Annals of Social Sciences and Perspective

ISSN (Print): 2707-7063, ISSN (Online): 2788-8797
Volume 3, Number 2, July -December 2022, Pages 399-413
Journal homepage: http://assap.wum.edu.pk/index.php/ojs

Investigating the Role of Learning Technology Adoption in Transforming Pakistan's Higher Education Sector in the Post-pandemic Context

Huma Ali[1*], Muhammad Shaukat Malik[2], Mishal Jaffar[3]

[1]Assistant Professor, Institute of Banking & Finance, Bahauddin Zakariya University, Multan - Pakistan.
[2]Professor, Institute of Banking & Finance, Bahauddin Zakariya University, Multan - Pakistan.
shoukatmalik@bzu.edu.pk
[3]MS Scholar, Institute of Banking & Finance, Bahauddin Zakariya University, Multan - Pakistan.
mishaljafar41@gmail.com
*Corresponding Author's Email: huma.ali@bzu.edu.pk

ARTICLE DETAILS

History:

Received: December 20, 2021
Accepted: December 31, 2022

Keywords:

Stakeholder Engagement
Stakeholder Performance
Learning Technology Adoption.

DOI:

10.52700/assap.v3i2.221

ABSTRACT

Tackling covid-19 and its spill-over effects on various aspects of the society is undoubtedly the most significant challenge faced by the modern world. In the past two years, there has been considerable research that has highlighted the issues and challenges associated with the pandemic. However, the other side of the story must be investigated as well i.e. the opportunity to 'unbundle' certain established practices. This research study focuses on Pakistan's higher education sector, where the entire operational model of universities experienced a range of significant changes due to the pandemic. In this study, we investigate how 'abrupt' adoption of learning technology in Pakistani universities impacted the performance and engagement behaviors of two of the most important stakeholders, the students and the teachers. Data for the study has been collected from a sample of 360 teachers and 360 students using a survey questionnaire. This study used a two-phase study design in which the average age and gender differences for technology adaptability among online teachers and learners were compared through cross-tabulation of the teachers' and students' data. The adoption of learning technologies' mediating effect on the relationship between stakeholder engagement and performance were examined using SEM analysis. The results of this study quantified the weak mediator role that learning technology adoption played in the relationship between stakeholder engagement and performance. At a time, when technology integration within higher education is considered a 'must', our findings suggest that unplanned adoption and integration of technology can have negative consequences. Our analysis revealed that adoption of learning technology was a weak variable in the relationship between Engagement and Performance as it had a negative mediating effect and actually lessened the impact of the direct relationship between the variables.

1. Introduction

The two most important stakeholders within an educational system are the teachers and students. Their engagement within their specific roles is a crucial indicator of their

performance, which then directly impacts the overall success or failure of an education system. According to Xu (2022), the engagement of teachers in their designated teaching roles is critical for a smooth education system and the growth of an education system. Similarly, engagement with teaching and learning activities is directly related to performance (Alshehri, 2020), thus educational institutions around the world are always looking for creative ways to enhance both student and teacher engagement through a range of measures. Students and teachers are considered 'stakeholders' within an educational system, because they actively promote the culture of that educational system. Thus, for any kind of change or new development in that system, these stakeholders become the direct target of action and reaction. The changes in their behaviors and attitude may then reflect if the changes being introduced within the system are successful or not.

In recent times, the most significant change being introduced within the educational sector is the integration of technology. According to Selwyn (2016, p.1006), use of technology is now considered an *"…expected part of the routine of academic study and campus life"*. The research in this domain has also focused on exploring the impact of technology on study and learning practices and understanding the experience of students and teachers (Edmunds et al., 2012). The covid-19 outbreak drastically impacted how technology was and is being used in educational institutions. Issues such as technological advancement and upgradation, technology acceptance and adoption, digital literacy, digital inequalities, to name a few once again became the focus of the research. However, according to Deshmukh (2021), this time another aspect also got prominence, which was related to exploring ways of enhancing stakeholder engagement during technology adoption within the educational institutions.

In the past two years, the higher education sector across the world has witnessed drastic transformations. As stated earlier, the integration of digital technology in almost all aspects of academics was a key transformative change. This not only impacted the teaching and learning strategies, but also aspects of professional growth and career progression (Ashour, 2021). During such drastic transformations, the contextual differences were often not taken into account. For example, according to Deshmukh (2021), in developing countries, despite their lack of expertise stakeholders in the education sector were 'forced to adopt' new technological integration. Technology acceptance became a 'forced step' that had a significant impact on the level of engagement and performance of education stakeholders (Sethi, 2022). Because not everyone was comfortable with technology, the engagement-performance factor of educational stakeholders was altered, disrupted, and, to some extent, reduced.

In Pakistan, the situation is no different. According to Ahmmad and Ashfaq (2022), acceptance of technology, learning new online teaching methods, and integration of modern learning systems is creating a 'recognition barrier'. As the teachers and students in Pakistani higher education system has not faced such challenges before, their prior exposure and practical experience is also a hurdle (Minhas, 2021). The technology acceptance and adoption in relatively traditional learning environment of Pakistan has always been a challenge. As per Manzoor (2020), training and development of key stakeholders within the system i.e. the students and teachers around the use of digital tools and learning technologies has never been a priority. The deployment of institutional systems such as LMS (Moodle), or Blackboard in some of the leading universities after the promulgation of country's first ever IT policy in early 2000 was also an initiative that severely lacked stakeholder engagement (REF). And, as the whole educational system of the country was not prepared for technology adoption, the overall attitude of the teachers and students during covid-19 further aggravated the situation. There were several reports of protests, strikes and complete shut-down of online academic activities (REF), during the past two years.

This research study is based on the experience of university students and teachers in Pakistan

with regards to adoption of learning technology during and after covid-19. It investigates the mediating role of learning technology adoption on the relationship between stakeholder engagement (in this case teachers and students) on their performance. The following sections will first review the extant literature in this domain to clearly identify the research gaps, after which the methodology, findings and discussion will be presented.

2. Literature Review

2.1 Learning Technology Adoption

Due to lack of awareness of technology usage, educational institutions faced a great problem during pandemic. People mostly don't adopt technology due to fear and anxiety and it has been investigated by many scholars as well that anxiety is a such component that causes a great hindrance in technology adoption and acceptance in different sectors including educational sector. In addition to anxiety, lack of knowledge along with technology fear, reduces the likelihood of technology adoption in educational sector (Meng, 2020).

Students' use of technology for learning, particularly online learning, is being constrained by a variety of fears (Kamal et al., 2020; Meng et al., 2020). According to Bailey's research (2020), faculty members who work for an organization also find it challenging to complete their tasks remotely using an online system because they psychologically worry about being unfamiliar with the technological patterns and dimensions.

The majority of research focuses on the effects of technology acceptance as a result of this fear. Most users have given a variety of explanations for why they don't like using technology. Some of them have admitted that the one of the problem is confidence. Mistakes are unavoidable when someone is working online, which raises the anxiety level (Gresham, 2020). Others claim they prefer not to use technology because it takes too long and interferes with their ability to finish tasks on time (Appavoo, 2020). Due to different technology acceptance studies that looked at the effect of worrying about violating data privacy, there is now even more emphasis on security and privacy awareness (Distler et al., 2020).

2.2 Stakeholder Engagement

Throughout educational history, the pandemic situation has had a significant impact on changing situations and career-engaging activity events. Stakeholders in educational institutions are experiencing a difficult period in which they must continue their daily formal performance while maintaining a distant formal interaction (Kumar, 2020). Students are the primary stakeholders in the performance of educational organizations (Ratten, 2020). Educational institution lockdowns and closures have disrupted the learning system as the educational platform has shifted from live classes to online classes, where teachers are instructed to teach through online learning platforms (Abidah et al. 2020). The home-based working style has had an effect on students' level of engagement in learning (Ratten, 2020).

An online learning management system's most important component is teachers' engagement to their teaching roles (Strielkowski, 2020). If the teacher is completely committed to offering his or her services to his or her students, he or she can achieve the desired results (Lei, 2021). Working through it may present some difficulties for teachers as stakeholders in the educational system because not all teachers are trained or have experience of using the online learning system (Toquero, 2020).

The online system has also changed the educational engagement system, requiring virtual links to be developed between faculty and students. Raju (2020) argued in his study that while the online system is not gaining traction due to a lack of acceptance, innovation in teaching patterns is required to overcome stress and anxiety on both sides. The closure of educational institutions hampered the education system and the teaching-learning process during the lockdown period. Understanding the teaching-learning process is critical during

this crisis period in order to design effective interventions to ensure the smooth operation of teaching and learning (India Today, 2020).

2.3 Stakeholder Performance

Today, stakeholder performance in the educational sector is a hotly debated phenomenon that serves as the sole indicator of a school's success or failure. Students are the pinnacle of any educational sector, and their performance in their roles defines the sector's performance as well as the institution's online learning strategy's success (Fidyah, 2020).

In terms of learning performance, students are the most important part of the institute. The better his/her performance will be, the more he/she absorbs the learning and produces the best results (Shen, 2020). The performance of stakeholders is measured by faculty deliverability and student absorption through the methods integrated into the learning system at each stage of the introduction of new methods and techniques in the educational sector (Lazar, 2020).

According to some researchers, using an effective instructor's guide in conjunction with collaborative online learning activities is a great way to get students to respond in a meaningful way (Gonzalez, 2020). However, switching from these conventional to more contemporary and interesting methods could give students access to learning through collaboration in virtual groups and teams, curriculum-based games, simulations, and case studies (Christopoulos, 2021). According to a study by Aristika (2021), students are encouraged and motivated to use more technical and problem-solving skills, collaborative thinking, simulative learning, and analytical and investigative skills when they are required to engage in more active, investigative, and analytical learning.

2.4 Hypotheses Development

Performance measures can be determined by the engagement behaviors of stakeholders (teachers) in different roles in their education institutional which in turn determine impact of teachers' engagement on students' performance (Ratten, 2020). The distant learning programs have developed an active participation of teachers and students that has ultimately stabilized the distant learning program by active performance of students eventually accommodated by the active engagement of teachers (Mahmut, 2020). The active enrollment and presence of students at online learning sessions is another indicator of educational institutes' satisfactory performance (Cahapay, 2020). Teachers' classroom behavior demonstrates how diligently they are working to create a remarkable learning environment for their students (Sethi, 2022). Without the support and direction of their teachers, students are unable to improve their performance, and this is absolutely true still when they are exposed to novel educational strategies (Susilo, 2022). Due to the fact that both parties involved in the education system have faced new challenges, a new dimension has been added to the measurement of the active relationship between teachers and students (Adnan, 2020). Students found it difficult to hone their skills and become familiar with new learning material without the guidance of their teachers (Minhas, 2021).

H1: Stakeholders Engagement has a positive relationship with Stakeholder Performance

With the transition from traditional to online teaching methods, teachers have gained more knowledge and demonstrated greater proficiency (Ayush, 2022). The teachers' capacity and level of adaptability to the transition from traditional to digital learning environments have been demonstrated (Cao, 2021). Teachers have undergone a variety of training programs and practical experiences so they can instruct students using the newly developed paradigms of the educational system (Rapanta, 2021). The teachers are seen as flexible and having a good attitude for learning new skills in the digital age of education to give good performance through the online learning programs. It has been noted that less experienced teachers are less likely to use online teaching methods than younger ones (Sethi, 2022). Due to their

educational backgrounds, the degree to which the content being taught requires technology, as well as the technical and non-technical aspects of the course, there are differences in how teachers use online technology and perform through it (Xu, 2022). Due to the abrupt change in the educational environment, there was also a need for training and learning technology specific to their field of study; otherwise, they would not be motivated to participate and learn online teaching methods (Fidyah, 2020).

H2: Stakeholder Engagement has an impact on the Learning Technology Adoption

During the lockdown period, the integration of technology into the performance of educational institutes had a significant positive impact (Singh, 2020). According to Shen's (2020) research, learning technology adoption has added a multi-dimensional approach to educational stakeholders' home-based performance. Online learning platforms are assisting institutes in making home-based learning more frequent and easier, as well as making their work more environment friendly (Rahmi, 2020). It is becoming more convenient for students and teachers to communicate with one another. The most intriguing aspect is that the integration of technology into educational jobs has added more functional improvement and stakeholders' competency to adhere to the online system, which ultimately shows their improved performance through development of technology paced skills, capabilities, and technical knowledge (Rapanta, 2021).

H3: Learning Technology Adoption has impact on Stakeholder's Performance

COVID-19 outbreak causes a technological revolution in the higher education system via online lectures, teleconferencing, e-learning open books, online examination, and interaction in virtual environments (Strielkowski, 2020). The online learning platform has changed the way educational employees, including teachers, perform their jobs, as well as the acceptance of this system by students and their families (Kumar, 2020), as online platforms prior to COVID-19 were only recognized for engaging communities for entertainment purposes (Strielkowski, 2020). However, in a fewer cases, online platforms introduced by technology have a positive impact, as teachers and students have demonstrated improved performance by demonstrating more engaged behaviors through the adoption of online learning strategies, as well as the credibility of managing online technology at institutes (Gonzalez et al. 2020). Such surveys have shown that incorporating technology into educational platforms has its own set of advantages and disadvantages. The online mode of teaching-learning is frequently discriminatory towards poor and marginalized students. The online learning and educating platforms are at risk because they may have a negative impact on the community of hearing-impaired students in online learning (Manzoor, 2020).

H4: Learning Technology Adoption mediates the relationship between Stakeholder engagement and stakeholder performance.

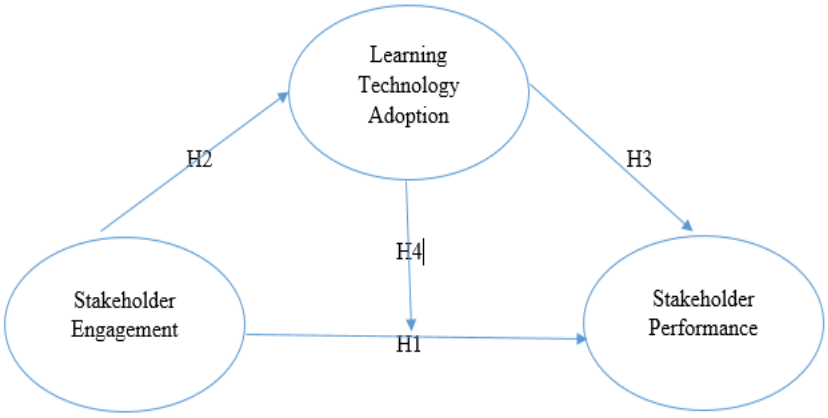

Figure 1: Hypothesized Model of Study

3. Research Methodology

This study is an explanatory study that is based on the higher education system of Pakistan. As there were differences in technology usage, education quality and type of technology adopted in all regions of Pakistan so all educational institutes of Pakistan were selected as population, because the students and teaching stakeholders of different provinces of Pakistan are diversified with their learning and teaching skills and more importantly their adaptability towards the new technology and education methods.

The target population for this study is the students and teachers of higher education institutes in Pakistan that has admitted a variety of students and recruited teachers from both technical and non-technical backgrounds enrolled in online learning programs as suggested in previous study by Adnan and Anwar, (2020). The reason for selecting teachers and students for this study as that they are the main stakeholders in an education system that represent the educational quality of an institute. In general, teachers and students play the main role of teaching and gaining knowledge in an educational institute and so they are considered to be the presenters and main stakeholders of an education system.

Although the study is a cross-sectional design but the survey was conducted in two sections. First the survey was conducted for the teaching faculties and 360 teachers including the contractual, regular and permanent teachers teaching were the respondents. This was called as Study 1. Afterward, the same survey was conducted for the students; 360 students from the same higher education institutes were selected who have experienced both kind of study patterns physical and virtual. This study was called as Study 2. The reason for conducting a two-wave survey was that researcher wanted to fully focus on stakeholder community as a whole at a time. Due to self-administered survey, the researcher has successfully collected all the responses under their careful observation.

The questionnaire developed was verified by sending it for review to the three faculty members from three different higher education institutes before conducing the survey. This proved the validity of the survey items. For reliability test of the adopted questionnaire a pre-test was conducted on 6 students and 6 teachers from the same higher education institutes that were selected for this study. After reliability and validity check, the data collection procedure was initiated so that pure results could be obtained for this study.

The variables adopted for this study are stakeholder engagement, stakeholder performance and learning technology adoption.

Stakeholder Performance: The dependent variable in the study is stakeholder performance. In this study it is the measure of performance of students as educational stakeholders in their respective roles and it is impacted by the engagement behavior of teachers and technology adopted integrated education system. It has 18 items in total. The performance scale has been adopted from study of Hung (2010). The performance of educational stakeholders is measured by selecting teachers and students as stakeholders and measuring their performance in their subjective roles. The stakeholder performance has further five dimensions of measure that dictates the performing ability of students through the online learning platforms. For measuring stakeholder performance Computer/Internet self-efficacy, Self-directed learning, Learner control (in an online context), Motivation for learning (in an online context) and online communication self-efficacy were the further dimensions selected for study.

Stakeholder Engagement: Stakeholder Engagement is the measure of the engagement of teachers as educational stakeholders in their respective roles of teaching as well as their engagement in technology enabled education system. The independent variable in this study is stakeholder engagement. The stakeholder engagement scale was developed using the Kabir study (2020). In this study, the stakeholder engagement of teachers and students in their respective roles in an educational institute is measured.

Learning Technology Adoption: This study's mediating variable is learning technology

adoption. Leaning technology adoption is the measure of the capacity and ability of education stakeholders' teachers and students in adopting technology in education system and learning the innovative methods of using technology integrated systems. It is measured with 11 items. The Kabir (2020) study was used to develop the Learning Technology Adoption Scale. Learning Technology Adoption is measured in this study by the use and adaptability of technology by teachers and students. Learning Technology Adoption was measured with two further dimensions that dictates the type of adoption by educationist; "Intention to adopt technology for online education" and "Adoption of online classes".

For obtaining the statistical results of this study, the SEM analysis is performed through which the relationship developed between the variables under study has been obtained.

4. Results

For study one, the total number of respondents were 360 teachers, with 282 females and 78 males, and 82 males and 278 females for study two. For study 1, there were 187 respondents between the ages of 25 and 30, 109 between the ages of 30-35, 46 between the ages of 35-40, and only 18 between the ages of 40 and above. In study 2, there were 194 students between the ages of 25 and 30, 104 between the ages of 30-35, 42 between the ages of 35 and 40, and 20 over 40. The majority of respondents were found to be between the ages of 25 and 30, while the majority of students were between the ages of 40 and up.

Table 1: Reliability Analysis

	Cronbach's Alpha	**rho_A**	**Composite Reliability**	**Average Variance Extracted (AVE)**
Learning Technology Adoption	0.834	0.842	0.869	0.579
Stakeholder Engagement	0.859	0.893	0.89	0.545
Stakeholder Performance	0.878	0.888	0.898	0.534

It is stated by Black et al. (2016) that the value of composite reliability must be greater than 0.7. Similarly, Peterson, in 1994 stated that value of Cronbach alpha should also be greater than 0.7. After analysis, value of all variables have composite reliability above 0.7. It means internal consistency is found in variables like Stakeholder engagement, learning technology adoption, and stakeholder performance. Values are found to be 0.869, 0.89 and 0.898 respectively. Similarly, values of Cronbach alpha are 0.834, 0.859 and 0.878 which are above the threshold level of 0.7.

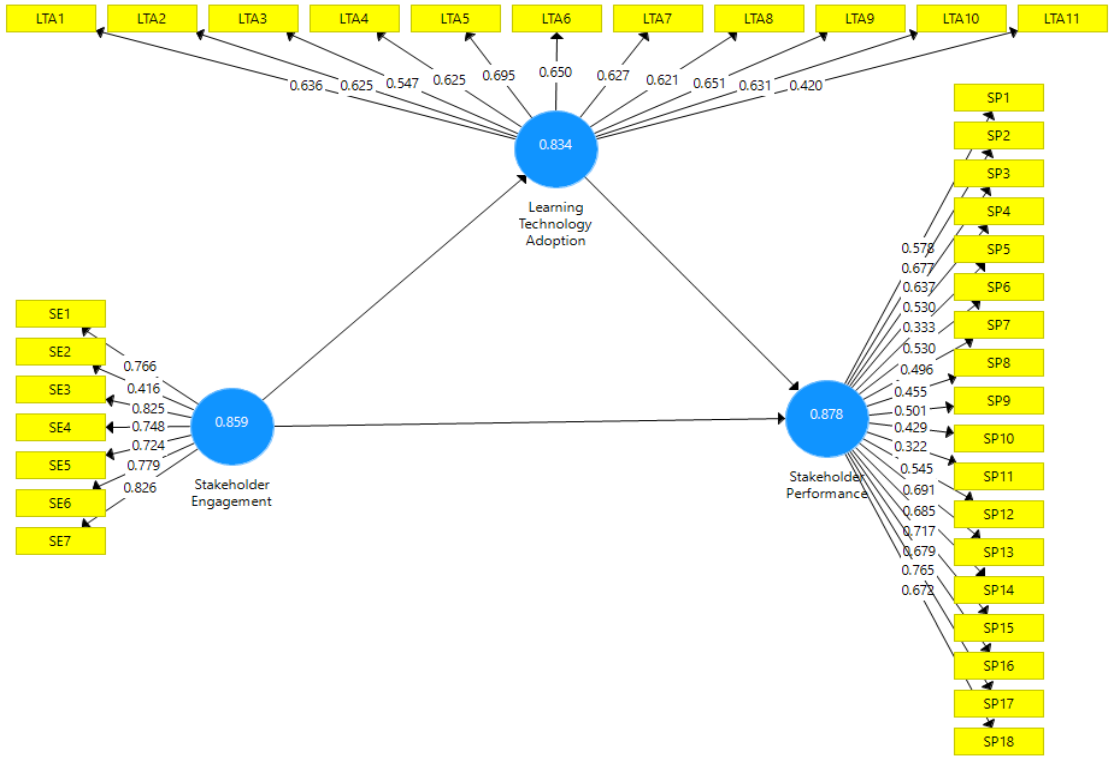

Figure 2: Reliability Analysis

4.1.Regression Analysis

In path analyses, the parameter from estimating the model on your initial dataset, as well as from a standard PLS algorithm estimation, is the original sample estimate. The sample means estimate is the average of all the estimates obtained throughout the bootstrapping process from your dataset's subsamples. Further, beta values show the changes produced by the independent variable on the dependent variable. The beta value between -1 to +1 demonstrates that positive or negative change in the dependent variable is caused by the independent variable. The standard deviation value shows that all variables are near to their means. The statistical analysis describes the T-value and P-value of the variables, which indicate whether or not hypotheses are accepted or rejected. The significance level of the T-value must be above 1.96, and P-value is less than 0.05.

4.1.1. Direct Effect For Teachers

Table 2 demonstrates that all the variables are significant. All beta values are also found to be positive, indicating that all independent variables produce positive change in the dependent variable.

Table 2: Direct Effect for Teachers

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Beta	T-Value
Learning Technology Adoption -> Stakeholder Performance	0.358	0.361	0.047	7.547	0.00	0.353	8.167***
Stakeholder Engagement -> Learning Technology Adoption	0.439	0.453	0.045	9.652	0.00	0.651	2.61***
Stakeholder Engagement -> Stakeholder Performance	0.383	0.381	0.035	10.915	0.00	0.137	2.823***

4.1.2. Mediation Analysis For Teachers

Results in table shows that partial mediation exists as relationship between Stakeholder Engagement and Stakeholder performance is still there in presence of mediating variable which is learning technology adoption.

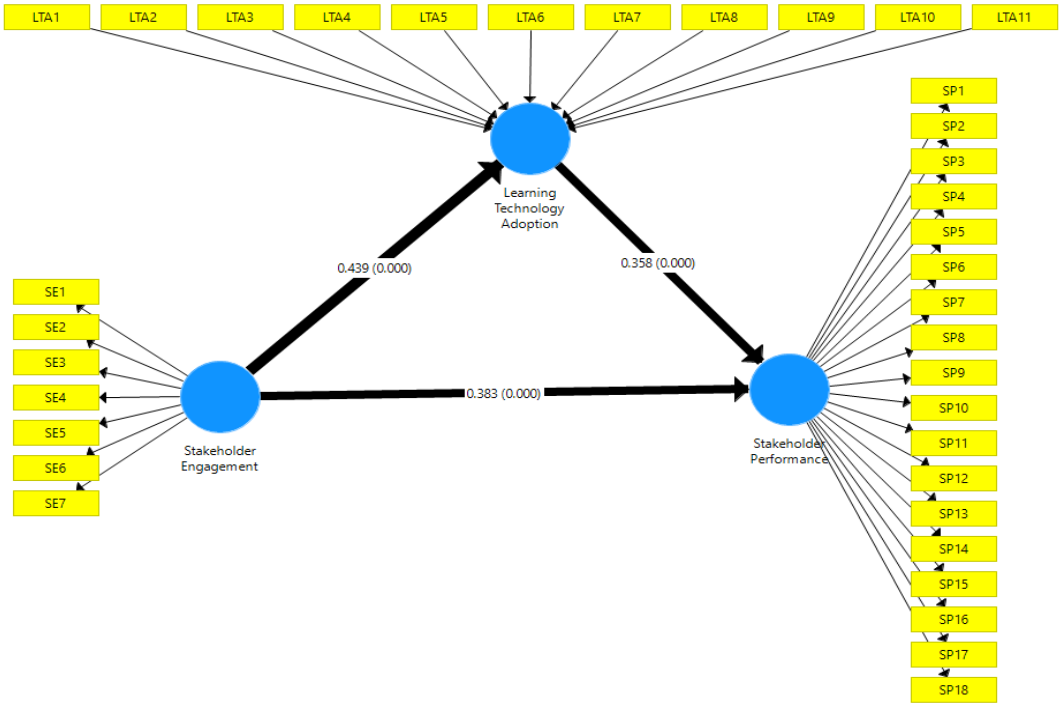

Figure 3: Mediation Analysis for Teachers

Table 3: Mediation Analysis for Teachers

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Beta	T-Value	LLCI	ULCI
Stakeholder Engagement -> Learning Technology Adoption -> Stakeholder Performance	0.157	0.164	0.029	5.338	0	0.13	4.386***	017	0.00

4.1.3. Direct Effect for Students

It can be seen from results given in table that significance level of the T-value is above 1.96, and P-value is less than 0.05. It is also demonstrated that all the variables are significant. All beta values are also found to be positive, indicating that all independent variables produce positive change in the dependent variable.

Table 4: Direct Effect of Students

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	B-Value	T-Value
Learning Technology Adoption -> Stakeholder	0.385	0.385	0.038	10.221	0	0.129	2.823***

Performance							
Stakeholder Engagement -> Learning Technology Adoption	0.279	0.285	0.052	5.386	0	0.631	26.1***
Stakeholder Engagement -> Stakeholder Performance	0.424	0.427	0.032	13.325	0	0.243	8.167***

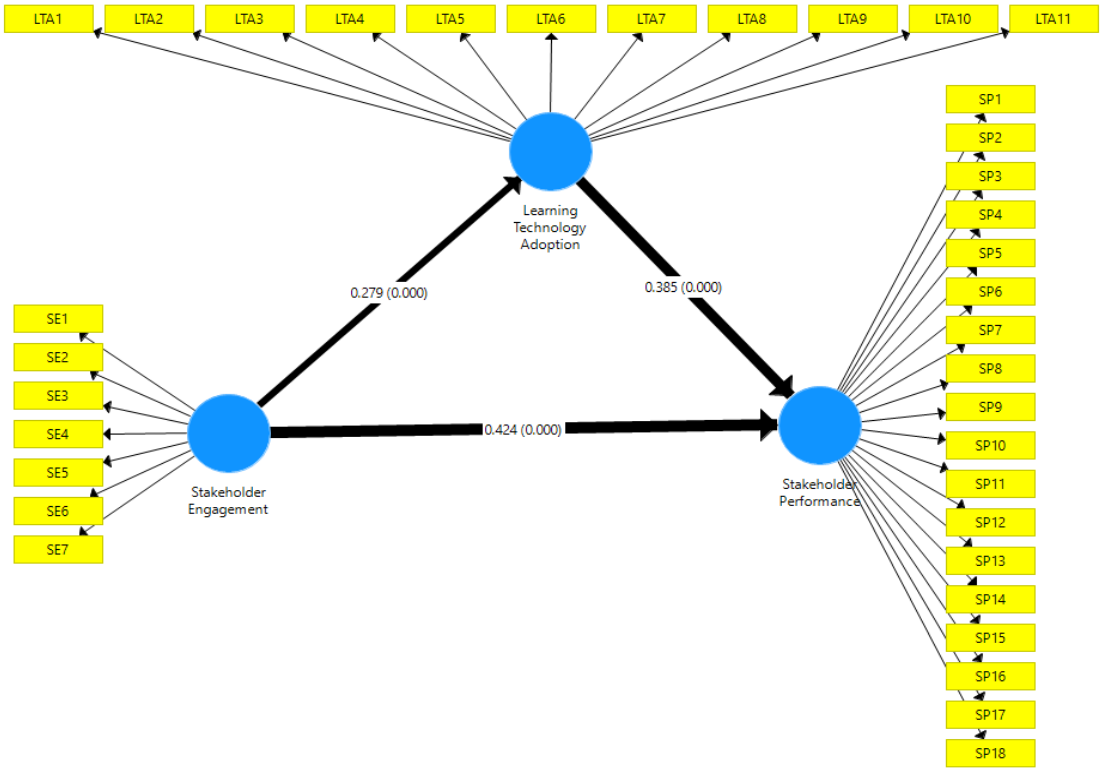

Figure 4: Mediation Analysis of Students

4.1.4. Mediation Analysis for Students

Results shows that learning technology partially mediates the relationship between stakeholders engagement and stakeholder performance

Table 5: Mediation Analysis of Students

	Original Sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**	**Beta**	**T-Value**	**LLCI**	**ULCI**
Stakeholder Engagement -> Learning Technology Adoption -> Stakeholder Performance	0.157	0.164	0.029	5.338	0	0.21	4.386***	0.15	0.66

5. Conclusion and Discussion

This research was a comparison study. As a result, the results for the perceived hypotheses in both cases have been discussed in comparison. According to the findings of study 1, the direct effect of stakeholder engagement (teachers) on stakeholder performance (students) is positive. The direct effect of engagement on performance is positive in both studies. Teachers and students interact more in a physical classroom, and the range of understanding expands with face-to-face discussion. Teachers are more engaged in physical classrooms because there are fewer interruptions, and students learn more effectively (Kritikos, 2020).When compared to other modes of learning, students understand more quickly in a physical classroom during discussions with their teachers. Students are new to learning new concepts and phenomena, and a direct link and face-to-face interaction with teachers is required for their understanding (Fidyah, 2020). Students are satisfied when teachers provide them with more content knowledge and force them to learn through more discussions and class activities (Al-Rahmi,).The classroom environment is necessary for students to learn and for teachers to teach, and in higher education, discussion and exposure through teacher-student discussions and group discussions provide beneficial results.

Stakeholder engagement (teachers) influences the learning technology adoption, according to hypotheses 2. In both studies, hypothesis 2 shows that increased engagement of teachers have affect on technology adoption. In Study 1, the population under study was teachers, who had years of teaching experience and had used technology several times, so their ability to adopt the technology-integrated medium was greater than that of students (Cao, 2021). Teachers have been trained and have developed self-expertise in dealing with technology and new integrated systems, allowing them to easily adapt to new changes (Koeswanti, 2021).

The third hypothesis states that learning technology adoption has an effect on stakeholder performance. This hypothesis is also accepted for both studies because teachers responded that learning technology adoption is strongly related to stakeholder performance (students). However, in Study 2, the responses of students also support the hypothesis statement, and the results for the relationship of learning technology adoption-performance are positive, so the hypothesis is also accepted in the case of students (Rapanta, 2021). Technology adoption is advantageous for students learning and gaining knowledge in theoretical subjects because it eliminates the need for additional practice or performance of technical tasks. When students are required to perform more technical tasks while learning the content, their performance suffers, and this is especially true if they lack basic technical abilities (Rof, 2022). When students learn how to use technology, their ability to perform improves and they become more efficient in their learning and action. It is difficult for students to learn and excel academically if they do not have a basic understanding of technology and how to use it. Students enrolled in online learning programs must learn fundamental technical skills in order to excel academically.

For hypothesis 4, the statement Learning Technology Adoption mediates the relationship between Stakeholder Engagement and Stakeholder Performance demonstrates partial mediation results for study 1 and study 2. Students can perform through online learning platforms with several trainings and teachings, but it requires a high level of engagement from teachers as well as high technical skills (Sethi, 2022). Students at the start of their higher education cannot give their best performance unless they are trained in technical skills by their respective teachers. The most important task for teachers in learning and performing through technology integrated learning mechanisms is not only to teach the content but also to guide the students in using the software (Susilo, 2022). Students can understand and perform well on digital learning platforms with the help of teachers' guidance and training. It can also be interpreted as students' performance in new and advanced digital systems can only be sustained with efforts in teaching approaches and teacher guidance (Xu, 2022).

6. Theoretical Implications

The purpose of this study was to discover the rapid changes in the education sector that were actually implemented as a result of the integration of technology in the field of education. A theoretical framework was developed in this study to demonstrate the impact of teachers' engagement on students' performance through learning technology adoption. According to the findings, the mediating effect of learning technology adoption on teacher engagement and student performance was also there. The direct relationship found between teacher engagement and student performance was statistically significant.

This study has developed a concept for the direct relationship between engagement and performance that demonstrates that the role of teaching and learning by stakeholders is well played even with the implementation of technology adoption. This study supports the technological educational model in which teachers and students carry out their respective duties through use of different technologies.

The relationship between performance and engagement, as well as the impact of learning technology adoption as a mediating factor, is further hypothesized. The obtained results demonstrated a partial mediation between learning technology adoption on both a direct and indirect level.

To improve engagement and performance through technology-assisted learning programs, it is necessary to thoroughly investigate learning technology adoption. The variable should be investigated in conjunction with other education and stakeholder engagement-performance impacting variables. Other factors influencing learning technology adoption should also be investigated in order to comprehend technology adoption behaviors and their consequences.

7. Practical Implications

This study has revealed a fresh line of inquiry for the fields of research and education. This study's main goal was to produce some useful conclusions about the effects of the abrupt switch in the education sector from traditional to virtual systems. And in light of this issue, the developed hypothesized framework demonstrates the mediating effect of teachers' engagement and students' performance on the adoption of learning technology.

The relationship established between performance and learning technology adoption, as well as its mediating effect on engagement and performance, demonstrates a partial and favourable association. This demonstrates that the adoption of technology in the educational system is being done effectively, which made it easier for the stakeholders in education (teachers and students) to adopt and had an impact on their engagement and performance behaviors. At first, the stakeholders in education are able to adopt technology and use it in their teaching and learning roles. And more specifically, our educational systems and the technological tools that support them are now sufficiently updated and developed to adopt the applied technology systems and behave in accordance with them. Therefore, there was a significant impact on the performance and engagement of education stakeholders.

The effective planning and design of the practical application of technology in the educational sector were lacking. The older technologically designed educational infrastructures were integrated with the newer technologies. More importantly, the majority of teachers and students lacked the practical skills necessary to use the system. As a result, technology had an impact on engagement and performance. In order to explore the characteristics of this variable and illustrate how it should be used properly, the role of learning technology adoption should be added to future research frameworks along with the corresponding factors.

This study has provided a basic ground for further studies as the new researchers should be conducted on the implementation of technology design and planning of infrastructure that could enhance the adoption of technology as well as improve the engagement and

performance actions of the educational stakeholders.

8. Limitations

This study has limitations, just like every other study. First off, it was a cross-sectional study that was limited in scope to the Pakistan and the quality of technologically implemented education there. Since engagement and performance are measured as behavioral actions, future research should employ a longitudinal design to better understand the variables that positively and negatively affect these behavioral patterns as well as the fundamental motivations for engaging in or refraining from these behaviors.

The implementation of updated technology has been mandated in other sectors as well, including hospitality, health, the industrial sector, and banking, but this study has only focused on the issues with implementation in the education sector. Regarding the specific study plan, these industries should be included in order to comprehend and analyses how technology has an impact on their engagement and performance behaviors.

References

Abidah, A., Hidaayatullaah, H. N., Simamora, R. M., Fehabutar, D., &Mutakinati, L. (2020).The Impact of Covid-19 to Indonesian Education and Its Relation to the Philosophy of "MerdekaBelajar". SiPoSE: Studies in Philosophy of Science and Education, 1(1), 38- 49.

Adnan, M., & Anwar, K. (2020). Online Learning amid the COVID-19 Pandemic: Students' Perspectives. Online Submission, 2(1), 45-51.

Al-Rahmi, A. M., Shamsuddin, A., & Alismaiel, O. A. (2020). Task-Technology Fit Model: The Factors Affecting Students' Academic Performance in Higher Education. Universal Journal of Educational Research, 8(12), 6831-6843.

Ahmmad, M., & Ashfaq, A. (2022). Higher Education Policy in Pakistan: Transforming a Culture of Teaching Media into a Culture of Learning. In The Routledge Handbook of Media Education Futures Post-Pandemic (pp. 399-407). Routledge.

Appavoo, P. (2020). Acceptance of technology in the classroom: A qualitative analysis of mathematics teachers'percep- tions. In S. C. Satapathy, V. Bhateja, B. L. Nguyen, G.-N. Nguyen, & D- N. Le (Eds.), Frontiers in intelligent computing: Theory and applications (pp. 355–364). Springer.

Ashour, S., El-Refae, G. A., & Zaitoun, E. A. (2021). Post-pandemic higher education: Perspectives from university leaders and educational experts in the United Arab Emirates. Higher Education for the Future, 8(2), 219-238.

Ayush, B., & Gupta, N. (2022). The Way Forward to the Post-pandemic Evolving Education Ecosystem: An Institutional Theory Perspective. Available at SSRN 4027058.

Cao, Y., Zhang, S., Chan, M. C. E., & Kang, Y. (2021). Post-pandemic reflections: lessons from Chinese mathematics teachers about online mathematics instruction. Asia Pacific Education Review, 22(2), 157-168.

Deshmukh, J. (2021). Speculations on the post-pandemic university campus–a global inquiry. Archnet-IJAR: International Journal of Architectural Research.

Distler, V., Lallemand, C., & Koenig, V. (2020). How acceptable is this? How user experience factors can broaden our understanding of the acceptance of privacy trade-o ff s. Computers in Human Behavior, 106,1 –10. https://doi.org/ 10.1016/j.chb.2019.106227

Fidyah, D. N., & Setiawati, T. (2020). Influence of organizational culture and employee engagement on employee performance: job satisfaction as intervening variable. Review of Integrative Business and Economics Research, 9(4), 64-81.

Hung, M. L., Chou, C., Chen, C. H., & Own, Z. Y. (2010). Learner readiness for online learning: Scale development and student perceptions. Computers & Education, 55(3), 1080-1090.

India Today (2020).Effect of Covid-19 on campus: Major steps being taken by Colleges to keep education going.https://www.indiatoday.in/education today/featurephilia/story/effect-of-covid-19-on-campus-steps-taken-by-colleges 1668156-2020-04-17.

Kabir, M. R., Islam, M. A., & Deena, S. A. Explaining the adoption of technology-based design of higher education during and after COVID 19 period from a developing country perspective.

Kamal, S. A., Shafiq, M., & Kakria, P. (2020). Investigating acceptance of telemedicine services through an extended tech- nology acceptance model (TAM). Technology in Society, 60, 101212. https://doi.org/10.1016/j.techsoc.2019.101212

Kritikos,M.(2020).Tentechnologiestofight coronavirus.EuropeanParliamentaryResearch Service. https://www.europarl.europa.eu/RegData/etudes/IDAN/2020/ 641543/

Koeswanti, H. D. (2021). Optimization of Online Learning with A Combination of Offline Practices in The Post-Pandemic Era. International Journal of Elementary Education, 5(2), 315-322.

Kumar, D. N. S. (2020). Impact of Covid-19 on Higher Education.Higher Education Digest.https://www.highereducationdigest.com/impact-of-covid-19-on-higher-education/

Lazar, I. M., Panisoara, G., & Panisoara, I. O. (2020). Digital technology adoption scale in the blended learning context in higher education: Development, validation and testing of a specific tool. PloS one, 15(7), e0235957.

Mahmut, Ö. Z. E. R. (2020). Educational Policy Actions by the Ministry of National Education in the times of COVID-19 Pandemic in Turkey. Kastamonu Eğitim Dergisi, 28(3), 1124-1129.

Manzoor, A. (2020). Online Teaching and Challenges of COVID-19 for Inclusion of Persons with Disabilities in Higher Education.https://dailytimes.com.pk/595888/online-teaching-and-challenges-of-covid-19-for-inclusion-of-pwds-in-higher-education/

Meng, F., Guo, X., Zhang, X., Peng, Z., & Lai, K.-H. (2020, January 7–10). Examining the role of technology anxiety and health anxiety on elderly users' continuance intention for mobile health services use. Proceedings of the 53rd Hawaii International Conference on System Sciences

Minhas, S., Hussain, T., Ghani, A., Sajid, K., & Pakistan, L. (2021). Exploring students online learning: A study of zoom application. Gazi University Journal of Science, 34(2), 171-178.

Mujtaba Asad, M., Athar Ali, R., Churi, P., & Moreno-Guerrero, A. J. (2022). Impact of Flipped Classroom Approach on Students' Learning in Post-Pandemic: A Survey Research on Public Sector Schools. Education Research International, 2022.

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2021). Balancing technology, pedagogy and the new normal: Post-pandemic challenges for higher education. Postdigital Science and Education, 3(3), 715-742.

Ratten, V. (2020). Coronavirus (Covid-19) and the entrepreneurship education community. Journal of Enterprising Communities: People and Places in the Global Economy.

Rof, A., Bikfalvi, A., & Marques, P. (2022). Pandemic-accelerated Digital Transformation of a Born Digital Higher Education Institution. Educational Technology & Society, 25(1), 124-141.

Sethi, K., & Roy, M. (2022). Gaining a Better Understanding of Higher Education: During and Post-Pandemic Scenario. International Review of Business and Economics, 7(1), 5.

Shen, C. W., & Ho, J. T. (2020). Technology-enhanced learning in higher education: A bibliometric analysis with latent semantic approach. Computers in Human Behavior, 104, 106177.

Shiffman,J.(2020).TheroleofnationalhealthinformationsystemsintheresponsetoCOVID- 19. https://coronavirus.jhu.edu/from-our-experts/the-role-of-national-health- information-systems-in-the-response-to-covid-19.

Strielkowski, W. (2020).COVID-19 pandemic and the digital revolution in academia and higher education.Preprints 2020, 2020040290.doi:10.20944/preprints202004.0290.v1.

Susilo, E. (2022, July). Students'emotional experiences in online learning during the covid-19 pandemic and post pandemic period. In Proceeding International Conference on Islam and Education (ICONIE) (Vol. 2, No. 2).

Xu, B., & Margeviča-Grinberga, I. (2022, May). Large-scale online learning supported by intelligent devices in the post-pandemic era. In society. Integration. Education. Proceedings of the International Scientific Conference (Vol. 1, pp. 572-583).