businesses to not only grow and thrive but also contribute to employment generation. In the realm of education, my teaching pedagogy is founded on principles of empowerment, personal transformation, and the practical application of theory. I am dedicated to enhancing students' knowledge, skills, and competencies by leveraging expertise, fostering reflective practices, and establishing authentic evidence. I firmly believe in an education that is dynamic, responsive to development, and adaptable to industry requirements. In addition to my professional pursuits, I have actively coached and mentored students, guiding them in strategic thinking, and inspiring innovation and creativity in their endeavors. I am the owner of www.plansane.com. It is a complete business planning and automated financial modelling website. I continue to bring my wealth of experience to the forefront, facilitating a platform that aligns with my commitment to fostering growth, innovation, and excellence in both business and education.