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# Analysis of teachers' technological competencies and their performance at a higher education level

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**ABSTRACT**

Technology has become the main game changer in all the fields of study, including education. The main purpose of this research was to analyze the teachers' technological competencies and their performance at the higher education level. The teachers' technological competencies were analyzed in six elements of technology, including perceptions, technological knowledge, perceived ease of use, perceived usefulness, and skills in using technology. The teachers' performance in using technology in the teaching and learning process was also determined. The study consisted of two samples: one from the teachers of the six social sciences departments at the six public universities of South Punjab, Pakistan, and the other from the students of the 6th, 7th, and 8th semesters of the six social sciences departments at the six public universities of South Punjab, Pakistan. The sample size consisted of 497 teachers and 611 students. The samples were selected by using a stratified random sampling technique. Two questionnaires, one for teachers and the other for students, were adopted from the literature to collect the data. SPSS-25 was used to analyze the collected data. Frequency distribution, descriptive statistics, and correlation analysis were done to analyze the data and to interpret the results. The findings of the study indicated that most of the teachers of the social sciences departments at the public universities of South Punjab, Pakistan, had a lack of technological competencies, and their performance was also not good. The results also indicated a high positive correlation between teachers' technological competencies and their performance at the higher education level. Some serious steps are required to improve the teachers' technological competencies and performance at the higher education level.

**Keywords:** teachers, technological competencies, performance, higher education level

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## INTRODUCTION

Teachers play a crucial role in incorporating technology at all educational levels, including higher education. Therefore, their valuable experiences and suggestions must be completely grasped before taking any action to integrate the technology. Technology integration, being a complicated process, consists of several aspects, such as an individual's perceptions about technology, technological knowledge, ease of use of technology, usefulness of technology, and technological skills. The availability of technological resources does not guarantee the success of technology integration in the teaching and learning process. Rather, it must be observed from the teachers' skills and capabilities in selecting and successfully employing technology suitable for learning content and methodology (Abbasi et al., 2022).

Teachers' technological competence is a significant element for using technology in the teaching and learning process. Technological competence is a comprehensive concept that includes not only the abilities of an individual but also the perceptions, knowledge, and attitudes towards the use of technology. In this regard, technological competence entails the successful

application of technology to gather, assess, store, generate, present, share information, interact over the internet, and engage in collaborative networks (Altun, 2019). Fails et al. (2018) pointed out that technological competence should be viewed as the capacity to integrate context-based knowledge, abilities, and skills.

Many teachers worldwide, including in Pakistan, face difficulties in using suitable technological tools according to the requirements of the students at the higher education level (Akram et al., 2021). Some teachers do not want to use the technology due to the anxiety of not executing the applied technological tool correctly. Some teachers do not have so much technological knowledge and skills in integrating the right technological tools in the teaching and learning process, and some teachers have strange perceptions about using technology in teaching and learning (Minamatov, 2021).

Teachers' technological competency is one of the key elements for the implementation and execution of technology at all educational levels, including higher education. As the university is the highest place for learning skills, applying the right and suitable technological tool is the key requirement for students at the higher education level. Qureshi et al. (2012) stated that awareness about using the right technological tools is the most crucial problem for Pakistani teachers at the higher education level. Further, Akram et al. (2021) concluded in their research study that most of the faculty members of the universities lacked sound skills in using technology. More recently, Thaheem et al. (2022) conducted comparative research to explore the challenges in using technological tools with Pakistani and Indonesian university teachers. They resulted in the university teachers from both countries facing technological and pedagogical challenges. So, in light of the above studies, there is a need for time to conduct more research on the teachers' technological competencies and their performance at the higher education level in Pakistan.

This study was built on the basis of the technology acceptance model (TAM). TAM addresses challenges related to the adoption and usage of technology based on their perceived ease of use and perceived usefulness. Venkatesh and Davis (2000) stated that behavioral intention to utilize a system was positively correlated with perceived usefulness. Perceived ease of use and perceived usefulness are the two cognitive views that support the theory on actual use by individual behavioral intention to utilize a technology system. Davis (1989) stated that the usage of a technological structure is impacted directly or indirectly by the operator's perception, intention, perceived usefulness, and perceived ease of use. The theoretical framework is presented in Figure 1.

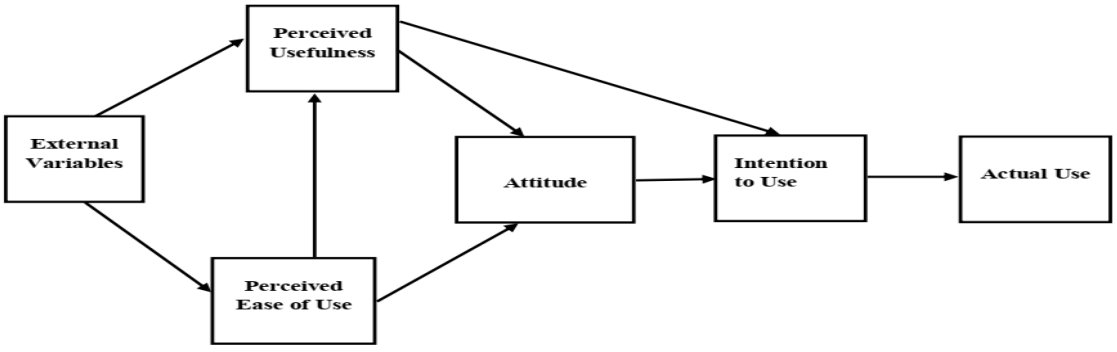


**Figure 1. Technology Acceptance Model (TAM) (Davis, 1989)**

A conceptual framework demonstrates how the variables in the research should be related. It outlines how the appropriate research process and goals fit together to provide meaningful results. The main objective of this research was to analyze the teachers' technological competencies and their performance at the higher education level. The TAM was modified according to the current study and defined as the technological competency that is the combination of perceptions, technological knowledge, perceived ease of use, perceived usefulness, and skills in using technology. All these elements determine the teachers' competency and performance in technology. The MTAM model formulated for the current research study is presented in Figure 2.

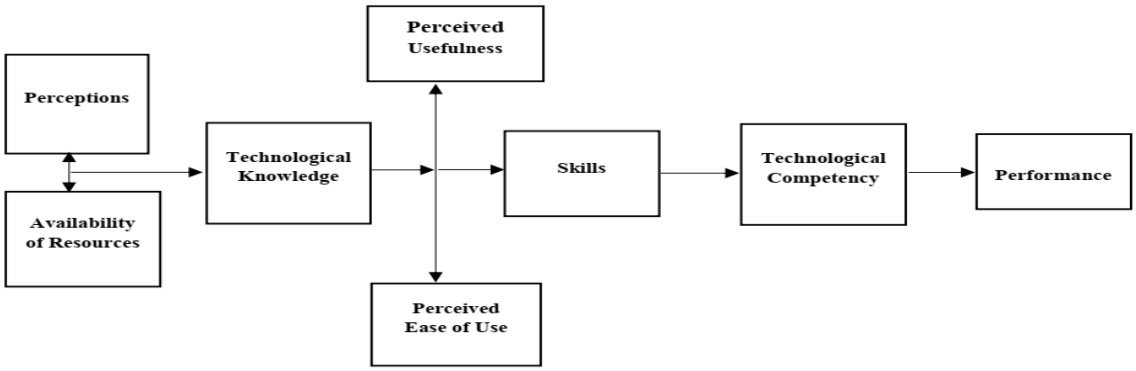


**Figure 2. Modified Technology Acceptance Model (MTAM)**

In the MTAM model, perceptions, availability of resources, and technological knowledge were taken as external factors. Perceived ease of use and usefulness are the two interconnected factors in which perceived usefulness affects perceived ease of use. Skills are obtained if an individual has positive perceptions, technological knowledge, and perceives technology as easy and useful. Finally, technological competency was proposed as the combination of perceptions, technological knowledge, perceived ease of use, perceived usefulness, and skills in using technology. Further, performance was stated as the result of technological competency.

Teachers' perceptions are often regarded as the most important element influencing technology adoption. They are essential because they influence how teachers use or do not use technology (Herro et al., 2021). They are critical of influencing whether and how much technology is used by the teachers in the classroom. These impressions can affect whether a teacher's trust in the educational technology tool is suitable for the content being taught (Iriani & Andjarwati, 2020). Mertala (2019) stated that the way instructors perceive the technology has a significant impact on technology usage. Abel et al. (2022) concluded in their research that teachers' perceptions about using technology are affected by their own perceptions of the benefits of technology. Moreover, Edannur and Marie (2017) agreed that teachers' backgrounds, including their perceptions, technological knowledge, and openness to try new things, are significant components that can inspire them to integrate technology in the classroom. Similarly, Katemba (2020) noted that essential elements influencing successful technology integration in the classroom are related to instructors, such as teachers' perceptions and behaviors.

Teachers must first identify technologies and their intended instructional functions in order to fully comprehend them. They can apply a wide range of contemporary technological tools to improve their lesson plans and student participation (Udayana et al., 2022). Here, technological knowledge cannot be as simply categorized and codified as scientific information due to the connection with a particular activity. When knowledge and expertise are particularly applied to certain technological activities, technology is best portrayed (Kimm et al., 2020). Kalinga and Ndibalema (2023) stated that there are no universals, or, to put it another way, regular patterns of technical thought. The use of technology necessitates the fusion of several diverse components that are both multichanneled and multileveled, and certain fields of technology influence particular forms of thought. In other words, technology draws on formal knowledge, but its usage is multidisciplinary and tailored to individual tasks.

The degree to which someone thinks utilizing a specific technology will be easy is known as perceived ease of use (Davis, 1989). Similarly, Baek and Sung (2020) stated that something that is liked or sought as the foundation of something that is deemed beneficial or has components of usefulness may be regarded as being easy to use. However, consumers' perception of how simple it is to understand technology is also a measure of ease of use (Elisa et al., 2022). Users believe that the simplicity of use of information technology systems will provide them a sense of the system's utility, which will make them feel more at ease while working. A system that is difficult to regulate will deliver a poor level of convenience, even if the opposite is true. One of the elements influencing the degree of positive attitudes toward usage is perceived ease of use (Hong et al., 2021).

Moreover, systems that are used more frequently indicate that their users are more familiar with, knowledgeable about, and proficient with the system. A number of factors affect how easy technology is for users to use, including the reputation of the technology acquired by the user (Salsabila & Usman, 2021), user experience with similar technology, and the use of technology that is clear and easy to understand, easy to control, flexible, and easy to become skilled with (Bregashtian & Herdinata, 2021).

Perceived usefulness is the user's belief that using a particular system will provide improvements to their work performance (Henderson & Divett, 2003). Furthermore, it is a belief about the decision-making process (Hong et al., 2021). Teachers perceived usefulness is an advantage that leads to their faith in the system utilized applications. Additionally, perceived usefulness is the forecast of technological acceptability in society. It acts as a mechanism for instructors to believe in educational institution performance, which is one of the most essential things that teachers acquire from the usage of innovation connected to the usability value of technology. In general, a person is more likely to utilize an application if it can support and facilitate the task being done (Lai & Zainal, 2015).

A system's perceived usefulness impacts its adoption and user behavior. Technology is considered successful if it gives the utility value that people demand. System users will use it if the system is advantageous, regardless of how basic or sophisticated the system is. Usman et al. (2020) stated that perceived usefulness is the degree to which a person believes that using a certain system would improve its performance. Likewise, Udayana et al. (2022) supported that perceived usefulness has a favorable impact on attitude and intention to adopt technology.

Technological skills are the knowledge and abilities needed to operate computer-based technologies and carry out technological tasks. Due to the fact that they are frequently learned through formal education, practice, and training, technology skills are regarded as hard skills. These abilities are useful for handling technological, scientific, mechanical, and mathematical challenges. In addition to general abilities, technological skills appear to be key to people's future life happiness in today's information society. Age, income, and the crucial 21$^{st}$-century skills of critical thinking, problem-solving, communication, and technology were found to favorably influence life satisfaction (Manco-Chavez et al., 2020).

Therefore, teachers must be equipped with the necessary skills, abilities, perspectives, and information to fully utilize technology in the classroom if effective technological integration is to occur. The integration of technology into teaching and learning is a challenging, dynamic process. If classroom teachers cannot better integrate technology, effective technological integration in education cannot be achieved. The acquisition of competencies, abilities, and knowledge about the use of contemporary technology integration within the process of their professional improvement and growth is a crucial element of training programs for teachers (Hanshaw & Hanson, 2019).

The objectives of this research were: 1) to determine the perceptions of teachers about using technology at the higher education level, 2) to identify the technological knowledge of teachers at the higher education level, 3) to find the perceived ease of use of technology in teachers at the higher education level, 4) to find the perceived usefulness of technology in teachers at the higher education level, 5) to determine the skills of teachers in using technology at the higher education level, and 6) to find the relationship between teachers' technological competencies and their performance at the higher education level. Meanwhile, the following research questions were addressed in this research study: 1) What are the perceptions of teachers about using technology? 2) Do teachers have technological knowledge at higher education level? 3) To what extent do teachers think technology is easy to use? 4) To what extent do teachers think technology is useful? 5) Do teachers have skills in using technology at a higher education level? 6) What is the relationship between teachers' technological competencies and their performance at the higher education level?

## METHOD

A research design outlines the strategy for the investigation to ascertain the causal connection between the dependent and independent variables. It is a strategy for seeking solutions to research questions. To address the questions mentioned in this study, the survey research design was employed. The data was gathered using a survey approach. For a survey, a sizable sample of respondents is chosen from the known population (Kelly, 2016). The most notable characteristic of this design is that it increases the proportion of individuals who participate. This creates the foundation for flexible, trustworthy, and reasonably objective analysis (Lam & Ducreux, 2013). Due to the size of the study population, the survey approach was employed to collect the data.

A sampling technique is a statistical approach that entails carefully analyzing the information acquired about the population and choosing a suitable sample based on that information. For the current study, a stratified random sampling technique was used to select the appropriate sample, as the population consisted of different strata (university, department, male, and female). The stratified random sampling technique is used when different subgroups have been identified in the population A sample size of 497 teachers, of which 284 male and 213 female, was selected from the six social sciences departments (education, psychology, economics, sociology, political sciences and management sciences) from the six public universities (Ghazi University, Bahauddin Zakariya University, Emerson University, University of Layyah, Khawaja Fareed University of Engineering and Information Technology, and Islamia University of Bahawalpur) of south Punjab for the study. Similarly, a sample size of 611 students, including 377 male students and 234 female students, was also selected from the six social sciences departments at six public universities of South Punjab by following the stratified random sampling technique.

In this research, two questionnaires (one for teachers and the other for students) were adapted from the research studies conducted by several scholars (Afari & Achampong, 2010; Kahveci et al., 2013; Samuel et al., 2018; Mills & Gay, 2019). The questionnaire of teachers was comprised of five elements, including perceptions of teachers about using technology, technological knowledge, perceived ease of use of technology, perceived usefulness, and skills in using technology. The items of standardized questionnaires were slightly modified in light of pilot testing results, as well as in light of expert opinion, with the help of a supervisor. Both questionnaires were based on the five-point Likert scale, having options of strongly disagree, disagree, neutral, agree, and strongly agree. The teachers' questionnaire consisted of 34 items, including five elements to determine the teachers' technological competency, and the students' questionnaire was comprised of 18 items to find the teachers' performance in technology usage in the teaching and learning process. The validity of the data collection instruments was ensured by expert opinion and pilot testing. The reliability of the data collection instruments was determined using Cronbach's alpha test. The reliability coefficient (r) for the teachers' data collection was 0.846 and 0.870 for the students' data collection instrument.

The data collected from the teachers and students through questionnaires was analyzed using SPSS-25. The data was analyzed by applying frequency distribution, descriptive statistics, and correlation tools to determine the teachers' technological competencies and performance at the higher education level.

## FINDINGS AND DISCUSSION

### Findings

#### *Frequency distribution of teachers' demographic information*

Table 1 shows the frequency distribution of the teachers' demographic information. The table shows that from the total sample of 497 teachers, 284 were male and 213 were female. The percentage of male teachers was 57% and 43% for female teachers. The frequency distribution regarding teachers' academic qualifications showed that from the total sample of 497 teachers, 188 were M. Phil qualified, 309 were Ph.D. qualified, and no teachers had post-doctorate qualifications. The percentage of M.Phil.-qualified teachers was 38%, and the percentage of Ph.D.-qualified teachers was 62%. The frequency distribution regarding the department-wise sample shows that from the total sample size of 497 teachers, 96 teachers were from the education

department, 67 teachers were from the psychology department, 161 teachers were from the management sciences department, 64 teachers were from the economics department, 60 teachers were from the sociology department, and 49 teachers were from the political science department. The percentage of teachers from the education department was 19.3%, from the psychology department was 13.5%, from the management sciences department was 32.4%, from the economics department was 12.9%, from the sociology department was 12.1%, and the percentage of teachers from the political science department was 9.9%. The frequency distribution regarding the university-wise sample shows that from the total sample of 497 teachers, 56 teachers were from GU, 147 teachers were from BZU, 172 teachers were from IUB, 28 teachers were from KFUEIT, 49 teachers were from EU, and 45 teachers were from UL. The percentage of teachers from GU was 11.3%, from BZU was 29.6%, from IUB was 34.6%, from KFUEIT was 5.6%, from EU was 9.9%, and the percentage of teachers from UL was 9.1%.

**Table 1. Frequency distribution of demographic information of teachers**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 284 | 57% |
| Female | 213 | 43% |
| Total | 497 | 100% |
| Academic Qualifications of Teachers | | |
| M.Phil. | 188 | 38% |
| Ph.D. | 309 | 62% |
| Post-Doctorate | 0 | 0% |
| Total | 497 | 100% |
| Department-wise Teachers | | |
| Education | 96 | 19.3% |
| Psychology | 67 | 13.5% |
| Management Sciences | 161 | 32.4% |
| Economics | 64 | 12.9% |
| Sociology | 60 | 12.1% |
| Political Science | 49 | 9.9% |
| Total | 497 | 100% |
| University-wise Teachers | | |
| Ghazi University | 56 | 11.3% |
| BZU | 147 | 29.6% |
| IUB | 172 | 34.6% |
| KFUEIT | 28 | 5.6% |
| Emerson University | 49 | 9.9% |
| University of Layyah | 45 | 9.1% |
| Total | 497 | 100% |

***Frequency distribution of students' demographic information***

Table 2 shows the frequency distribution of the students' demographic information. The table shows that from the total sample of 611 students, 377 were male and 234 were female. The percentage of male students was 62%, and 38% for female students. The frequency distribution regarding the semester-wise students shows that from the total sample of 611 students, 201 were from the 6th semester, 205 were from the 7th semester, and 205 were from the 8$^{th}$ semester. The percentage of 6$^{th}$ semester students was 32.9%, 7$^{th}$ semester students was 33.6%, and 8$^{th}$ semester students was 33.6%. The department-wise frequency distribution shows that 143 students were from the education department, 69 students were from the psychology department, 181 students were from the management sciences department, 77 students were from the economics department, 79 students were from the sociology department, and 62 students were from the political science department. The percentage of students from the education department was 23.4%; 69% of students were from the psychology department, 29.6% of students were from the management sciences department, 12.6% of students were from the economics department, 12.9% of students were from the sociology department, and 10.1% of students were from the

political science department. The university-wise frequency distribution of students shows that 76 students were from GU, 173 were from BZU, 193 were from IUB, 35 were from KFUEIT, 59 were from EU, and 75 were from UL. The percentage of students from GU was 12.4%; 28.3% of students were from BZU, 31.6% of students were from IUB, 5.7% of students were from KFUEIT, 9.7% of students were from Emerson University, and 12.3% of students were from the University of Layyah.

**Table 2. Frequency distribution of demographic information of students**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 377 | 62% |
| Female | 234 | 38% |
| Total | 611 | 100% |
| Semester-wise Students | | |
| 6th | 201 | 32.9% |
| 7th | 205 | 33.6% |
| 8th | 205 | 33.6% |
| Total | 611 | 100% |
| Department-wise Students | | |
| Education | 143 | 23.4% |
| Psychology | 69 | 11.3% |
| Management Sciences | 181 | 29.6% |
| Economics | 77 | 12.6% |
| Sociology | 79 | 12.9% |
| Political Science | 62 | 10.1% |
| Total | 611 | 100% |
| University-wise Students | | |
| Ghazi University | 76 | 12.4% |
| BZU | 173 | 28.3% |
| IUB | 193 | 31.6% |
| KFUEIT | 35 | 5.7% |
| Emerson University | 59 | 9.7% |
| University of Layyah | 75 | 12.3% |
| Total | 611 | 100% |

***Descriptive analysis of teachers' technological competencies***

*Teachers' perceptions*

The first objective of this research study was "to determine the perceptions of teachers about using technology at higher education level," and the research question regarding this objective was "What are the perceptions of the teachers about using technology?". To determine the perception of teachers about using technology, descriptive statistical analysis was done. The results of descriptive statistical analysis are presented in Table 3.

**Table 3. Perceptions of teachers about using technology**

| Sr. No | Statement | M | SD |
|---|---|---|---|
| 1 | I think technology makes me more professional in teaching | 3.21 | 0.862 |
| 2 | I believe that using technology changes the classroom's learning climate | 3.42 | 0.791 |
| 3 | Efficient use of technology creates a positive relationship between teachers and students | 3.19 | 0.721 |
| 4 | I feel that using technology makes my teaching more effective | 3.37 | 0.740 |
| 5 | Technology satisfies the students' learning requirements | 3.51 | 0.729 |
| 6 | Using technology helps me in the preparation of my teaching materials | 3.61 | 0.634 |
| 7 | I feel more confident when using technology in teaching | 3.22 | 0.880 |
| 8 | I think the integration of technology greatly influences teaching styles | 3.29 | 0.651 |
| | Overall | 3.29 | 0.751 |

Table 3 shows the results of the descriptive statistical analysis of teachers' perceptions about using technology at the higher education level for each statement and overall. The mean

value (M) for the statement that I think technology makes me more professional in teaching was 3.21, and the standard deviation (SD) was 0.862. As the M value for this statement is more than 3, most teachers think technology makes them more professional in teaching. The M value for the statement that I believe that using technology changes the learning climate of the classroom was 3.42, and the value of SD was 0.791. As the mean value for this statement is more than 3, most teachers believe that using technology changes the classroom's learning climate. The mean value for the statement that efficient use of technology creates a positive relationship between teachers and students was 3.19, and the value of SD was 0.721. As the mean value for this statement is more than 3, most teachers think efficient use of technology creates a positive relationship between teachers and students. The M value for the statement that I feel that using technology makes my teaching more effective was 3.37, and the value of SD was 0.740. As the mean value is more than 3, most teachers think technology makes their teaching more effective. The M value for the statement that technology satisfies the learners' learning requirements was 3.51, and the value of SD was 0.729. As the mean value is more than 3, most teachers think technology satisfies the students' learning requirements. The M value for the statement that using technology helps me prepare my teaching materials was 3.61, and the value of SD was 0.634. As the mean value is more than 3, most teachers think technology helps them prepare their teaching materials. The M value for the statement that I feel more confident in using technology in teaching was 3.22, and the value of SD was 0.880. As the mean value is more than 3, most teachers feel more confident about using technology in teaching. Moreover, the M value for the statement that I think that technology integration greatly influences teaching styles was 3.29, and the value of SD was 0.651. Again, as the mean value is more than 3, most teachers think technology integration greatly influences their teaching styles. The overall mean value of teachers' perceptions about using technology in higher education was 3.29, and the SD was 0.751. As the overall mean value is more than 3, most teachers have positive perceptions about using technology in higher education.

*Technological knowledge*

The second objective of this research study was to identify the technological knowledge of teachers at the higher education level, and the research question regarding this objective was "Do teachers have technological knowledge at the higher education level?" The results of the descriptive analysis of teachers' technological knowledge are shown in Table 4.

**Table 4. Technological knowledge of teachers**

| Sr. No | Statement | M | SD |
|---|---|---|---|
| 1 | I know how to solve my technical problems | 2.78 | 0.887 |
| 2 | I have enough knowledge about how to use the technological tools in teaching | 2.67 | 0.782 |
| 3 | I know the recent developments of technology used in teaching and learning | 2.92 | 0.887 |
| 4 | I have enough knowledge about technology to get my teaching job done | 2.97 | 0.714 |
| 5 | I have enough knowledge to teach technology-related courses proficiently | 2.73 | 0.792 |
| 6 | I have enough knowledge about how to deliver an online lecture by using different technological tools | 3.11 | 0.872 |
| 7 | I know how to use different websites for preparing teaching materials | 2.99 | 0.654 |
| | Overall | 2.79 | 0.798 |

Table 4 shows the results of the descriptive statistical analysis of teachers' technological knowledge for each statement and overall. The mean value (M) for the statement that I know how to solve my technical problems was 2.78, and the standard deviation (SD) value was 0.887. As the mean value was less than 3, most teachers do not know how to solve their technical problems. The M value for the statement that I have enough knowledge about how to use the technological tools in teaching was 2.67, and the value of SD was 0.782. As the mean value is less than 3, most teachers do not know enough about how to use the technological tools in teaching. The M value for the statement that I know the recent developments of technology used in teaching and learning was 2.82, and the value of SD was 0.887. As the mean value is less than 3, most teachers do not know the recent developments of technology used in teaching and learning. The M value for the statement that I have enough knowledge about technology to get my teaching job done was 2.97,

and the value of SD was 0.714. As the mean value is less than 3, most teachers do not have enough knowledge about technology to complete their teaching job. The M value for the statement that I have enough knowledge to teach technology-related courses proficiently was 2.73, and the value of SD was 0.792. As the mean value is less than 3, most teachers do not have enough knowledge to teach technology-related courses proficiently. The M value for the statement that I have enough knowledge about how to deliver online lectures using different technological tools was 3.11, and the value of SD was 0.872. As the mean value is more than 3, most teachers have enough knowledge about how to deliver online lectures using different technological tools. Then, the M value for the statement that I know how to use different websites for preparing teaching materials was 2.99, and the value of SD was 0.654. As the M value is less than 3, most teachers do not know how to use different websites to prepare teaching materials. The overall M value was 2.79, and the value of SD was 0.798. As the overall mean value is less than 3, the descriptive statistical analysis results showed that most of the teachers do not have technological knowledge in social sciences departments at the higher education level.

*Perceived ease of use of technology*

The third objective of this research study was to find perceived ease of use of technology in teachers at the higher education level, and the research question regarding this objective was "To what extent do teachers think technology is easy to use?" To achieve this objective and to find the answer to the research question, descriptive analysis was applied. The results of descriptive analysis are shown in Table 5.

**Table 5. Perceived ease of use of technology**

| Sr. No | Statement | M | SD |
|---|---|---|---|
| 1 | I can easily use technological tools/devices in teaching | 2.56 | 0.887 |
| 2 | It is easy for me to execute the use of technology in teaching | 2.61 | 0.891 |
| 3 | I face no trouble in remembering how to use technology for teaching-related tasks | 2.43 | 0.820 |
| 4 | My interaction in using technology for teaching is understandable and clear | 2.81 | 0.816 |
| 5 | It is easy for me to become skilled at using technology in teaching | 2.84 | 0.923 |
| 6 | It is easy for me to find the teaching materials by using technology | 2.81 | 0.682 |
| 7 | It is easy for me to manipulate the technological tools during teaching | 2.70 | 0.712 |
| 8 | I can easily manage the troubleshooting problems related to technology | 2.47 | 0.920 |
| | Overall | 2.65 | 0.831 |

Table 5 shows the descriptive statistical analysis results of the perceived ease of use of technology for each statement and overall. The table shows that the mean value (M) for the statement that I can easily use technological tools/devices in teaching was 2.56, and the standard deviation (SD) value was 0.887. As the M value is less than 3, most teachers cannot easily use technological tools/devices in teaching. The M value for the statement that it is easy for me to execute the use of technology in teaching was 2.61, and the value of SD was 0.891. As the mean value is less than 3, it is not easy for most teachers to use technology in teaching. The M value for the statement that I face no trouble remembering how to use technology for teaching-related tasks was 2.43, and the value of SD was 0.820. As the mean value is less than 3, most teachers face trouble remembering how to use technology for teaching-related tasks. The M value for the statement that my interaction in using technology for teaching is understandable and clear was 2.81, and the value of SD was 0.816. As the mean value is less than 3, most teachers do not have understandable and clear interactions in using technology for teaching. The M value for the statement that it is easy for me to find the teaching materials using technology was 2.81, and the value of SD was 0.682. As the mean value is less than 3, it was not easy for most teachers to find teaching materials using technology. The M value for the statement that it is easy for me to manipulate the technological tools during teaching was 2.70, and the value of SD was 0.712. As the mean value is less than 3, it was difficult for most teachers to manipulate the technological tools during teaching. Moreover, the M value for the statement that I can easily manage the troubleshooting problems related to technology was 2.47, and the value of SD was 0.920. As the

mean value is less than 3, most teachers were unable to easily manage the troubleshooting problems related to technology. The overall mean of the perceived ease of use of technology was 2.65, and the value of SD was 0.831. Therefore, most of the teachers of social sciences departments perceived that they cannot easily use the technology in teaching at the higher education level.

*Perceived usefulness*

The fourth objective of this research was to find the perceived usefulness of technology in teachers at the higher education level, and the research question regarding this objective was "To what extent do teachers think technology is useful?". To achieve this intended objective and to find the answer to the research question, descriptive analysis was applied. The results of descriptive analysis are shown in Table 6.

**Table 6. Perceived usefulness of technology**

| Sr. No | Statement | M | SD |
|---|---|---|---|
| 1 | Technology improved my teaching skills | 3.11 | 0.772 |
| 2 | Technology improved my work efficiency | 3.19 | 0.784 |
| 3 | Using technology enhanced the effectiveness of my teaching activities | 3.34 | 0.809 |
| 4 | Using technology improved my quality of teaching | 3.23 | 0.784 |
| 5 | Technology-based teaching improved the productivity of my department/ faculty | 3.59 | 0.813 |
| 6 | Using technology enabled me to accomplish teaching tasks more quickly | 3.22 | 0.721 |
| | Overall | 3.28 | 0.780 |

Table 6 shows the results of the descriptive statistical analysis of the perceived usefulness of technology in teaching at the higher education level. The table shows that the mean value (M) for the statement that technology improved my teaching skills was 3.11, and the standard deviation (SD) value was 0.772. As the M value was more than 3, most of the teachers perceived that technology improved their teaching skills. The M value for the statement that technology improved my work efficiency was 3.19, and the value of SD was 0.784. As the mean value was more than 3, most teachers perceived that technology improved their work efficiency. The M value for the statement that using technology enhanced the effectiveness of my teaching activities was 3.34, and the value of SD was 0.809. As the mean value was more than 3, most teachers perceived that using technology enhanced the effectiveness of their teaching activities. The M value for the statement that using technology improved my quality of teaching was 3.23, and the value of SD was 0.784. As the mean value was more than 3, most of the teachers perceived that using technology improved their quality of teaching. The M value for the statement that technology-based teaching improved the productivity of my department/ faculty was 3.59, and the value of SD was 0.792. As the mean value was more than 3, most teachers perceived that technology-based teaching improved the productivity of their departments/ faculties. The M value for the statement that using technology enables me to accomplish teaching tasks more quickly was 3.22, and the value of SD was 0.721. As the mean value is more than 3, most teachers perceived that technology enables them to accomplish teaching tasks more quickly. The overall M value of the perceived usefulness of technology was 3.28, and the value of SD was 0.780. Thus, most teachers of social sciences departments perceived technology as useful in teaching at the higher education level.

*Skills in using technology*

The fifth objective of this research was to determine the skills of teachers in using technology at the higher education level, and the research question related to this objective was "Do teachers have skills in using technology at the higher education level?" To achieve this intended objective and to find the answer to the research question, descriptive analysis was applied. The results of descriptive statistics are shown in Table 7.

**Table 7. Skills of teachers in using technology**

| Sr. No | Statement | M | SD |
|---|---|---|---|
| 1 | I can complete a task using technology without calling someone to help me | 2.44 | 0.885 |
| 2 | I feel confident using technological tools for classroom interactions | 2.34 | 0.935 |
| 3 | I feel confident in using technology for teaching content | 2.22 | 0.763 |
| 4 | I feel competent in using technology in teaching | 2.18 | 0.601 |
| 5 | I can use advanced technological tools like SPSS, Statistics, etc. for research purposes | 2.32 | 0.611 |
| | Overall | 2.67 | 0.752 |

Table 7 shows the results of the descriptive statistical analysis of the skills of teachers in using technology at the higher education level. The table shows that the mean value (M) for the statement that I can complete a task using technology without calling someone to help me was 3.44, and the standard deviation (SD) value was 0.885. As the mean value is less than 3, most teachers do not have the skills to complete a task using technology without calling someone to help them. The M value for the statement that I feel confident using technological tools for classroom interactions was 2.34, and the value of SD was 0.935. As the mean value is less than 3, most teachers do not feel confident using technological tools for classroom interactions. The M value for the statement that I feel confident in using technology for teaching content was 2.22, and the value of SD was 0.763. As the M value is less than 3, most teachers do not feel confident using technology to teach content. The M value for the statement that I feel competent in using technology in teaching was 2.32, and the value of SD was 0.601. As the mean value is less than 3, most of the teachers do not feel competent in using technology in teaching. The M value for the statement that I can use advanced technological tools like SPSS, Statistics, etc. for research purposes was 2.32, and the value of SD was 0.611. As the M value is less than 3, most of the teachers do not have the skills to use advanced technological tools like SPSS, Statistics, etc. for research purposes. The overall M value was 2.67, and the value of SD was 0.752. As the mean value was less than 3, most of the teachers of social science departments stated that they do not have skills in using technology in teaching at the higher education level.

*Relationship between teachers' technological competencies and their performance*

The sixth objective of this research was to find the relationship between the technological competencies of teachers and their performance at the higher education level, and the research question regarding this objective was "What is the relationship between the technological competencies of teachers and their performance at the higher education level?" Pearson's correlation test was used to achieve this intended objective and find the answer to this question. The results of Pearson's correlation test are presented in Table 8.

**Table 8. Relationship between teachers' technological competencies and their performance at the higher education level**

| Factors | TC | P | TK | PEU | PU | SUT | TP |
|---|---|---|---|---|---|---|---|
| Technological Competencies | 1 | | | | | | |
| Perceptions | .183** | 1 | | | | | |
| Technological Knowledge | .792** | .030 | 1 | | | | |
| Perceived Ease of Use | .811** | .012 | .053 | 1 | | | |
| Perceived Usefulness | .4.21** | .032 | .017 | .078 | 1 | | |
| Skills in Using Technology | .899** | .078 | .092 | .045 | .190* | 1 | |
| Teachers' Performance | .839** | .022 | .101** | .069 | .204** | .106** | 1 |

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

Table 8 shows the Pearson correlation coefficient test results applied to find the relationship between the teachers' technological competencies and their performance. The findings indicated that the Pearson correlation coefficient (r) value between teachers' technological competencies and their performance was 0.839, which showed a high positive significant relationship between

the teachers' technological competencies and their performance at the higher education level. In the same way, the values of "r" for perceptions, technological knowledge, perceived ease of use, and technological skills were 0.183, 0.792, 0.811, and 0.899, respectively. The majority of technological competency elements had a strong positive correlation with the teachers' performance at the higher education level.

**Discussion**

The aim of this research study was to analyze the teachers' technological competencies and their performance at the higher education level. It is evident from the results of the study that most higher education level teachers do not have the technological competencies, and their performance was also not good. The technological competencies were divided into six elements: perceptions of teachers, technological knowledge, perceived ease of use, perceived usefulness, and teachers' skills in using technology in teaching. The teachers were analyzed for each element of technological competency, and their performance was also determined based on these technological competencies at the higher education level.

Teachers' perceptions are regarded as an important element in adopting technology in the classroom. They are essential because they influence how teachers use or do not use technology in their classrooms. More than 60 years of research on teachers' perceptions has provided good evidence for the premise that perceptions play a key role in determining teachers' behavior in the classroom. Moreover, teachers' perceptions are a prominent focus of research in the context of technology integration since they are assumed to impact how and why teachers may or may not modify their teaching to embrace a new curriculum, accept new instructional techniques, and implement new projects. Teachers' perceptions seem to be a strong forecaster of technology integration (Baek et al., 2018). Buabeng-Andoh (2012) pointed out that teachers' decisions on using technology in teaching are influenced by their perceptions. Similarly, Sailer et al. (2021) stated that important aspects of successful technology integration in the classroom are related to teachers themselves, such as teachers' perceptions, technological knowledge, and skills. The findings of this study related to teachers' perceptions about using technology showed that most teachers have positive perceptions about technology usage in teaching. The mean value for the teachers' perceptions about using technology in teaching was 3.29, showing that most of the teachers of social sciences departments at the public universities of South Punjab perceived technology as a useful helping phenomenon to be used during the teaching and learning process. So, the findings of this study are evidence that perception is the most crucial element for the successful integration of technology in teaching, as stated by the findings of the many studies, including Redmond & Lock (2019) and Baek & Sung (2020).

Koyuncuoglu (2022) stated that technology integration in the teaching and learning process heavily depends on technological knowledge. It demonstrates how a teacher uses technical expertise according to the subject matter and students' requirements. A teacher with greater technological knowledge can create a learning environment that meets the requirements of the students and the subject matter. They can also use technology more skillfully, which leads to more useful learning. Furthermore, technological knowledge is more than just a collection of facts, rules, theories, and general information that is imparted to students; it is more than that. Individuals struggle with the application of knowledge, whether it be conceptual, analytical, or manipulative, and technical knowledge is dynamic, with meaning being formed and reconstructed as they do so. When used in real-world situations, generalizations, ideas, principles, technical maxims, and processes gain significance. The findings of the current study regarding teachers' technological knowledge showed that most teachers do not have the technological knowledge to be used in teaching. The mean value for the teachers' technological knowledge was 2.79, showing that most of the teachers of the social sciences departments at public universities of South Punjab do not have the technological knowledge to be used in teaching at the higher education level. These findings are closely related to the studies conducted by other scholars, such as Adedokun-Shittu & Shittu (2015 and Singhavi & Basargekar (2019).

A person's propensity to adopt and employ particular technology is thought to be favorably influenced by perceived ease of use. Shafira and Yasri (2021) suggested that teachers might find

it simple to use technology when considering various factors. In the evaluation of technology adoption, perceived ease of use has been the most significant and widely affected factor. A person's view of the procedure leading to the outcome is referred to as perceived ease of use. The findings of this study regarding the perceived ease of use indicated that most of the teachers perceived that they could not easily use the technology in the teaching and learning process. The mean value for the perceived ease of use of technology was 2.65, showing that most of the teachers of social sciences departments at public universities of South Punjab perceived that they cannot easily use technology in the teaching and learning process.

Moreover, perceived usefulness is the key factor in user acceptance of technology. The system's effectiveness, efficiency, and overall benefits in terms of improving user performance all have an impact on how useful people find it to be. Perceived usefulness plays a great role in helping educational institutions, particularly those that continuously introduce new technology to enhance the productivity of the individuals and the system (Pitafi et al., 2020). The findings of this study regarding the perceived usefulness indicated that most teachers perceived technology as useful in the teaching and learning process. The mean value for the perceived usefulness of technology was 3.28, indicating that most of the teachers of social sciences departments at public universities of South Punjab perceived technology as useful for the teaching and learning process.

Manco-Chavez et al. (2020) proposed that technological skills are the knowledge and abilities needed to operate computer-based technologies and carry out technological tasks. Due to the fact that they are frequently learned through formal education, practice, and training, technology skills are regarded as hard skills. These abilities are useful for handling technological, scientific, mechanical, and mathematical challenges. The findings of the current study regarding the skills of teachers in technology showed that most of the teachers do not have skills regarding the use of technology in the teaching and learning process. The mean value for the skills of teachers in using technology was 2.67, indicating that most of the teachers of social sciences departments at public universities of South Punjab do not have skills for using technology in the teaching and learning process.

Finally, the relationship between teachers' technological competencies and their performance at the higher education level was also determined. The Pearson correlation test was used to find the relationship between the teachers' technological competencies and their performance at the higher education level. The study's findings indicated a highly positive relationship between the teachers' technological competencies and their performance at the higher education level. The value of the Pearson correlation coefficient (r) was found to be as low as .839, indicating a highly positive relationship between teachers' technological competencies and their performance at the higher education level.

The current research study is very important as it has practical implications. The results of the current study may be beneficial for higher education teachers and students to identify the challenges they face while using the available technology tools effectively to enhance the teaching and learning process. The findings of this study are significant for the stakeholders, policymakers, and government officials to provide the necessary technological equipment and devices and to conduct regular training for the teachers to improve their technological competencies. Future research may be conducted on the challenges and difficulties the teachers of social sciences departments at the public universities of South Punjab face, leading to their not performing well at the higher education level. The research may also be conducted in all the public universities of Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan to analyze the teachers' technological competencies and performance at the higher education level.

## CONCLUSION

It was concluded that most of the teachers of the social sciences departments at the public universities of South Punjab do not have technological knowledge, do not perceive the ease of use of technology, and most teachers do not have the skills to use technology in the teaching and learning process. Yet, most of them have positive perceptions about the use of technology and perceive it as a useful phenomenon to be used in the teaching and learning process. There was a

high positive correlation found between the teachers' technological competencies and their performance at the higher education level.

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