Artificial Intelligence and Digital Transformation in Pakistan's Public Universities: A Systematic Review of Technology Integration and Training

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Abstract

In today's Fourth Industrial Revolution, also known as digitalization, higher education institutions must identify evolving industry needs to equip students w ith skills required to work alongside smart technologies. Digitalization involves converting analog systems to digital formats and leveraging digital tools and information technology (IT) for academic and administrative functions. This transformation drives innovation and compels institutions to revise their curricula accordingly. While developed nations are rapidly adopting hybrid learning models, developing countries like Pakistan face significant barriers in adapting to these shifts. This study conducts a systematic review using PRISMA guidelines, analyzing literature published between 2020 and 2025 from databases such as Google Scholar, Scopus, and Web of Science. The review explores how Artificial Intelligence (AI) is being integrated into digital transformation and technology training in public universities of Pakistan. It identifies major challenges—such as weak infrastructure, policy gaps, and insufficient faculty training—and highlights the importance of aligning digital strategies with institutional goals. The findings offer actionable recommendations for policymakers and educational leaders to support sustainable digital transformation in Pakistan's higher education sector. The study addresses the gap focusing on the human aspects of digital change, contributing to theoretical knowledge and offering practical recommendation for the digital transformation.

Keywords: *Digital Transformation (DT), Technology Training, Artificial Intelligence (AI). Organizational Culture, Institutional Transformation*.

Introduction

Although, the past studies have been restricted and put the limited impact on the digitalization in high education in Pakistan that is why this research has focused in the last five years with the Digital disruptive technologies like artificial Intelligence (AI), robots, virtual reality (VR), and internet of things (IoT) are commonly called the parts of the fourth industrial revolution (Lasi, Fettke, Kemper, Feld, & Hoffmann, 2014). "Industry 4.0" is a word that describes the deep causes and effects of this revolution. The way that people, machines, and things use and interact with the IoT is one of these big developments. Industry 4.0 is a big idea that means bringing computers and the internet into the workplace. It also means a whole process that includes data, processes, practices, and training employees.

The fourth industrial revolution and digitalization have had an impact on many parts of industry, and the education sector and other related fields have had to adapt to these changes and train people who are skilled in digitalization. Disruptions to the Internet have had a huge impact on people's life (Ahmad, 2015). There is a lot of confusion and questions about the new interest in digitalization because it seems to be similar to and share many of the same ideas as other well-established systems and terms, like information technology, computerization, and internet computing. We need to look at the history of Information Technology (IT) to comprehend the new trend of digitalization. Digitalization is clearly a part of information management (Heinzl & Uhrig, 2016). Digital value creation, digital transformation, digital disruption, and digital business strategy are all ideas that were already part of information management frameworks (Heinrich, Riedl, & Stelzer, 2014).

In the past, information management has been changing and growing. It has been through the following steps:

a) Data processing 1970
b) Personal Computing 1980
c) Internet computing 1990
d) Digitalization / digital transformation 2010

These stages can be called innovations and developments in IT that are widely used and put into practice to help with corporate operations and processes. Some academics say that digitalization is a process that takes us from an information society in the post-industrial era to a digital society (Sikora, Roithmayr, & Pomberger, 2016). In this case, the internet is just a process carrier. This means that in the business and economic world, the internet is responsible for changing business and society models that are only partly digitalized into new, fully digitalized ones where "information" is still the main focus of value creation and IT (Riedl, Benlian, Hess, Stelzer, & Sikora, 2017).

According to the 2022–2023 Pakistan Education Statistics survey report. Pakistan has 247 universities in all. Forty percent of the universities are in the private sector, while sixty percent are in the public sector. There are 2.23 million students enrolled in these colleges and universities that give out degrees. This means that only 9% of students can get a college education.

Digitalization and the need for digital content are growing in schools and colleges, and Pakistan is likewise moving toward digitalizing its schools. There have been a number of research on how Pakistani universities are using digital technology. These studies show that both the universities and the students prefer digital platforms (Malik & Mahmood, 2009; Rafiq & Ameen, 2009). More and more schools in Pakistan are using digital media (Rafiq & Ameen, 2012). As the telecom business in Pakistan grows, the technological infrastructure of Pakistani institutions is also getting better. Many universities in Pakistan are employing video conferencing, web-based internet services, and Local Area Network (LAN) and Wide Area Network (WAN). This has led to more digital technologies being used in higher education (Rafiq & Ameen, 2012). Different colleges and universities use Information Communication and equipment (ICT) in different ways, and students don't use it much since higher education institutions don't have the right infrastructure and equipment. Rafiq and Ameen's (2012) study showed that there is a growing need for digital content in Pakistani higher education institutions.

The study came about because of the fast digital changes that were happening to organizational structures, notably in private sector universities in Pakistan. Public sector universities in Pakistan don't have all the technology they need, unlike private sector schools. A lack of digital infrastructure and digital knowledge, as well as a lack of technology instruction, thus they are on the same level as private universities in Pakistan (Jamil, 2021). There isn't much research on how digital changes effect the health of workers. still isn't enough in Pakistan's academic writing. Alojail and Khan (2023) backed up Bresciani et al. (2021) when they said that digital transformation goes beyond new technologies to include changes to the way people work and the culture of the firm. Employee well-being becomes a key issue because changes at work sometimes produce stress, worry, and reluctance to change among employees as they go through digitalization.

Asad and Guerrero (2023) say that academic professionals in Pakistan are becoming more exposed to technostress. They said that more real-world studies were needed to explain the effects of digital change on people. I came up with a research project that looks at how digital transformation affects the well-being of public sector university personnel because this is such a fascinating and talked-about topic.

In summary, the introduction sets the stage by defining the context of the Fourth Industrial Revolution and digitalization, tracing the evolution of information management, and detailing the specific challenges and progress within Pakistan's higher education sector regarding AI and digital transformation. It underscores the critical need for a systematic review to bridge the existing knowledge gaps and facilitate effective policy and implementation strategies.

Literature Review

Moving further, after the exclusion and inclusion criteria the researcher deeply studied the relevant literature. This study gone through a organized search of the literature to find research that works in the areas of digital transformation and AI use. This study also searched databases like Scopus,

Web of Science, and Google Scholar in a systematic way. Some of the keywords used in the search were "Digital Transformation (DT)," "Artificial Intelligence (AI)," and "Policies in Higher Education." The search only looked for items that were published in English between 2020 and 2025.

In Pakistan the universities have a challenges for example the poor training programs infrastructure, employees resistance to change and the bureaucratic organizations structure that really limits their effective communications systems (Fatima and Arshad, 2023). The public sector universities, where bureaucratic structures are common, require cultural readiness in order to have sustainable digital innovation (Bozkus, 2023).

Though this review is confined for last five years, before current year there was not much usage of AI at institutional level. Over the past ten years, there has been a lot of research on how using artificial intelligence (AI) in schools influences the culture of the school, the morale of the teachers, and the involvement of the students. AI technology is changing the way institutions work more and more, bringing up issues like data culture, ethics, and working conditions. The second half talks about recent research on how AI affects colleges and universities. It lists the main issues that come up in this research, which are teacher empowerment, student participation, ethics, and changing institutions.

AI use in education is changing the way schools are run by making them more efficient, simplifying administrative tasks, and creating a culture based on data. Institutions can use AI-based predictive analytics to keep an eye on how students are doing, make the most use of their resources, and make smart decisions (Cornejo et al., 2025). Most schools now use AI for things like managing student enrollment, learning analytics, and academic advising. This has led to better planning and policy-making at the schools (Bribesh et al., 2024). AI automating monotonous tasks, such as scheduling and student services, has made operations more productive and given instructors and administrators less work to do (Espinosa, 2024).

AI also makes it hard to change the values and culture of institutions, in addition to these benefits. If this review rely too much on AI-driven insights, we might stop using traditional human-driven decision-making methods, which could hurt institutional identity and ethical governance. The increasing use of AI in decision-making in institutions has prompted concerns about fairness, openness, and the risk of AI algorithms that have built-in biases. Some people think that while AI can make an organization run more smoothly, it should be used carefully so that it fits with the nature of education, which is to develop students' critical thinking, ethical reasoning, and overall growth (Alam & Mohanty, 2023).

IT, or Information Technology, is a mix of technology and a set of IT services that make sure that all of an organization's Information Technology works well. Information Technology Service Management (ITSM) is now a global topic, much like other services. This is because controlling IT is only possible with good ITSM standards (Ilyas et al. 2022). In his 2024 paper, the researcher said that organizational changes often meet with resistance from employees, which makes it hard to successfully adopt digital change. There is a lot of research on organizational leadership,

employees' resistance, and technology implementation, but not much on how people's views change depending on their level of management in an organization.

Research Gap

Currently more research is being done on how digital transformation is happening in Pakistani universities. Saqib et al. (2021) talked on technology preparedness and regulatory implications, as well as problems with infrastructure. However, they didn't show that they understood employee experience well enough. Javaid. Malik and Kazmi (2023) looked into digital stress and burnout, however they didn't take into account important organizational elements that affect how employees respond to changes in technology. Sajid, Yousaf and Awan (2024) looked at corporate culture in the context of e-governance deployment, but they didn't look at how it affects employee health when they move to digital systems. There is a big gap in research because there isn't any that connects digital transformation dynamics (DTD) to employee well-being (EW) in the context of organizational culture (OC).

To fully understand digital transformation and the whole change process, we need to look at both the technology and the people involved (Gong & Ribiere, 2021; Brunner et al., 2021). In Pakistani public higher education, there are still very few human and technical aspects working together. This is because cultural characteristics have a big effect on how well organizations do (Zeb et al., 2021).

So, this study wants to deal with the problem and fill in this gap by suggesting a model that looks at how digital transformation projects affect the health and happiness of employees. The study will look at how corporate culture affects the relationship between digital transformation and employee well-being. As a result, the current study is very important, timely, and in line with both global and national goals.

Problem Statement

Artificial Intelligence (AI) technologies are moving forward quickly and are having a big impact on businesses, governments, and schools all around the world. For impoverished countries like Pakistan, adding AI to public colleges is both a big chance and a tough problem. Even though the world is moving toward digital transformation, public institutions in Pakistan have been hesitant to use AI-driven tactics for things like institutional development, teaching methods, administrative tasks, and training their staff. This delay not only makes these schools less efficient and competitive, but it also makes it harder to train graduates who are ready for the future and have the skills needed for an AI-driven economy.

There is a clear lack of a systematic understanding of how AI is currently being used for digital transformation and technology training in Pakistan's public higher education institutions. There may be several projects and trial programs, but the lack of a clear plan, infrastructure, knowledgeable faculty, and policy framework has led to uneven adoption. Also, there aren't any thorough evaluations in the literature that look at the pros and cons of using AI in these schools, as well as the problems and results that come with it.

A systematic evaluation is needed to bring together all the current research, find the best ways to do things, and find out what makes it hard to use AI effectively in public sector universities. This kind of work is very important for teaching policy makers, academic leaders, and teachers how to effectively include AI in their plans for digital transformation and strengthening their own skills.

Comparison Of Findings with the Problem Statement

This analysis looks at the problem statement, which talks about the problems that come up while trying to integrate AI and digital transformation into Pakistan's public higher education, and compares it to the results shown in Table 1. The results show that there are various common themes that fit with and expand on the problems mentioned in the problem statement.

The problem statement makes it clear that public sector universities in Pakistan have been hesitant to implement AI-driven strategies for institutional development, teaching, and administration, even though AI is quickly changing many areas around the world. This delay hurts efficiency, competitiveness, and the growth of graduates who are ready for the future. There is a big gap in understanding how these schools use AI for digital transformation and technology training. A lack of a clear strategy, infrastructure, faculty knowledge, and policy frameworks is what makes adoption fragmented.

There aren't many thorough reviews in the literature that look at how AI is used in these institutions, what problems it causes, and what results it gets. This shows how important it is to do a systematic review to find the best ways to utilize AI and the problems that make it hard to do so.

Research Methodology

The present study is performed based on the systematic review by following the standard guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The database like Google Scholar, Scopus and web of science were used for collecting the data. Literature was also searched by using the key words like Digital Transformation (DT), Technology Training, and Artificial Intelligence (AI).

Inclusion Criteria

The Inclusion criteria were made to find the best evidence in each research area and the regions was selected from the technological advanced country and the Asia.

They included:

- Studies that randomly assigned the use of Digital Transformation (DT) and Artificial Intelligence (AI) in higher education and looked at how well they worked in public universities.
- Studies that have been fully published in peer-reviewed journals.

Exclusion Criteria

Some of the things that were not allowed were: papers that were not in English, dissertations, conference abstracts, and sources that had not been peer-reviewed.

Methods of Data Collection

Literature was also searched by using the key words like Digital Transformation (DT), Technology Training, and Artificial Intelligence (AI).

Table 1
Summary of studies conducted.

Sr. No.	References	Study Design	Findings
1	Ilyas *et al* 2022	review	The study's results led to the creation of new ways to measure how well IT and institutional strategic goals are in line with each other.
2	Tariq *et al*; 2024.	review	The study's results show that the digital transition makes Change is hard for all levels of management, but especially for lower management, therefore it has a huge effect on people. This report gives useful advice to both public and private businesses who are going through digital transformation.
3	Batool *et al*; 2024.	review	how digital transformation (DT) is changing how talent is managed in many different fields in Pakistan
4	Aman *et al*; 2022.	review	The digitalization period is a continuation of the New Public Management Model (NPM), which says that the government should run like a company to provide services.
5	Caballero *et al*; 2020.	review	Instead of giving students a desktop computer that can only be used for work, the colleges should focus on giving them laptops that they may use for both work and school.
6	Ahmed *et al*; 2024.	review	Schools should focus on building a strong technological infrastructure, giving staff thorough training and assistance, and changing their teaching methods to properly include the Metaverse in the curriculum.
7	Jamil *et al*; 2024.	review	The findings suggested that faculty teachers might have basic instrumental skills to operate the Internet and ICT devices; however, they might were lacking advanced skills to use VLS and online meeting portals. Sadly, the highest educational organization in the country (HEC) didn't do a good job of making sure that many sections of the country have access to the Internet. It hadn't forcefully told public and private institutions to train their teachers to teach online.

8.	Akhtar *et al*; 2024.	review	The study gives us important information about how future teachers feel, think, and deal with digital technology. The results show that future teachers usually have a positive view of technology, but they may need more help and training to use it effectively in their classrooms.
9.	Brohi *et al*; 2023.	review	Public sector universities in Pakistan should deal with this problem by either developing their own software or buying a dedicated program for recordkeeping. Also, it's important to give personnel thorough training and set up ways for them to get technical help.
10	Huma *et al*, 2022.	review	There was also a mediation effect of adopting learning technology on how engaged teachers were and how well students did. There was a statistically significant link between how engaged teachers were and how well their students did.
11	Sajjad *et al*, 2023.	review	The large dataset shows that teachers are not very interested in learning how to use digital technology, which is bad news for both teachers and pupils. This is especially interesting because it was hard to switch to online education quickly during the Covid-19 pandemic, when schools had to go from traditional to only online classes. techniques of teaching took place, with a lot of Internet and digital technologies.
12	Nimra *et al*; 2024.	-	Because technology in schools is changing so quickly, present instructors need to stay very tech-savvy so that new teachers who are current teachers may bring this knowledge into the 21st century classroom.
13	Kashmeeri *et al*; 2023.	-	The study's results show that the rate of student involvement at the tertiary level in Pakistan is not very good because of the energy crisis and problems with technology.
14	Sadia *et al*; 2023.	-	DL parts that help establish trust, raise awareness of individual EI, encourage teamwork, self-sacrifice, and lead by example might be the best for organizations that are moving toward technology. This report can help human resources and training departments help decision-makers make choices regarding hiring and career planning for digital transformation projects.
15	Taher *et al*; 2023.	-	the people-process-technology perspectives as a framework for putting digital transformation into action at colleges and universities. Without a lot of focus on how to communicate, develop, and motivate the people in the system, the digital transformation will fail.

16	Shoukat 2024.	review	To use comparable methods to improve its educational environment. The study found that many different types of educational institutions have widely used and accepted AI in the classroom. At first, AI showed up in computers and other associated technologies. Then it changed into web-based and online smart education systems.
17	Irfan, *et al.*, 2025	Research	The results showed a strong positive link between the use of AI and teacher motivation. This shows that AI-based tools can make teaching more effective, make it easier for teachers to execute their jobs, and help them grow professionally.
18	Yin *et al.*, 2025	review	. The process of changing higher education to digital is complicated and has a lot of effects. The digital transformation of higher education will help make education more fair, improve the quality of education, and encourage new ways of teaching through policy support, technology upgrades, new ideas about education, and working together to build new schools. However, it will have to deal with problems with technology, talent, and fairness.
19	Malik *et al.*, 2025.	review	The main results of the study are: • The study shows that there are big problems with how AI policies are put into place at universities in Pakistan. • Most of the people who answered (56.5%) don't think that their university has a clear AI policy. They also don't think that the policy is being communicated (65.2% disagreement) or spread about. 60.0% disagreement, which is quite weak • Some universities have ways for continual communication (0.73) and updates (0.76), but execution across departments is still not consistent (60.0% disagreement).
20	Mahreen *et al.*, 2021.	Review	Digitalization should be in line with the goals of the institution. Everyone in the educational community should be involved in and trained for digitalization. Every college and university should have a good way to hire and keep staff and a way to pay for it. Finally, but most crucially, the leaders of the institution need to provide proactive and dynamic assistance that doesn't change in order to improve the digital skills and digitalization of higher education.

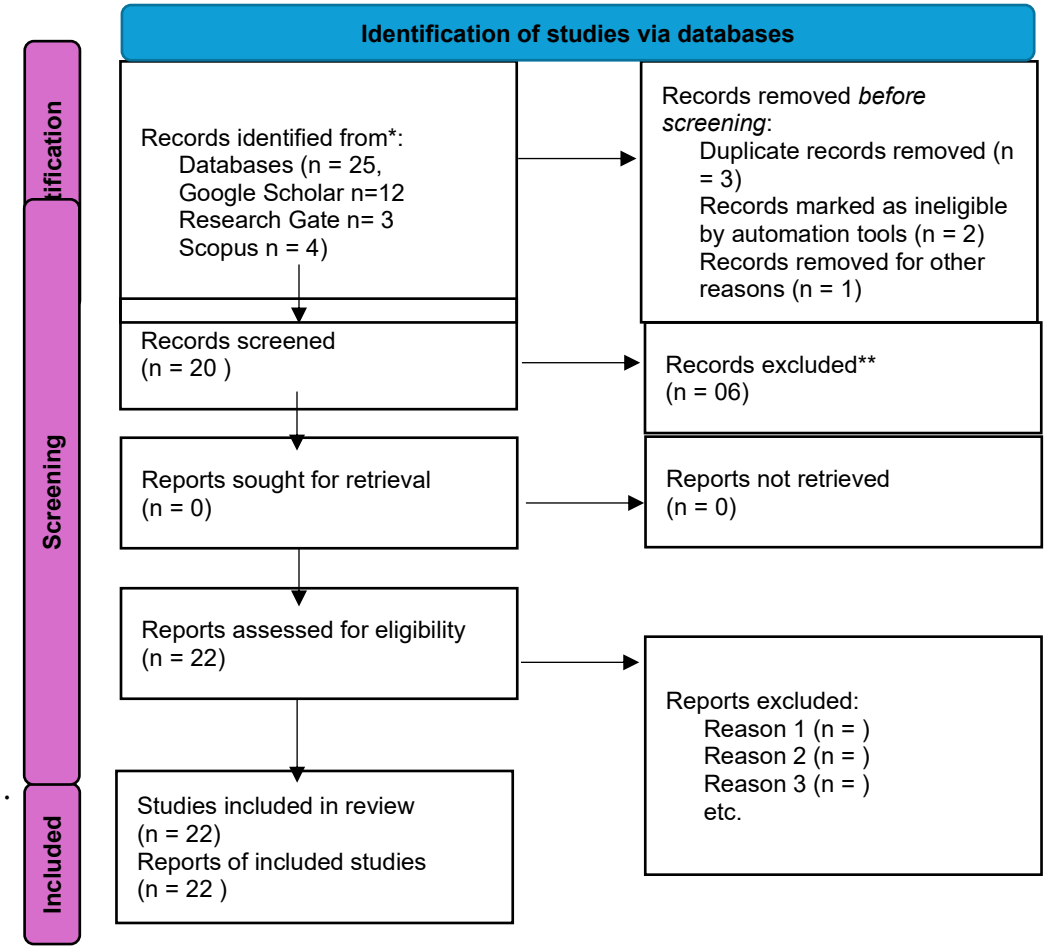
Interpretation Of Findings

Table 1 gives a brief overview of various research on digital transformation, AI, and technology adoption, mostly in the context of higher education in Pakistan and other countries. The table

shows the main results, the study designs (mainly reviews), and the countries where the research took place.

In surmising, Table 1 reveals that while there's a recognized need for digital transformation and AI integration in higher education, particularly in Pakistan, significant challenges persist. These include inadequate infrastructure, low digital literacy among teachers, insufficient policy frameworks, and a lack of leadership support and resources. Overcoming these issues requires a holistic approach that addresses technological, human, and strategic aspects to foster a digitally empowered learning environment and prepare graduates for an AI-driven future.

Figure 1
PRISMA flow chart



Flowchart shows that the number of studies included in the review is not explicitly stated in the flow chart, indicated by "(n = 20)" for both "Studies included in review" and "Reports of included studies. While the chart provides the structure of the PRISMA methodology, some numerical details for the later stages of the study selection process are not explicitly filled in within the provided figure.

Themes From Findings

Lack of Technological Infrastructure and Equipment

- Several research show that we need better technology infrastructure and equipment. Universities should put building strong infrastructure and giving students the right technology, like laptops, for use in the office and in the classroom at the top of their list of things to do (Webb, A. 2020a; Webb, A. 2020b).
- There are worries regarding the lack of advanced abilities among teachers when it comes to using virtual learning systems (VLS) and online meeting portals. There are also problems with making sure that people in many parts of the country can always go online (Webb, A. 2020b).

Digital Literacy, Training, and Skill Shortages

- A common topic is the need for better digital literacy and full training for both present and future teachers. Prospective teachers may be open to using technology, but they frequently need more help and training to use it effectively in the classroom (Sikora, et al., 2016; Malik, & Mahmood, 2009).
- The results also show that teachers are not very interested in learning how to use digital technology, which is worrying, especially since COVID-19 caused a quick shift to online teaching pandemic. To get pupils ready for 21st-century education, teachers nowadays need to be very good with technology (Rafiq & Ameen, 2009; Cornejo, et al., 2025).

Strategic Alignment, Policy, and Leadership Support

- Digital transformation projects need to be in line with the goals of the organization. When you want to make a digital transformation happen, you need to pay attention to how individuals in the system talk to each other, grow, and stay motivated (Bribesh, et al., 2024; Espinosa, 2024).
- The lack of explicit AI policies and insufficient communication and dissemination systems at universities make it hard to adopt AI consistently across departments. To improve digital skills and digitalization in higher education, strong leadership support, enough staff, and good funding models are all very important (Alam, & Mohanty, 2023; Bresciani, et al., 2021).

Impact on Management and Human Resources

- Digital change makes things harder for managers at all levels, but especially for lower-level managers, and it has a big effect on people. This means that companies going through digital transformation need effective advice (Brunner et al., 2021).
- Digital transformation is changing the way companies manage their employees. HR departments can utilize research to help them decide who to hire and how to plan careers for digital transformation initiatives (Asad, et al., 2023).

Student Engagement and Performance

- The number of students who are involved in higher education is not very high, mainly because of energy concerns and problems with technology. However, the use of learning

technology has an indirect influence on teacher engagement and student performance. There is a direct beneficial link between teacher engagement and student performance (Gong, & Ribiere, 2021; Jamil, 2021)..

The results in Table 1 substantially support what the problem statement says about how slowly and in pieces AI and digital transformation are being adopted in Pakistan's public higher education. They give examples of the problems with infrastructure, digital literacy, policy execution, and the necessity for strategic leadership and thorough training to get over these problems and create a digitally empowered learning environment.

Thematic Analysis

This thematic analysis combines the results shown in Table 1 to show a few important topics that affect digital transformation and AI integration in higher education, especially in Pakistan. The themes show problems, areas that need to be improved, and strategic issues that need to be thought about for digitalization to work.

- One main theme is that there are problems with the infrastructure and equipment. It is very important for colleges and universities to make the development of strong technology a priority. This means giving the right digital tools, like laptops for use in the office and classroom instead of less adaptable desktop computers. Making sure that many sections of the country have reliable internet connectivity is also a big problem that directly affects the ability to learn online and do business online (Alojail, & Khan, 2023; Ahmad, 2015; Lasi, et al., 2014).
- Another important topic is digital literacy, training, and skill shortages. The results regularly show that both existing and future teachers have big gaps in their digital literacy and need thorough training (Lasi, et al., 2014; Webb, 2020a; Webb, 2020b).Faculty may know how to use the internet and ICT tools, but they typically don't know how to use virtual learning systems (VLS) and online meetings. One worrying trend is that some teachers are not very interested in learning how to use digital technology. This is especially bad because the COVID-19 pandemic forced schools to switch to online education very quickly (Lasi, 2014; Heinzl, & Uhrig, 2016). So, teachers nowadays are encouraged to stay up to date on technology so they can prepare their pupils for 21st-century learning (Heinrich, et al., 2014).
- A third important theme is the need for policy, strategy alignment, and leadership support. Digital transformation projects can only work if they are in line with the overarching strategies of the institution (Sikora, 2016; Pakistan Education Statistics, 2004-2005). One important problem is that there are no clear AI policies at the university level, as most of the people who answered said there weren't any (Malik, & Mahmood, 2009). Also, these policies aren't always followed because of poor communication and distribution methods.
- For digital transformation to work, institutional leaders need to be proactive and flexible, and there needs to be enough staff and resources to improve digital skills. The involvement

of everyone in the educational community, with a focus is also important for successful digitalization are communication, development, and motivation (Pakistan Education Statistics, 2004-2005; Rafiq & Ameen 2009; Cornejo, 2025).

- Another theme is how digital change affects management and human resources. Digital change makes things harder for all levels of management, especially for lower-level managers' management, it has a big effect on people in the business, thus institutions going through these changes need effective advice. It has been noticed that talent management techniques are changing in a variety of fields. This suggests that human resources departments should use research to help them make decisions about hiring and career planning for digital transformation (Bribesh, 2024; Alam, & Mohanty, 2023).
- Finally, the theme of student engagement and performance shows that the level of student involvement at the tertiary level in Pakistan is not great, partly because of energy crises and technological problems (Bresciani, 2021). However, using learning technology has a positive effect on both teacher engagement and student performance. There was a statistically significant direct positive association between teacher involvement and student performance. This means that using technology in the right way can have a positive effect on student results (Brunner, 2021.

The thematic analysis of the results in Table 1 gives a full picture of the many problems and chances that come with digital transformation in higher education. It shows how important it is for technological infrastructure, human capital development, strategic leadership, and policy frameworks to work together to make digitalization and AI integration function better for education.

Digital Transformation And It Alignment

One study stresses the need for new measurements to see how well IT matches with institutional strategic goals. This suggests that a clear link between technology progress and broader

organizational goals is necessary for successful digital transformation.

Effect on Different Levels of Management

Digital transformation is hard for all levels of management, but especially for lower management. This shows that these kinds of changes have a big effect on people in an organization. This discovery gives useful advice to both public and private companies who are going through digital transformation.

The New Public Management Model

The digitalization period is seen as an outgrowth of the New Public Management Model (NPM), which says that governments should use commercial principles to improve how they offer services. Adoption of technology and infrastructure in schools.

Providing Technological Equipment

Universities should focus on giving students and staff the laptops they need for work and school, not simply laboratory PCs available on campus.

Strong Infrastructure and Training

Schools should work on building up their technology infrastructure, giving staff thorough training and support, and adding new teaching methods, like the metaverse, to the curriculum.

Teacher Digital Literacy and Support

Faculty may know how to use the internet and ICT tools, but they often don't know how to use virtual learning systems (VLS) and online meeting portals very well. This shows that further advanced training is needed. The Higher Education Commission (HEC) also has not always made sure that students can get online and that teachers are trained to offer online programs. Most people who want to be teachers have a good view of technology, but they need more help and training to use it well in their classes.

Ways to Train and Help Employees

To make it easier for employees to use specific programs for record-keeping, they need to get a lot of training and set up technical support systems.

Learning Technology Adoption and Performance

The use of learning technology has a favorable effect on both teacher engagement and student performance, and there is a statistically significant direct link between these two elements.

Challenges And Gaps In Digital Transformation

Digital Skill Inclination

It's worrying that teachers don't seem very interested in learning how to use digital technology, especially after so many of them had to switch to online teaching during the COVID-19 pandemic. To get kids ready for 21st-century education, teachers nowadays need to be very good with technology.

Energy and Technology Problems

In Pakistan, energy crises and technology problems make it hard for students to get involved in higher education, which shows that the rate of student engagement is not very good.

The Human Aspects of Digital Transformation

To successfully change to digital, you need to pay attention to your people, such as helping them develop their emotional intelligence, teamwork, self-sacrifice, and leadership by example. For successful implementation, it is very important to communicate with, develop, and motivate individuals.

AI Adoption in Education

AI has been widely used in education around the world, moving from computer-based tools to web-based and online intelligent systems. AI-based tools can help teachers do their jobs better, lighten their bureaucratic burdens, and help them grow as professionals.

Policy Gaps In Pakistan

There is a big disparity in the implementation of AI policy framework at Pakistani universities. Most people who answered said they don't think their colleges have clear AI policy framework and that the ways policies are communicated and shared are insufficient. Some colleges have ways to talk to each other, although not all departments use them consistently. Digital transformation in higher education, especially in Pakistan, is a complicated process that includes building up technology, training people, and making new policies. formulating and aligning strategies. There is a definite need for and some success in using digital tools and AI, but there are still big problems, such as teachers not being tech-savvy enough, not having enough tech assistance, and not having clear, consistently followed policies. All of the findings point to the same thing: a successful digital transformation needs to take into account both the technological and human aspects of the process. This will make sure that schools are ready to produce graduates who are ready for the future and increase the quality of education.

Findings And Implications

Digitalization should be in line with the goals of the institution. Everyone in the educational community should be involved in and trained for digitalization. Every college and university should have a good way to hire and keep staff and a way to pay for it. Finally, but most crucially, the leaders of the institution need to provide proactive and dynamic assistance that doesn't change in order to improve the digital skills and digitalization of higher education. The process of changing higher education to digital is complicated and has a lot of effects. The digital transformation of higher education will help make education more fair, improve the quality of education, and encourage new ways of teaching through policy support, technology upgrades, new ideas about education, and working together to build new schools. However, it will have to deal with problems with technology, talent, and fairness. Hence this study focuses on the AI and teacher motivation. This shows that AI-based tools can make teaching more effective, make it easier for teachers to execute their jobs, and help them grow professionally.

Recommendation And Future Outlook

For digital transformation and AI integration to work in higher education, especially in places like Pakistan, it is important to improve the technology infrastructure, train staff better, and make policies that support these changes.

Strategies to Improve Technological Infrastructure

Prioritize Robust Infrastructure Development

Schools should make building a strong technical infrastructure a top priority. This involves making sure that internet connectivity is consistent and available to a lot of people, which has been a problem in many sections of the country.

Provide Appropriate Technological Equipment

Instead of depending on less flexible options like desktops, universities should focus on offering the right technology, like laptops, for both professional and classroom use.

Effective Enhancement of Faculty Training

Comprehensive Training and Support

To effectively include emerging technologies, such as the metaverse, in the curriculum, institutions should give staff thorough training and continuing assistance

Address Skill Gaps in virtual learning systems

Some faculty members may know how to use the internet and ICT tools, but they don't know how to use virtual learning systems (VLS) or online meeting portals very well. To make sure that online teaching is effective, training programs should focus on these topics.

Foster Digital Literacy and Continuous Learning

To get kids ready for 21st-century education, teachers nowadays need to be very good with technology. This means that instructors need to keep learning new digital abilities all the time, especially since some teachers seem to be less interested in learning these skills.

Support Prospective Teachers

Even future instructors who are open to using technology need more help and training to use digital tools in their classrooms effectively.

Policies Supporting AI Integration in Education

Developing Clear AI Policies

One big problem that has been found is that universities don't have explicit AI policy framework. Institutions need to make clear rules to help them use AI.

Strengthening Communication and Dissemination Mechanisms

Because AI policies aren't communicated and spread well, they aren't always followed in the same way in all areas. Everyone in the institution needs to be able to understand and follow the policies.

Aligning Digitalization with Institutional Strategies

Digitalization activities, like adding AI, need to fit in with the institution's broader plans. This makes sure that new technologies help with bigger educational goals.

Ensure Leadership Support and Adequate Resources

To improve digital skills and digitalization, institutional leaders need to provide proactive and dynamic support. This also means making sure there is a good, long-term staffing plan and a finance model to support these projects.

Engage the Entire Educational Community

Everyone in the educational institution community should be involved in and taught for digitalization, with a focus on communication, growth, and motivation of people in the system.

To make higher education's digital transformation and AI integration work, you need to take a multi-faceted strategy. This means putting money into strong technology infrastructure and the right tools, offering targeted and ongoing training programs to help faculty improve their digital literacy and skills in virtual learning environments, and making sure that AI policies are clear, well-communicated, and in line with the institution's goals, with support from leadership and enough resources.

Conclusion

This article systematically reviewed the state of digital transformation and Artificial Intelligence (AI) integration in public sector universities in Pakistan, highlighting key challenges and offering recommendations for future development.

Even while previous studies have emphasized the potential benefits of AI in education, this study highlights that adopting AI by itself does not ensure that organizational culture and educator motivation will improve. Educational institutions must make investments in teacher training, provide institutional support, and create policies that encourage the efficient use of AI technology if they hope to see a revolutionary impact from AI. Future studies need to emphasize longitudinal research and individual AI applications in order to better learn how AI can support the sustainable quality improvement of the learning and teaching culture in higher education. Eventually, AI can transform educational institutions, but its success is conditional on an integrative and sufficiently supported implementation approach.

In summary, it concludes that a successful digital transformation and AI integration in Pakistan's higher education sector necessitates a multi-faceted approach. This involves significant investment in technology infrastructure, comprehensive training for human capital, strong strategic leadership, and clear policy frameworks to overcome existing challenges and prepare future generations for an AI-driven economy.

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