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Digital Education Interventions and University Students' Academic Performance Amid the COVID-19 Pandemic: Faculty Members' Perspective

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Abstract

The aim of this study was to document the university faculty members' views related to digital education during the COVID-19 pandemic and subsequently its influence on students' academic performance, encountered obstacles, and recognized prospects. A concurrent triangulation strategy by employing (QUAN+QUAL) mixed method design was used in this research. A survey was conducted to solicit perspectives of 242 university faculty members in six public sector universities selected through a stratified random sampling technique to ensure representation of geographical regions and gender. Survey focussed on ascertaining faculty members' readiness, institutional preparedness, and difficulties of online mode of delivery. Survey was followed by qualitative data collection in the form of narrations of feelings, personal experiences, challenges faced and suggestions to make online mode more effective. Data were analysed by computing descriptive statistics, mean response values of responses. The study found that faculty members expressed concerns about their readiness and satisfaction with online learning. They utilized various communication methods and assessment strategies, highlighting their adaptability. Key challenges included time management, internet connectivity, and technical issues. Achieving success in online programs necessitates reliable internet connectivity, adept time management skills, and mitigation of power disruptions Gender did not significantly affect gadget accessibility, understanding of online classes, or preferences for future online education. In conclusion, faculty members faced challenges with readiness, time management, and internet connectivity during the shift to online education

but showed adaptability through diverse communication and assessment methods. To enhance digital education, institutions should improve internet infrastructure, offer time management training, and address technical issues. Gender did not significantly impact access to technology or preferences for online learning.

Keywords: digital education, post graduate-level scholars, satisfaction of faculty members, tertiary education

Introduction

Digital education involves using technology for learning, such as online courses and virtual classrooms. During COVID-19, it became crucial as schools closed, with factors like the need for remote learning and digital tools driving the shift (Baloran, 2020). In Pakistan, this exposed issues like poor infrastructure and unequal internet access. This research focused on the effectiveness of digital education and challenges faced by educators, to help improve future education systems. This research inquired how digital education inclined student academic performance in COVID-19 pandemic, from faculty viewpoints. It delved faculty viewpoints on the usefulness, obstacles they faced, potential opportunities they identified and whether gender influenced their perception of digital education.

The digital education ensured the continuity of learning during the interruption caused by the COVID-19 pandemic and facilitated students to access education remotely. However, digital education also exposed inconsistencies in technological access and internet connectivity (Bates, 2019). Grasping the link between digital education and academic performance, faculty perspectives on online learning and the hindrances encountered is crucial to address the growing needs of education during extraordinary period (Hodges et al., 2020). The worldwide closure of educational institutions due to the COVID-19 pandemic disrupted education for more than 1.3 billion students in 203 countries. In Pakistan, the existing educational disparities were exacerbated by limited digital resources (UNESCO, 2020). While the COVID-19 pandemic's shift to digital education affected not only academic performance but also resulted in mental health, well-being, stress and technological challenges for students and faculty (Tang and Chaw, 2016; Tasso et al., 2021). The purpose of this study was to investigate the perceptions of university faculty members regarding digital education during COVID-19 pandemic. By probing faculty perspective, the research pursued to reveal the challenges, opportunities,

and strategies associated with online teaching and learning. This study intended to provide insights that can inform the development of effective digital education strategies and policies to support both educators and students during and after complexities.

Problem Statement

Educational institutions during COVID-19 pandemic, worldwide shifted to digital education interventions to ensure learning. However, the usefulness of these interventions, especially at master's level in the Punjab province, remained underexpose. This research aims to address this gap by examining the effects of digital education with a specific focus on the experiences of faculty members at master's level students. Finally, this research aims to provide deliberations that can be utilized in educational plans, strategies and policies in Pakistan and globally.

Objectives of the Study

The objective of this research was to evaluate how digital education affected the academic performance of university students during the pandemic. Precisely, the study aimed to investigate the viewpoints of faculty members in Punjab, regarding the efficiency of online learning educational programs. Moreover, it intended to find the challenges confronted by faculty members in transitioning to online learning and to uncover possible prospects within this new educational framework. Lastly, an examination was conducted to determine whether there is a relationship amongst these perspectives and the gender of faculty members. The objectives of the study were to:

1. Examine the perceived impact of digital education on academic performance, as reported by university faculty members during the COVID-19 pandemic.
2. Investigate the opinions of faculty members concerning the effectiveness of online learning programs deployed in Punjab province, Pakistan.
3. Identify challenges and opportunities in online learning programs from faculty members' viewpoint.

Research Questions

Following are the research inquiries:

1. How do faculty members comprehend the influence of digital education in the pandemic on students' academic performance?
2. What are the perceptions of faculty members concerning the effectiveness of online learning programs?
3. What difficulties do faculty members face in online learning programs and what prospects do they identify within this educational framework?

Hypothesis

H_{01} There was no significant difference in male and female teachers' satisfaction on university support for online teaching.

H_{02} There was no significant difference in male and female faculty members' perceptions on their role for delivering online instructions.

H_{03} There was no significant difference in male and female faculty members' feelings on online teaching experience

Significance of the Study

The significance of this study dwells in the exploration of online learning, or digital education, which has altered from conventional teaching methods by leveraging technology to provide flexible educational experiences worldwide. By transcending topographical and temporal boundaries, digital education democratizes learning, granting learners universal access to high-quality educational resources. Beyond its benefits for students and education sector, digital education allows teachers to experience innovate teaching methodologies and improve success through data-driven evidences. With the progress in technology, the impact of digital education on knowledge propagation and attainment is expected to raise. Policymakers, educator, and administrators can use research discoveries to optimize its implementation in educational institutions, addressing related obstacles. By identifying these challenges, educational planners can develop programs that ensure effectiveness for digital education.

Literature Review

One of the studies conducted in the Punjab province of Pakistan, emphasized that the quality of instruction, course design, and prompt feedback significantly influence student satisfaction and learning outcomes. Another multi-country study, which included participants from Pakistan, examined the relationship between basic psychological needs, motivation, and learning behaviors during emergency distance learning. It found that the satisfaction of psychological needs like independence and ability was crucial for maintaining motivation and reducing procrastination among students (Aucejo et al., 2020; Pelikan et al., 2021). The move to digital education not only influenced academic performance but also had adverse effects on the mental health and welfare of educators' students. Many faculty members and students faced stress and anxiety due to prolonged screen time, isolation, and adapting to new learning environments. Research suggests that remote learning environments lacked the necessary support structures from the university and government to address mental health concerns (Selwyn, 2020; Tasso et al., 2021).

Recently, digital literacy emerged as a major reason affecting the effectiveness of online learning. One of the major challenges was that faculty members were expected to acclimatize their teaching methodologies without proper capacity building or availability of resources. Although, in education sector, the COVID-19 pandemic has accelerated the adoption of digital technologies, however it also raised grave queries about the sustainability and longstanding impacts of such modifications. This includes but not limited to addressing infrastructure gaps, digital equity, and the development of hybrid learning models (Schleicher, 2020). According to Spector and Morel, educational technology encounter hinderances in guaranteeing broad access and effective implementation in varied educational contexts that require careful integration of theory and practice. In addition, it contains selecting appropriate technologies, dealing rapid advancements, and acclimatising to learners' needs in multifaceted environments (Spector & Morel, 2022).

The COVID-19 pandemic interrupted traditional education globally, pushing institutions to implement online platforms. However, digital education has tinted significant disparities, with disenfranchised groups facing challenges due to limited internet connectivity and lack of access to gadgets, aggravating the digital divide in education (Gupta et al., 2020). The COVID-19 pandemic has meaningfully altered education globally, shifting the learning environment from schools to private

homes. This shift forced educational responsibilities on the shoulders of parents and introduced tests such as compromised privacy, increased rates of academic dishonesty, and heightened social disparities. As a result, the rapid move to digital learning underscored these issues and exposed gaps in resources and cultural keenness, especially within Arab societies (Al-Lily et al., 2021). According to DiMaggio the rapid shift to online learning revealed inequalities in technology and internet access among students, mainly from marginalized communities, and remote areas that ultimately hindering their educational progress. (DiMaggio, 2004). Allen and Seaman found that online education is essential for mounting access to learning and meeting the institutional objectives. However, concerning the challenges, it was inferred that lower retention rates, faculty uncertainty, and self-control requirements hamper its widespread acceptance. In addition, faculty members view these barriers as significant, highlighting the need for strategic solutions to enhance online learning's quality and adoption. (Allen & Seaman, 2013).

Son et al. (2020) highlighted the research gap related to the mental health and well-being of both students and instructors. Due to the continued use of digital gadgets, social isolation, and imbalance between work and personal life have raised worries related to the psychological impacts of online learning. There is a pressing need for research related to mental health, support mechanisms, and identify strategies to alleviate the negative effects of lengthy screen time and distance learning environments. Despite the growing research on digital education in COVID-19 pandemic, several significant gaps remain in the literature. Many studies focus on technological and infrastructural challenges, but there is limited exploration of how digital education impacts different student demographics, especially in terms of gender disparities, socio-economic status, and rural versus urban divides (Millar et al., 2021). Additionally, the long-term mental health effects of remote learning on both students and educators have been underexplored, despite evidence of increased stress and burnout. Further research is also needed to identify best practices in online pedagogy and strategies to enhance digital equity and inclusivity across diverse learning environments (Khan and Vuopala, 2019).

Methodology

Research Design

A mixed-methods approach was adopted, integrating both quantitative and qualitative methods to ensure a comprehensive understanding of the research

questions. The concurrent triangulation strategy (QUAN+QUAL), facilitated the simultaneous collection of quantitative and qualitative data, enabling comparison and the identification of patterns. This approach allowed a thorough investigation of the research topic, enhancing the depth and breadth of the findings. A survey questionnaire consisting of restricted response questions designed to elicit responses from predefined options was developed and validated through expert feedback.

Sample

The current study examined a varied demographic across the northern, central, and southern regions of Punjab. According to Punjab Higher Education Commission, 2022, Punjab has total 80 universities (49 public and 31 private). This research involved 6 universities, out of which, two each from the northern (Rawalpindi and Gujrat), central (Lahore and Faisalabad), and southern (Multan and Bahawalpur) regions. Employing a method of stratified random sampling based on distinct categories of region and gender, we ensured a representative sample from a wide-ranging demographic. Our study included faculty members from Social Sciences, Humanities, and Arts departments, including both male and female participants.

Instrument

The questionnaire underwent pilot testing by administering it to 50 faculty members selected from universities not included in the study sample. It comprised 25 Likert-type items aimed at capturing faculty members' opinions. The reliability coefficient (Cronbach's alpha) for the Likert-type items was found to be 0.87, indicating a reasonable internal consistency of the scale. Expert feedback was incorporated to finalize the questionnaire. The validated and pilot-tested survey questionnaire was then administered via Google Forms to 292 faculty members across six selected universities. A total of 242 faculty members completed and returned the questionnaires.

To ensure the validity of instruments, A panel of educational research experts reviewed the tools to ensure clarity, alignment with study objectives, and appropriate language use. Their feedback helped refine the instruments into their final versions, forming the foundation for data collection. In this study on digital education interventions, key reliability measures were applied. Internal consistency,

assessed by Cronbach's alpha (Cronbach, 1951), ensured survey items consistently measured student perceptions of digital education. For qualitative data, inter-rater reliability, by Cohen's kappa (Cohen, 1960), ensured consistent coding. Items with low correlations were removed during pilot testing to improve the instrument's accuracy.

Data Analysis

Data obtained from the survey questionnaire were analyzed through descriptive statistics, including numbers, percentages, mean response values, and standard deviation. Following the quantitative survey, interviews were conducted with selected faculty members who volunteered to participate in the study. Twelve faculty members, two from each of the six selected universities, were interviewed. Open-ended questions followed by probing questions yielded rich qualitative data on faculty members' perspectives on the online mode of delivery during the pandemic.

Procedure

As the data were to be collected from faculty members of the faculties of humanities and social sciences from selected Universities. Names and contacts details of faculty members were obtained from the websites of the universities. Questionnaire was mailed to all the faculty members as a google form. About eighty three percent (83% i.e. 242 out of 292) faculty members responded and filled the questionnaire. Twele faculty members i.e. two from each university were selected for detailed interviews.

Results

Analysis of data on survey questionnaire was analyzed by computing descriptive statistics and mean response values as per research questions. Proceeding tables present summaries of quantitative data analysis.

Table 01

Readiness of Faculty Members for Online Learning

S #	Statements	Response			
		Yes	%	No	%
1	Prior to the COVID-19 pandemic, I had experience with online learning and felt comfortable teaching students through this mode.	105	43%	137	57%
2	I was very comfortable to download and run applications, browse the web, install software, and manage files etc. without any help.	198	82%	42	18%
3	I had all the necessary equipment (such as a mobile phone, laptop, etc.) to conduct online classes.	225	93%	17	7%
4	During the teaching, both online and in person approaches require similar efforts for learning.	171	71%	71	29%
5	I feel more comfortable in classroom face to face teaching as compared to online classes.	219	91%	23	9%
6	Engaging in online education fosters enthusiasm within the teaching and learning process.	172	71%	70	29%
7	Online education positively impacts the medium of instruction.	185	76%	57	24%
8	Overall, I have observed that the student's involvement in online classes has improved	154	64%	88	36%
9	In the present digital era, online classes are a better option than formal learning	171	71%	71	29%
10	While teaching through online, it arises new ideas and queries about the topic	189	78%	53	22%

The descriptive statistics provided in Table 01 offer valuable insights into survey respondents' views on online learning. Notable findings include the varying levels of awareness and comfort with online learning, with 43% of respondents reporting familiarity and comfort, while 57% lacked prior knowledge and felt uneasy. The majority of respondents (82%) expressed confidence in their digital skills, and most (93%) reported having the necessary equipment for online learning. While 71% perceived similar effort levels in online and in-person teaching, 91% preferred face-to-face instruction. Interestingly, 71% believed that online education positively influenced the medium of instruction, and 64% perceived enhanced student engagement. Moreover, a majority (71%) considered online classes superior, and 78% believed that online teaching stimulated new ideas and questions. However, it's worth noting that 29% disagreed with various aspects, such as the impact on teaching modality and preference for online classes. These findings highlight diverse faculty experiences and suggest the need for tailored support and resources to adapt to digital education effectively. They also underscore the complex factors affecting online teaching's adoption and effectiveness in education.

Table 02

Responses of Faculty Members' Preparedness for Online Learning

S #	Statements	Responses*					Mean	SD
		1	2	3	4	5		
1	Comprehensive instructions for transitioning from conventional to online education mode.	9 4%	47 19%	123 51%	58 24%	5 2%	3.01	.82
2	Guidance on the access and use of learning management systems or other modes of online education.	5 2%	102 42%	103 43%	27 11%	5 2%	2.69	.78
3	Availability of learning material for course completion.	9 4%	67 28%	113 47%	47 19%	6 2%	2.89	.84
4	Technical support to overcome any technical difficulties.	13 5%	67 28%	126 52%	29 12%	7 3%	2.79	.83
5	Provision for registering any grievances or complaints.	16 7%	38 16%	136 56%	46 19%	6 2%	2.95	.84

**1=No satisfaction, 2=Minimal satisfaction, 3=Some satisfaction, 4=High satisfaction, 5=Maximum satisfaction*

In table 02 mean response values for the five statements fell between 2 and 3, indicating "slightly satisfied" to "moderately satisfied." None reached the neutral midpoint of 3. This suggests faculty members were generally less satisfied than neutral about their readiness for online teaching, highlighting concerns or challenges.

Addressing these concerns is crucial to boost faculty confidence and effectiveness in online teaching, ultimately improving student experiences and outcomes. In summary, faculty satisfaction with online readiness calls for proactive measures to enhance their comfort and effectiveness in the digital learning environment.

Table 03

Factor Affecting the Online Learning as Perceived by the Faculty Members

S #	Statements	Responses*					Mean	SD
		1	2	3	4	5		
1	The overall Quality of Course Content	4 2%	37 15%	114 47%	79 33%	8 3%	3.21	.80
2	In-time delivery of course content	2 1%	73 30%	115 48%	41 17%	11 5%	2.94	.83
3	Appropriate pace of lectures	4 2%	98 41%	95 39%	35 14%	10 4%	2.79	.86
4	Opportunities given to ask questions	10 4%	99 41%	79 33%	36 15%	18 7%	2.81	.99
5	Clear guidelines about assignments and assessments	9 4%	82 34%	103 43%	34 14%	14 6%	2.84	.92
6	Flexibility in following assignment deadlines	4 2%	59 24%	128 53%	45 19%	6 2%	2.96	.77
7	Convenient exam schedules	3 1%	56 23%	136 56%	38 16%	9 4%	2.98	.77
8	Timely and continuous feedback on class progress	2 1%	62 26%	129 53%	39 16%	10 4%	2.97	.79
9	Follow-up and motivation to improve class progress	2 1%	61 25%	120 50%	45 19%	14 6%	3.03	.84
10	Availability for consultation and guidance after class timing (WhatsApp, Messages, E-mails, etc.)	3 1%	23 10%	112 46%	83 34%	21 9%	3.40	.82

**1=No satisfaction, 2=Minimal satisfaction, 3=Some satisfaction, 4=High satisfaction, 5=Maximum satisfaction*

Analysis of faculty survey responses revealed varying satisfaction levels regarding online learning. For statements 2 to 8, mean responses fell between 2 and 3, indicating "slightly satisfied" to "moderately satisfied." These values were below the neutral midpoint (3), suggesting less-than-positive satisfaction in these areas.

In contrast, for statements 1, 9, and 10, mean responses ranged from 3 to 4, indicating "moderately satisfied" to "very satisfied." These values exceeded the midpoint, showing positive satisfaction in these aspects of online learning.

These findings highlight the necessity for targeted strategies to address the concerns and augment satisfaction where faculty members are already satisfied.

Table 04

Modes of Communication used by the Faculty Members

Sr #	Statement	Respondents	Percentage	Ranking
1	E-mail Correspondence	45	19%	3
2	Social Media apps (WhatsApp/Facebook, etc.)	67	28%	1
3	Online lectures or video conferencing platforms (such as Google Hangouts, Zoom, Skype, etc.).	58	24%	2
4	Recorded Lectures	24	10%	5
5	Course Websites	29	12%	4
6	Additional website links (for reading material).	19	8%	6
Total		242	100%	

The table 04 depicts primary online education communication channels for teacher-student interactions. WhatsApp groups, favored by 28%, played a key role in real-time discussions and building a sense of community. The second preference was for video-conferencing platforms like Zoom, Microsoft Teams and Skype (24%), replicating in-person experiences. Email retained significance (19%) for formal communication, announcements, assignments, and feedback. In summary, these channels shape online education, offering versatile ways to engage in learning.

Table 05

Types of Assessment Methods used by Faculty Members

Sr #	Statement	Respondents	Percentage	Ranking
1	Oral/written quizzes	54	22%	1
2	Written examinations	41	17%	3
3	One-to-one discussions	19	8%	6
4	Individual assignments	47	19%	2
5	Group discussions	25	10%	5
6	Group assignments	13	5%	7
7	Presentations	34	14%	4
8	Online	9	4%	8
Total		242	100%	

The table 05 shows that faculty members used diverse assessment methods to gauge student performance. Total 22% preferred oral and written quizzes for quick comprehension checks, while 19% found individual assignments effective for promoting critical thinking and independent learning. Traditional written exams remained relevant, used by 17% of respondents. These methods showcase educators' commitment to adaptability and contribute to a holistic educational experience.

Table 6

Summary of t-test of Factors Affecting Satisfaction Levels of Male and Female Faculty Members

Factor	Gender	N	Mean	SD	t-value	df	Sig.
Satisfaction on University Support	Male	82	2.82	.729	.677	129	.460
	Female	160	2.88	.548			
Satisfaction on Personal Role	Male	82	3.10	.768	1.732	240	,086
	Female	160	3.93	.546			
Personal Feeling on online teaching experience	Male	82	3.48	.839	.557	124	.579
	Female	160	3.42	.600			

Table 6 presents faculty members' satisfaction levels regarding five aspects of university support for online teaching, measured on a five-point Likert scale. Mean scores below 3 for both male and female faculty members indicate a low level of satisfaction. An independent sample t-test showed that there is no significant difference between the mean scores of male and female faculty members, leading to the acceptance of the null hypothesis (H01). Faculty members' satisfaction with their roles and efforts was measured through a five-point Likert scale across ten aspects of online instruction delivery. A mean score above 3 for both male and female faculty members indicated an above-average satisfaction level. While female faculty members had higher mean scores compared to their male counterparts, suggesting greater satisfaction, the difference for male and female faculty members was not statistically significant according to the results of an independent samples t-test. Consequently, the null hypothesis (H02) was accepted.

The personal experiences of faculty members regarding online teaching were gathered across ten aspects. An independent sample t-test depicted that there is no significant difference between male and female faculty members' feelings

when delivering online instruction. Consequently, H03 was accepted.

Qualitative Data Analysis

Following the survey, a qualitative inquiry explored faculty members' perspectives regarding the online teaching and learning during the pandemic. The interview protocol aimed to extract insights on the impact of online education on students' learning, the obstacles encountered by both faculty members and students, and the opportunities recognized. Key questions included:

1. What is your assessment regarding the impact of online learning on students' learning?
2. What challenges did faculty members and students face during this transition?
3. What opportunities have emerged from your experience with online teaching?
4. How can online teaching be better utilized during emergencies such as a pandemic?
5. How can the potential of online teaching be maximized in normal circumstances?

Responses were transcribed, coded, clustered, and themes were extracted for analysis. Faculty members narrated the primary hurdles encountered in online teaching.

Interviews were transcribed, coded, and themes were extracted to draw conclusions. Among the 12 faculty members surveyed, 10 faced challenges in time management, potentially impacting the quality of their instruction. Following closely were issues with internet connectivity, with 9 out of 12 faculty members emphasizing their critical importance. Ranking third were technical glitches, which caused various disruptions during online sessions, affecting 7 faculty members. The survey findings highlighted essential elements for successful online programs. The most critical requirement was uninterrupted internet access, cited by 11 out of 12 faculty members. Time management was also critical, out of 12, 10 faculty members emphasizing its worth for scheduling. Apprehensions related power failure

was raised by the faculty members. Concerning the personal experiences of faculty members that included motivation, time management, convenience, software and tool utilization, transportation cost savings, opportunities for additional activities, proficiency in relevant tools, self-responsibility, and self-discipline during online learning was generally positive. The majority of faculty members (11 out of 12) confirmed willingness to adopt online education. As a result, these observations can assist institutions in developing strategies and ensure effective of faculty in online learning.

Discussion

According to Figueiredo, digital technologies, such as MOOCs, e-learning platforms, and mobile applications, are extensively implemented in educational institutions, improving student self-sufficiency and backup entrepreneurial endeavours. In addition, these technologies ease knowledge transmission and promote novelty within university contexts (Figueiredo et al., 2024). Students voiced moderate satisfaction with their home study environments, demonstrating the necessity for enhancements in the overall online learning experiences. Likewise, their satisfaction regarding the university support to conduct the online learning classes was moderate, underscoring the necessity to augment support services. Students' satisfaction levels did not reach highly enthusiastic levels (ElSaheli-Elhage, 2021).

The selected six universities also encountered challenges associated to internet connectivity, time management, and power failure. Although the faculty members made their efforts to address these obstacles, however workable solutions remain paramount. Although online learning has yielded positive practices, ongoing obstacles like the digital divide and the need for the teachers' capacity building must be tackled for long-term benefits (Schleicher, 2020).

This study reveals significant inconsistency in faculty members' experiences with online teaching. Concerning the faculty perceptions, 43% expressed comfort with online learning, while 57% lacked prior experience. About self-confidence in digital skills, 82% felt assured, while 18% were less confident. Access to gadgets was high at 93%, with 7% lacking essential devices. Majoring of respondents (71%) regarded online and in-person teaching efforts similarly, with a vigorous partiality for face-to-face teaching (91%). Opinions on the impact of online learning related

to instruction quality, student involvement, and idea stimulation were varied. These findings highlight the need for tailored support and resources to effectively implement digital education.

Faculty members voiced diverse levels of gratification with their willingness for online teaching, with none reaching neutrality (3). This indicates significant concerns that require attention to enhance faculty confidence. The course delivery and lecture pace also fell below neutrality (3), signaling areas needing improvement. However, faculty members reported moderate to high satisfaction with course content quality and motivation. Despite obstacles, faculty members had positive feelings and experiences with online learning. Hence, these insights can inform institutions in developing strategies and support systems to augment faculty engagement for successful online teaching.

Concerning the communication methods, Faculty members utilized WhatsApp groups (28%), video conferencing platforms (24%), and email (19%). Diverse assessment methods were used to reflects adaptability and a commitment to a novel educational experience. Key challenges identified were time management, internet connectivity issues, and technical difficulties. Lastly it was found out that factors contributing to effective online programs included uninterrupted internet access, efficient time managing, and mitigation of power failure. This underlines the implication to address these factors and ultimately ensure the success and accessibility of online education programmes.

Conclusion and Recommendations

Faculty members had varying experiences, with a noteworthy proportion lacking prior knowledge and feeling uncomfortable with online learning. Although, the confidence in digital skills was fairly high, but some faculty members felt less confident. Concerning the access to necessary equipment, it was generally good, but a marginal lacked required gadgets for online learning. Many faculty members shared that the effort required for online and in-person teaching to be similar, while a partiality for in person teaching was leading. Faculty members were normally "slightly satisfied" to "moderately satisfied" with their readiness for online teaching, which reveals apprehensions to be addressed. Concerning facilitating teacher-student interactions, WhatsApp groups, video conferencing platforms, and email emerged as pivotal tools in shaping online education. Lastly, faculty members

utilized diverse assessment methods to demonstrated adaptability and commitment to a comprehensive educational experience.

The online distance learning obstacles included challenges related to time management, internet connectivity, and technical disruptions, that highlight the need for vigorous digital infrastructure and support. Some of the key priorities for successful online programs were identified as uninterrupted internet access, efficient time management, and the mitigation of power outages. Concerning the gender differences, it was insignificant in numerous aspects of online learning, indicating the effect of personal preferences. Some of the prominent challenges identified were internet connectivity and time management. Overall, it is revealed to address specific challenges related to infrastructure, faculty capacity building, and technical support to enhance the efficiency and effectiveness of online learning.

Concerning the first research objective and question, it is recommended that universities should devise an inclusive capacity building programs to address the needs of faculty members during the pandemic. These capacity building programs should include but not limited to enhancing faculty confidence and usefulness in online teaching methodologies. In addition, universities should also address the faculty members concerns associated with course delivery and lecture pacing that will guarantee the provision of first-class online education.

Considering the second research question, universities in Punjab, Pakistan, should invest in evaluating the efficacy of online learning programs from the perspective of faculty members. This evaluation should encompass gathering viewpoints on the merits and demerits of existing online learning initiatives. Furthermore, universities should actively seek feedback from faculty members to identify areas for improvement and refinement in online education delivery.

Universities should focus on providing adequate support and resources to address the obstacles encountered by faculty members in online education programs as highlighted in the third research question. This includes offering training and professional development opportunities to address identified challenges. Additionally, universities should explore possibilities for enhancing the online learning experience, such as implementing technical support systems and improving digital infrastructure.

Regarding the fourth research question related to correlation between faculty members' perception and their gender, it is recommended that future research will explores this association in deepness. In this regard, universities should conduct studies to investigate potential gender-based disparities in faculty members' perceptions and experiences with online education. Lastly, strategies should be developed to ensure gender equity in access to digital resources and support systems, so that an inclusive online learning environment can be promoted.

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