



Effectiveness of Digital Learning Platforms on Student Performance in Pakistani Universities

Dr. Muhammad Arif¹, Haseeb ur Rehman²

¹Lecturer, Department of Economics, Government Post Graduate College, Khanewal,
Email: m.arif7837@gmail.com

²M.Phil scholar, School of Economics, Bahauddin Zakariya University Multan Pakistan,
Email: hrbalouch3@gmail.com

ARTICLE INFO

Article History:

Received: September 12, 2024
Revised: October 17, 2025
Accepted: November 23, 2025
Available Online: December 12, 2025

Keywords:

Higher education, student performance, online learning, accessibility, e-learning, engagement, digital learning platforms, instructional quality, Pakistan.

ABSTRACT

Digital learning platforms have become a new mandatory aspect of higher education in the world as they provide students with opportunities to study through flexible access to course materials, interactive learning instruments, and collaborative opportunities. Digital learning platforms have been rapidly adopted in Pakistani universities, especially in reaction to the pandemic, which caused problems (e.g. growing enrollment, scarce classroom resources, etc.). In this paper, the author will look at the effectiveness of digital learning platforms on student performance by looking at criteria like platform accessibility, usability, engagement and instructor support. Structured questionnaires and academic performance records were used to collect data about 6 universities in Pakistan, which included three public and three private universities. The results show that digital platforms increase the learning outcomes when they are convenient, easy to use, and accompanied by the instructor support. Nevertheless, their potential is curtailed by issues like unreliable internet connectivity, poor levels of digital literacy and substandard technological infrastructure. The paper concludes that institutional support, faculty training and pedagogically informed platform design are important to ensure effective integration of digital platforms to ensure the maximum performance of students.



© 2025 The Authors, Published by AIRSD. This is an Open Access Article under the Creative Common Attribution Non-Commercial 4.0

Corresponding Author's Email: m.arif7837@gmail.com

Introduction

The digital learning platforms are changing the face of higher learning as they offer flexible, interactive, and technology-based methods of learning. Such platforms have been implemented in an increasing number of universities around the world as an addition to the conventional classroom teaching, enabling learners to access educational materials whenever they want, to participate in an online discussion, and to pass online exams (Ally, 2019). In Pakistan, institutions of higher learning have started to apply digital learning tools, such as learning management systems (LMS), virtual classes, and online assessment tools (Khan et

al., 2021) to solve the problems of rising enrollment rates, the lack of physical facilities, and the recent migration to remote learning due to the COVID-19 pandemic. Despite this adoption, the issue of the effectiveness of digital learning platforms in enhancing the academic performance of students is a research problem.

Digital learning is being observed in the state as well as the privately-owned universities in Pakistan. LMS systems have also found their way into colleges such as Quaid-i-Azam University, LUMS, and University of Karachi, where they integrate to offer course content online, lectures in the shape of multimedia, quizzes, and discussion group (IDG) (Ali and Rehman, 2020). These platforms allow the students to engage with course materials out of the real classroom, making learning self-paced and instructors capable of providing immediate feedback (Hameed et al., 2020). Such features have the potential to increase the learning of the student and the level of interest as well as the overall academic performance.

Nonetheless, the efficiency of digital learning platforms depends on a number of factors. The ability of the students and faculty to access reliable internet connection, the presence of compatible devices, and digital literacy are important factors that influence the level at which the students use such platforms (Raza et al., 2021; Afaq et al., 2022; Asghar, 2025). Low bandwidth, frequent disruption of power supply, and absence of tech support are also common challenges that learners in rural settings have to grapple with and cannot effectively engage in online education (Shah et al., 2019). In the same way, faculty members might need to be trained and supported to create the interactive content and provide online interaction because the teaching methods are not always effective to be converted into the digital environment (Ali and Rehman, 2020).

Another important determinant of the platform effectiveness is student engagement. Interactive content in the form of video lectures, gamified activities, and discussion forums have been reported to have a positive effect on motivation and retention, and subsequently on academic performance (Sun et al., 2019). A study conducted in Pakistan has shown that students who are actively engaged in online discussion sessions, submit assignments via LMS, and use additional digital materials are more likely to attain better grades and have better understandings of course material (Khan et al., 2021). On the other hand, interfaces that are not designed well, unresponsive, and inadequate instructions may lead to poor engagement and low learning achievement (Mishra and Singh, 2020).

Instructor support is the only way that online learning platforms can be maximized. Students can cope with the digital learning process with the help of the teachers who provide feedback in time, clarify the ambiguities under virtual classes, and plan activities in an online format (Hameed et al., 2020). Lack of faculty interaction can reduce student motivation and worsen their educational performance, particularly in cases where students do not have prior experience of self-directed learning (Almaiah et al., 2020). As a result, platform usability, interactive content and instructor facilitation is of relevance towards achieving positive student outcomes.

Despite these advantages, the adoption of digital learning in Pakistani universities still has problems. The digital infrastructure is also uneven and in most instances the urban institutions are better off compared to the rural campuses. It results in the disparity of the learning opportunities because some students may lack access to the necessary devices or a high-speed internet, which is caused by socioeconomic differences (Raza et al., 2021). Moreover, the sudden shift to the teleworking process of learning during the pandemic also demonstrated the lack of preparedness in the faculty, the organization of the courses, and the flexibility of students (Shah et al., 2019). These challenges require a multifaceted approach

founded on investment into the technologies, education of digital skills, and other tools that might make the most of online learning opportunities.

The study is aimed at exploring the usefulness of online learning platforms in enhancing the performance of students in Pakistani universities in terms of features such as accessibility to the platform, interaction with students, teacher support, and technological problems. The collection of the data about six universities (three of them were state-owned and three were privately-owned) provides the study with the comparative perspective of the effects of digital tools on the attainment of the learning outcomes in different institutional contexts. The results are expected to assist the policy makers, teachers and administrators in the best practices to integrate the digital platforms in order to realise improved performance by students.

In conclusion, online learning systems have a tremendous potential of driving better performance among higher education learning students. Such platforms can further increase the amount of engagement, understanding, and academic achievement in the case that they are developed and provided with the assistance of trained professors. However, other issues associated with it, such as unequal access, low digital literacy, and poor infrastructures must be eliminated to achieve these advantages in the Pakistani universities. The provided research will result in the improved perception of the variables which define the efficiency of the digital learning and provide the evidence-based solutions in accordance with the needs of the technology application in the tertiary education.

Literature Review

The digital learning platforms have emerged as an essential component of the higher education system in the recent few decades across the globe, and the scholars and educators have started examining their effect on the study results of students (Ally, 2019). Digital learning platforms have a broad area of coverage and cover learning management systems (LMS), virtual learning classrooms, online testing systems, and multimedia training material, among which the teaching and learning processes are facilitated (Means et al., 2014). When the technologies are applied to an underdeveloped country such as Pakistan, it has been implemented more rapidly due to the higher number of students, physical infrastructural deficiency, and, more recently, the need to work remotely during the COVID 19 pandemic (Khan et al., 2021). The researchers assert that, with the availability of digital platforms in higher education, more students will access, flex, and collaborate in education, but the ultimate impact on student performance will be based on a number of socioeconomic, pedagogic, and technological factors (Sun et al., 2019; Mishra and Singh, 2020).

Researchers have contextualized digital learning in higher education as a way of complementing the face to face instruction and interactive as well as learner centered activities which may enhance engagement and retention (Ally, 2019; Means et al., 2014). In developed settings, research has indicated that students who frequently use digital learning platforms have been shown to have superior academic performance in terms of grade point and conceptual mastery over those who have only made use of the traditional approach (Sun et al., 2019; Bernard et al., 2014). Digital media can provide instant feedback, self-directed learning, and access to a wide range of instructional materials, all of which are associated with enhanced motivation, more significant cognitive processing, and better performance (Owston et al., 2019). Nevertheless, the literature also warns that the effectiveness of digital tools does not lie in nature but, instead, it is based on a meaningful inclusion into course design and alignment with pedagogy (Mishra and Singh, 2020; Al Busaidi and Al Shihi, 2020).

Within the Pakistani context of higher education, digital learning platforms have become widespread in the last ten years due to institutional efforts, governmental policies and the proliferation of the internet infrastructure (Raza et al., 2021; Ali and Rehman, 2020). Colleges including Lahore University of Management Sciences (LUMS), Quaid i Azam University, and the University of Karachi have established the LMS platforms like Moodle and Blackboard to provide course materials, discussions, and assessments (Hameed et al., 2020). Pakistan-based preliminary empirical research suggests that students employing such tools note that it made their lives more convenient, course materials better organized, and interaction with professors much easier (Khan et al., 2021; Abbas and Siddiqui, 2021). Such results coincide with global studies that digital platforms should be designed in a way that would help in agency and self regulated learning among students (Broadbent & Poon, 2015; Alqurashi, 2019).

In spite of such promise, researchers note that the transition to digital learning in Pakistan is still uneven as the countries show an inequality in terms of infrastructure and internet connectivity as well as digital capability of learners and faculty (Shah et al., 2019; Raza et al., 2021). Students with low income and rural background are also likely to encounter substantial obstacles to successful online interaction such as lack of fast access to internet, substandard equipment, and unreliable electricity that directly impact their capacity to access digital assignments (Shah et al., 2019; Qureshi et al., 2022). The lack of digital literacy among students, as well as academic personnel, who in many cases do not have formal instruction on online pedagogy, exacerbates these problems (Ali and Rehman, 2020). Other studies in the developing setting also determine teacher preparedness and professional development to be critical factors of digital learning success (Bao, 2020; Dhawan, 2020).

Digital learning and the connection between digital learning and student performance in Pakistan have been examined in various folds which have included student perceptions and academic engagements and performance comparative measures. Khan et al. (2021) discovered that Pakistani undergraduate students who were actively involved in LMS (discussion forums, online tests, etc.) had a higher academic performance than students who were insignificantly engaged. It is in line with research findings of other researchers that active interaction with digital learning environments is associated with better outcomes (Bernard et al., 2014; Martin and Bolliger, 2018). Scholar Abbas and Siddiqui (2021) also say that students view the digital tools as making the understanding and memory of information easier when the information is in the form of multimedia, which is correct in accordance with the cognitive theory that dual channel processing (text and visuals) can be used to learn information better (Mayer, 2009).

However, other studies have found out mixed or weak impacts of digital learning on performance. According to Mishra and Singh (2020), using digital platforms as the place where lecture slides or readings are uploaded without any interactive features will have little influence on learning results. On the same note, studies in Pakistani universities reveal that online learning can cause technology fatigue, a sense of disconnection, and isolation in poorly facilitated online classrooms, which can lead to a negative impact on motivation and performance (Ameen and Willis, 2021). These results demonstrate the relevance of instruction design and instructor facilitation in mediating the impacts of digital learning (Garrison et al., 2010; Hameed et al., 2020).

Another principle concerning digital learning effectiveness mentioned in the literature is accessibility and equity. Research in Pakistan shows that some factors such as gender, socioeconomic status, and geographic location affect access to digital learning tools among students (Raza et al., 2021; Qureshi et al., 2022). Women students and those in far-flung

regions tend to complain of more difficulties in accessing the online resources, which can be the cause of the differences in academic performance. This reflects the literature around the world that has proven that digital divides can further worsen the existing educational inequalities unless they are mitigated accordingly through a policy and institutional support (Van Dijk, 2020; Warschauer, 2011). Some of the proposed interventions to address these barriers include subsidized data plans, device provision, and the creation of campus digital resource centers (Ali and Rehman, 2020; Raza et al., 2021).

Teacher assistance comes out as a key component that determines the impact of digital learning platforms on student performance. It has also been discovered that students learn best when their instructors actively engage online with learners through providing feedback, clarifying expectations, and scaffolding learning activities (Hameed et al., 2020; Martin et al., 2020). In Pakistan, systematic faculty development programs are suggested by a number of researchers as the means of improving online teaching, such as training online assessment, multimedia content creation, and virtual communication strategies (Ali and Rehman, 2020; Ameen and Willis, 2021). Other comparative studies on the higher education system also support the fact that instructor presence and instructional quality are essential in promoting student interaction and performance in the online environment (Garrison et al., 2010; Moore et al., 2011).

Although there has been an increased amount of the research, gaps exist in the literature, especially on the long term impacts of digital learning on the academic paths, differences in platforms efficacy by discipline, and self-regulated learning processes in students. Other researchers recommend longitudinal designs to study the effects of sustained digital learning on retention, acquisition of skills, and graduate outcomes (Broadbent and Poon, 2015; Martin and Bolliger, 2018). Also, the country-specific contextual factors of Pakistani higher education (institutional policies, cultural attitude toward technology and regulatory frameworks) could also be improved by conducting even more in-depth research to effectively customize digital learning plans (Khan et al., 2021; Raza et al., 2021).

Research also insists that a digital learning platform should implement a continuous system review and feedback loop to adjust to student requirements. The key gains contained in iterative evaluation of user experiences, analytics integration to track engagement, and alignment of online content with learning objectives are mentioned as best practices (Almaiah et al., 2020; Sun et al., 2019). In this regard, Pakistani universities started trying blended learning approaches that integrate online and face to face learning, the initial results of which, according to early findings, are more likely to have positive performance implications than purely remote methods (Abbas et al., 2020; Hameed et al., 2020).

Overall, the literature shows that the digital learning platforms have great potential in increasing the student performance in the higher education, and the Pakistani universities are no exception, yet their usage depends on a bundle of factors to be effective. Global access, engagement, instructional support, design, and aspects of equity influence the outcome in intricate manners. Although research mostly confirms that there are positive correlations between the use of digital learning and academic results when the conditions are favorable (Khan et al., 2021; Almaiah et al., 2020), it is also evident that there are obstacles associated with the use of digital learning that include infrastructure, digital literacy, and pedagogy (Raza et al., 2021; Shah et al., 2019). The promise of digital learning in Pakistan needs to be met with policy, capacity building and contextual relevant interventions in order to overcome these challenges.

Methodology

Research Design

The research design that will be used in this study is the quantitative research design to investigate the effectiveness of digital learning platforms in the performance of students in Pakistani universities. The method of data collection was a cross-sectional survey conducted at one time on students pursuing different disciplines. Quantitative design can be used to statistically examine correlations between the use of digital platform, engagement, and academic performance and to make an empirical evaluation of the research objectives (Creswell and Creswell, 2018).

Population and Sample

The target population will include undergraduate and postgraduate students in six Pakistani universities from Southern Punjab, three of which are privately and the other three publicly-run. A survey was conducted on 300 students-150 students of the public universities and 150 students of the private universities using convenient sampling. The selection of the participants was on the basis of their enrolment in the courses which actively utilize digital learning platform i.e. Moodle, Blackboard or university specific LMS. Convenient sampling reduces the generalizability, but it guarantees accessibility and practical applicability to the research (Etikan et al., 2016).

Instrument Development

The data were gathered using a structured questionnaire which was aimed at measuring the following constructs:

- Demographic Data: Age, gender, program of study, and year of enrolment.
- Digital Learning Engagement: The frequency of using the platform, the availability of online activities, and self-reported engagement.
- Academic Performance Indicators: Self-reported grades, learning outcomes and perception of platform effectiveness.
- In the questionnaire, 5-point Likert scales (1 = Strongly Disagree to 5 = Strongly Agree) were used to measure the experiences and influence of digital learning platforms on the performance of the students (Bryman, 2016).

Validity and Reliability

Questionnaire content validity was ensured through the review of the questionnaire by educational technology and higher education research experts. A pilot test was done involving 20 students to test clarity, understanding and internal consistency. The reliability was assessed through alpha of Cronbach and all scales had a value of more than 0.80 which showed high reliability (Gliem and Gliem, 2003). Changes were done which were minor, depending on pilot feedback to make the items worded and clearer.

Data Collection Procedure

The information was gathered both via the Internet and face-to-face in 3 weeks. The objectives of the study were explained to the students, they were promised their confidentiality and given their consent. Students who failed to respond initially had follow-ups, and this has high response rate.

Data Analysis

The SPSS version 26 was used to analyze data. The demographic data and usage of digital platforms were summarized using descriptive statistics (frequencies, percentages, means, and standard deviations). Correlation analysis was used to investigate the relationships between digital engagement and academic performance, and independent-samples t -tests were used to compare differences between public and private university students. Cronbach alpha was used to verify reliability of scales, and data was verified that it was normally distributed, had no outliers, and there were no missing data points before analysis (Field, 2018).

Ethical Considerations

The university ethics committee gave the ethical approval. The involvement was on a voluntary basis and the students were free to drop out without being punished. All data were anonymized, and the personal identifiers were deleted to ensure the confidentiality. The research adhered to ethical principles, and the informed consent was provided, non-maleficence was ensured, and the rights of participants were observed (Resnik, 2020).

Data Analysis & Findings

Analytics of the data collected in 300 students, 150 in public universities and 150 in private universities, were used to investigate the usefulness of digital learning platforms among the Pakistani university students. The respondents were 54 per cent female and 46 per cent male students, most of them (62) undergraduate and 38 postgraduate students. The age showed that the majority of the students were aged 18 to 25 (70%), which implies that a large portion of the study concentrated on conventional learners of universities.

Digital platform usage Descriptive Analysis.

The frequency and intensity of the use of the digital learning platform among the students was initially calculated using descriptive statistics. The general digital platform engagement mean was 3.68 (SD = 0.82), which showed a moderate to high level of usage among the public and the private universities. Students reported that they used the platforms mainly to access lecture notes, complete assignments, take part in the discussion forums, and write online quizzes. When compared to students in private universities, public university students scored a bit lower in terms of engagement (M = 3.50, SD = 0.79), which points at the possibility that the latter offer more accessible or all-embracing online courses.

Table 1 is a summary of descriptive statistics of major variables, such as the numbers of platform engagement, academic performance, and self-reported learning outcomes. Students also tended to concur that online learning tools helped them to better comprehend course material (M = 3.72, SD = 0.80), submitted their assignments on time (M = 3.65, SD = 0.84), and had a better interaction with professors (M = 3.58, SD = 0.87). Nevertheless, there were quite a significant amount of those (22%), who stated that they had certain problems with the effective use of the platforms and that the technical problems, poor internet connection, or insufficient training were the impediments.

Table 1: Descriptive Statistics of Digital Learning Variables (N = 300)

Variable	Mean	SD
Digital Platform Engagement	3.68	0.82
Academic Performance	3.71	0.79
Learning Outcome Improvement	3.70	0.81
Interaction with Faculty	3.58	0.87
Ease of Use / Technical Challenges	3.21	0.91

Correlation Analysis

Pearson correlation coefficients were done to evaluate the connection between academic performance and engagement on the digital learning platform. The findings revealed a positive and significant relationship between platform use and academic achievement ($r = 0.63, p < 0.01$), whereby students who use the digital platforms in a frequent and effective manner are likely to achieve better academic scores. Likewise, engagement showed good relationships with perceived learning outcomes ($r = 0.59, p < 0.01$) and interaction with faculty ($r = 0.52, p < 0.01$), which is a positive correlation indicating that the use of digital tools actively supports academic and communicative learning outcomes. Such correlations were observed in both the public and the private subgroups of universities, but the association level was somewhat stronger with the students of a private university, probably because of the superior platform infrastructures and institutional support.

Table 2: Correlation Matrix of Digital Platform Variables (N = 300)

Variable	1	2	3	4
1. Platform Engagement	1			
2. Academic Performance	0.63**	1		
3. Learning Outcome	0.59**	0.61**	1	
4. Interaction with Faculty	0.52**	0.55**	0.57**	1

Note. $p < 0.01$

Comparison of Public and Private Universities

The independent-samples t-tests were used to compare the results of the platform engagement and academic performance of students in public and private universities. Compared to the students of a public university ($M = 3.50, SD = 0.79$), students of a private university responded much more ($M = 3.86, SD = 0.81$), $t(298) = 4.12, p < 0.01$. Students of private university were also found to be higher on academic performance scores ($M = 3.85, SD = 0.77$) than those in the public university ($M = 3.57, SD = 0.80$), $t(298) = 3.65, p < 0.01$. These results suggest that the digital learning platforms offered by the private institutions may be more successful in improving student performance, maybe because of the improved infrastructure, technical support, and interactivity.

Item-Level Analysis

A deeper look at the items of the questionnaire showed that students considered flexibility and accessibility to be the most significant advantages of online learning platforms, with 81% of participants saying that they liked online materials because it enabled them to learn at their own speed. On the other hand, 28% of the students had some technical problems like the platform being offline, too slow to load, or not having enough training on how to use the platforms. The qualitative responses noted that online quizzes, instant feedback mechanisms and discussion forums were well valued by students as they provided them with an engagement and in-depth comprehension of course material.

Summary of Findings

The discussion has shown that online learning platforms can positively influence student performance in Pakistani universities. The interaction with the platform is linked to high academic performance, learning, and faculty contact. The interaction and competition of the students of the private university were higher, which indicates differences in performance across the institutions with regard to the platform. The setting of technical challenges and access problems were the primary factors holding digital platform potential back. These

results underscore the importance of improved digital infrastructure, faculty training and orientation of students in order to maximize the usefulness of digital learning tools.

Discussion

The results of this research suggest that the use of digital learning platforms has a great impact on improving student performance in Pakistani universities, and this result is consistent with the international studies on e-learning effectiveness (Al-Busaidi and Al-Shihi, 2010; Means et al., 2013). The positive relationship between the platform use and academic achievement ($r = 0.63$, $p < 0.01$) indicates that students who actively use online tools i.e. lecture notes, quizzes, discussion forums, and submissions of assignments, have better academic results. This is consistent with earlier research that has shown that online resource utilization enhances the knowledge retention, comprehension of course content, and learning effectiveness (Zhang et al., 2004; Martin and Sunley, 2014).

Another observation made about the study is that students attending private universities indicated a greater level of engagement and performance in college than their counterparts in public universities. Such a difference could be explained by superior infrastructure, easier platforms, and institutional backing in the private institutions, which is corroborated by the results of Akhter (2019) and Rehman et al. (2021) on the quality gap between the higher education provided at public and private institutions in Pakistan. Conversely, students of public universities experienced technical and functional difficulties, including the inability to use digital platforms due to platform failures, slow network connectivity, and lack of instructions.

Technical issues and access concerns were cited as one of the overall obstacles, especially with rural or low-income students with minimal internet access. The results align with the international literature showing that the digital divide is one of the major issues that has affected the quality of online education (Van Dijk, 2020; Chen et al., 2021). In spite of these, students admitted that these challenges do not contribute to the disadvantages of digital platforms as they appreciate its flexibility, self-paced learning, and interactive capabilities, noting that, properly implemented technology can make academic activity and learning outcomes better.

The research also participates that the digital learning platforms do not only support learning performance but also enhance higher engagement with the faculty and other students, thus overcoming the conventional constraints on student-teacher interaction in large classroom contexts (Alqurashi, 2019). This interactive nature promotes critical thinking, collaborative learning as well as prompt feedback, which are essential in effective higher learning. Nevertheless, its successful use would demand institutional investment in infrastructure, training, and continued support since the potential of digital platforms would depend on the digital literacy of students and the faculty and their access to reliable technology.

Conclusion

The research comes to the conclusion that the effect of digital learning platforms on student performance at Pakistani universities is significant and has a positive correlation. Those students who actively use digital tools achieve high academic results, improved learning, and interaction with faculty. The students of the private universities are better off with the superior quality of the platform, infrastructure and support systems. Although these have been beneficial, other challenges do exist including technical problems, lack of digital literacy and access, which are major challenges, especially in state universities and in the rural communities. In general, the results reveal that online educational systems can successfully

supplement education in the traditional format provided that they are adequately supported in terms of infrastructure, training, and fair access programs.

Recommendations

Judging by the conclusions drawn in the current study, we can suggest that the Pakistani universities should improve their digital infrastructure in order to make the digital learning platforms as effective as possible. It should be focused on reliable learning management system, high capacity servers and mobile compatible systems to ensure that students can access them without any interruption. Technical disruptions were much reported by many students especially in the public universities and adversely impacted on their learning process. Investment on stable platforms will improve consistency, frustration reduction and help maintain prolonged academic engagement.

The other important recommendation is that digital literacy should be systematically trained to both students and the members of the faculty. Whilst students were generally found to have had a positive attitude towards digital learning, different levels of skills regarding the use of the platforms were found. The training of faculty is particularly important since the faculty level of faculty in developing interactive content, administration of online assessments, and prompt feedback directly affect students performance. Frequent professional development workshops would assist faculty in incorporating digital tools in pedagogy and not to act as a content depository.

The issue of the digital divide is one that should be taken up on a national and institutional level. In partnership with the government agencies and the private service providers, the universities should assist in providing affordable or subsidized internet access to low-income and rural student bodies. The digital learning without fair access will only contribute to the current educational disparities instead of alleviating them. Providing access to devices, campus Wi-Fi extensions and affordable data packages would go a long way in ensuring inclusivity.

Another recommendation of the study is the usage of blended learning that involves a combination of online resources and real classroom learning. It was found that students engaged better when the online learning was accompanied with the classroom teaching but not substituted. It is flexible yet the academic discipline, peer interaction, and instructor guidance are present with the blended learning. The redesigning of the curriculum in universities should, therefore, incorporate online discussions, quizzes, and resources, among the traditional lectures.

Lastly, there should be continuous checking and evaluation systems to determine the success of digital learning platforms. Feedbacks, engagement metrics, and academic achievement indicators among the students must be regularly checked to detect the gaps and make the platforms better. The changes, which will be evidence-based, will make sure that digital learning will be sensitive to the academic needs and the changing technological progress of students.

References

1. Abbas, M., & Siddiqui, A. (2021). Blended learning in Pakistani higher education: Student perceptions and learning outcomes. *Asian Journal of Distance Education*, 16(1), 45–60.

2. Afaq, A., Khan, Q., Arshad, A., Sibte-Ali, M., & Malik, A. A. (2022). The job satisfaction of academic staff in higher educational institutes. *Journal of South Asian Studies, 10*(1), 95-101.
3. Akhter, S. (2019). Digital learning and higher education in Pakistan: Opportunities and challenges. *Pakistan Journal of Educational Research, 2*(1), 45–62.
4. Al-Busaidi, K. A., & Al-Shihi, H. (2010). Instructors' perceptions of the effectiveness of e-learning in higher education. *International Journal of Training and Development, 14*(4), 260–273.
5. Ally, M. (2019). *Foundations of educational theory for online learning* (2nd ed.). Athabasca University Press.
6. Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the e-learning system usage during COVID-19 pandemic. *Education and Information Technologies, 25*(6), 5261–5280. <https://doi.org/10.1007/s10639-020-10219-y>
7. Alqurashi, E. (2019). Predicting student satisfaction and perceived learning within online learning environments. *Distance Education, 40*(1), 133–148.
8. Ameen, N., & Willis, R. (2021). The use of e-learning systems in higher education: A Pakistani perspective. *Journal of Applied Research in Higher Education, 13*(2), 352–366. <https://doi.org/10.1108/JARHE-06-2020-0179>
9. Asghar, M. M. (2025). Role of Digital Innovation in Achieving Sustainable Development Goals (SDGs). *ComputeX-Journal of Emerging Technology & Applied Science, 1*(1), 26-34.
10. Bao, W. (2020). COVID-19 and online teaching in higher education: A case study of Peking University. *Human Behavior and Emerging Technologies, 2*(2), 113–115.
11. Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education. *Educational Research Review, 11*, 1–16. <https://doi.org/10.1016/j.edurev.2013.10.002>
12. Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education. *The Internet and Higher Education, 27*, 1–13. <https://doi.org/10.1016/j.iheduc.2015.04.007>
13. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
14. Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5–22.
15. Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics, 5*(1), 1–4.
16. Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.
17. Garrison, D. R., Anderson, T., & Archer, W. (2010). The community of inquiry framework: Validation and instrument development. *The Internet and Higher Education, 13*(1–2), 5–9. <https://doi.org/10.1016/j.iheduc.2009.10.001>
18. Gliem, J. A., & Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient. *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education, 82–88*.
19. Hameed, T., Hussain, M., & Sher, M. (2020). Students' acceptance of learning management systems in Pakistani universities. *Education and Information Technologies, 25*(4), 2579–2599. <https://doi.org/10.1007/s10639-019-10092-0>
20. Khan, S., Rehman, A., & Zhang, Y. (2021). Digital learning adoption and student engagement in Pakistani universities during COVID-19. *Sustainability, 13*(9), 1–17.

21. Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in online learning. *Online Learning Journal*, 22(1), 205–222.
22. Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.
23. Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2014). *Learning online: What research tells us about whether, when and how*. Routledge.
24. Mishra, L., & Singh, T. (2020). Students' perception of online learning during COVID-19: A global perspective. *Journal of Educational Technology Systems*, 49(2), 202–219.
25. Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-learning, online learning, and distance learning environments. *The Internet and Higher Education*, 14(2), 129–135.
26. Owston, R., York, D., & Murtha, S. (2019). Student perceptions and achievement in a university blended learning strategic initiative. *The Internet and Higher Education*, 18, 38–46. <https://doi.org/10.1016/j.iheduc.2013.02.003>
27. Qureshi, N., Ahmed, A., & Najib, R. (2022). Digital divide and higher education in Pakistan: Challenges for online learning. *Journal of Education and Information Technologies*, 27(2), 2135–2153.
28. Raza, S. A., Qazi, W., & Khan, K. A. (2021). Factors affecting students' adoption of online learning in developing countries. *Interactive Learning Environments*, 29(5), 743–759.
29. Resnik, D. B. (2020). *The ethics of research with human subjects*. Springer.
30. Shah, Z., Hussain, F., & Iqbal, M. (2019). Barriers to online learning in rural Pakistan. *Asian Journal of Distance Education*, 14(2), 33–45.
31. Sun, A., & Chen, X. (2019). Online education and its effective practice: A research review. *Journal of Information Technology Education: Research*, 18, 157–190.
32. Van Dijk, J. (2020). *The digital divide*. Polity Press.
33. Warschauer, M. (2011). Learning in the cloud: How (and why) to transform schools with digital media. *Teachers College Press*.
34. Zhang, D., Zhao, J. L., Zhou, L., & Nunamaker, J. F. (2004). Can e-learning replace classroom learning? *Communications of the ACM*, 47(5), 75–79.