Relationship between Secondary School Teachers' Technological Proficiencies and Their Effectiveness in Instructional Practices

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Abstract

This study aims to find out the relationship between secondary school teachers' technical skills and their instructional competencies. It also seeks to understand the obstacles that keep teachers from utilizing technology and how they view their instructional competencies and information technology skills. The research also investigated the relationship between teachers' information technology skills and job proficiency. The study addresses the diverse landscapes among teachers and promotes broader technology adoption in assessment and evaluation. The concerns that have been identified include those linked to technology, students, and families, which emphasizes the necessity of making infrastructural upgrades and providing thorough training. The study highlights the significance of motivation and attendance in online learning, consistent with previous research. Teachers emphasize in-service training and skill development, expressing a common sense of inadequacy in technological integration. The study used a questionnaire to gather information from secondary school teachers as part of a quantitative research approach. The study's conclusion sheds light on how information technology might help teachers do better at work and develop their instructional competencies. The findings might also be useful in devising ways to get around obstacles that hinder teachers from using technology in the classroom.

Keywords: Information Technology, Instructional Competency, Quantitative Teaching.

Introduction

Technology integration in education has significantly influenced teaching and learning outcomes, and higher secondary schools have been at the forefront of this change. With the availability of digital resources, tools, and platforms, teachers can improve their instructional strategies, engage students in new ways, and personalize learning experiences to meet each learner's needs better. Nevertheless, successful technology integration in the classroom needs a strong base of information technology skills among teachers.

When technology is used in education well, it facilitates higher-level teaching, learning, and information availability (Albirini, 2006). It adds fun to the learning process (Baydas & Göktas, 2016). It makes a major contribution to learning that is more successful by providing teachers and students with support and additional help (Jamieson et al., 2013). Moreover, technological integration fosters knowledge production in a flexible setting and enriches the learning

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environment (Sang et al., 2010). In conclusion, there are many advantages for students and instructors when technology is included in the classroom.

Teachers who use digital tools in their teaching notice significant changes in how they teach and see students learning new skills. For example, studies have shown that learning to code can improve both programming abilities and creativity in students (Haghshenas, 2019; López-Belmonte et al., 2021; Dúo-Terrón, 2023). Also, teachers are very good at using technology in the classroom and creating fun educational games for students. They also know how to keep students safe when using technology, especially regarding cyberbullying. A study by Chou and Peng (2011) showed that educators play an important role in ensuring that students have a safe and good environment for learning with technology.

A recent study by Eskici and Çayak (2023) looks at how teachers' skills with technology are related to how they use it in their teaching. It uses a survey method to compare the two. The study used two tools to look at how well 398 teachers in Istanbul use technology. It found that most teachers, regardless of gender, experience, or education level, were good at using technology. The only group that was not as good was teachers who had only finished their undergraduate studies. The results show that good use of technology is closely connected to how well it is used in different activities. Good use of technology is a big factor in predicting how much technology is used.

Research Problem

The research entitled relationship of teachers technological skills with their instructional competencies at secondary level is at hand. It is important to comprehend the current situation of teachers' skills and attitudes towards information technology (IT). Moreover, figuring out the barriers that stop teachers from properly using Information Technology might assist in improving the teaching and learning process. The study aims to understand teachers' perspectives on their competency in their profession and their use of technology. The researcher also wants to see how these two things are connected. Moreover, the researcher wants to know what makes it hard for teachers to use technology in the classroom.

Objectives of the Study

The objectives of this study are:

- To investigate teachers’ perceptions about their skills in information technology.
- To investigate teachers’ perceptions about their instructional competencies at the secondary level.

Significance of the Study

It is important to find out how teachers opine they are good at their job and computer skills for numerous reasons. To make training programs that help teachers get better at utilizing technology, we need to figure out how much they already know and can do. Secondly, the survey can help us understand how good teachers think they are at their job. This can help us determine what areas they might need more training and help with. Third, the study will show how teachers' computer skills affect how well they teach and how well students do in school. Finally, the study can find out what stops teachers from using technology in their teaching. This can help make plans to get around these problems and make technology more important in education. Overall, it can provide useful information about how technology is used in education. This information can be used to improve teaching policies and programs.

Literature Review

Teachers play a critical role in how IT is used in education. However, according to studies (Albirini, 2006; Ertmer et al., 2007), teachers often do not need to gain the necessary skills and knowledge to use technology in their teaching. It is important to understand how teachers think about their job skills and ability to use technology. This research examines the challenges of using computers in schools, how teachers feel about their computer skills, and how it impacts their ability to do their jobs. It also explores the connections between these factors.

Studies have also found a connection between being skilled in technology and succeeding at work. For instance, Marzano et al. (2001) believe that using technology in teaching is important for students to learn. Technology can improve teaching, find new learning methods, and make students more involved. Similarly, Zhao et al. (2008) found that technology integration positively influenced student achievement. These studies suggest information technology skills are critical for effective teaching and learning.

Shah (2014) states that the effectiveness and efficiency of online information systems have led to a rapid increase in their use in educational management. The primary goal of school management systems was to increase school operations' efficiency by storing student and teacher personnel data. The comprehensive literature review also emphasized the benefits of school management systems for administration and management in general. These benefits include improved time management, increased utilisation of school resources, decreased workloads, improved accessibility to information, and higher-quality reports. Thus, technology encompasses all scientific methods and procedures for enhancing labour, and in order for educators to apply technology effectively, they must comprehend how advancements in technology may impact the efficiency of school administration (Munro, 2008). Put differently, educators are the ones who push for the efficient use of SMS in school administration. To do this work, instructors must possess the requisite abilities or competencies. Therefore, this study aimed to investigate the link between secondary school teachers' acceptance and usage of SMS and their ICT ability.

Nevertheless, other obstacles keep teachers from successfully integrating technology into their lesson plans, especially despite the potential benefits of IT integration in education. Lacković, Margetić, and Križanović (2014) found that things like bad roads not, enough money, and not enough teachers made it hard for schools to use technology. Similarly, Siddiq, Hatlevik, Olsen, and Throndsen (2016) found that teachers' feelings and beliefs about technology and their lack of confidence in using it were some of the main reasons why bringing technology into the classroom was hard.

Methods and Procedures

Population and Sampling Procedure

For this study, a sample of two hundred and twenty-five (225) teachers in district Malakand was taken as participants. To guarantee that the sample is representative of the population (i.e., Distt., Malakand) in terms of gender, age, and educational attainment, a stratified random sampling approach was employed.

225 SST teachers working in Distt., During the 2022–2023 school years, Malakand made up the research cohort. Convenience sampling, as described by Etikan et al. (2016) is a technique for selecting participants that involves selecting "members of the target population who meet certain practical criteria such as easy accessibility, geographical proximity, and availability at a given time, willingness to participate" (Of these teachers, one hundred and fifteen (51%) were men. One hundred and ten (49%) were women. The distribution of work experience showed that, among

teachers, 50 (22%) had 1–5 years of experience, 79 (35%) had 6–10 years, and 97 (43%) had 11 years or more. Furthermore, eight teachers (35%) mentioned having taken online courses. Interestingly, 146 of them (or 65%) had never taken an online course before. Regarding education, 117 (52%) had a master's degree and 108 (48%) had a bachelor's degree. There were differences in the way instructors utilized technology in the classroom: 5 (9%) said they never used it, 38 (17%) said they used it seldom, 137 (61%) said they used it often, and 29 (13%) said they used it usually.

Data Collection Tools

A thorough questionnaire technique was used to answer the study questions. This required the thoughtful creation of six well-considered open-ended questions to assess the level of technology use among educators. The researchers' painstaking efforts, which included a thorough literature evaluation and the establishment of a strong framework, led to the formation of these questions. Furthermore, the opinions and suggestions of a renowned specialist in curriculum and teaching were actively sought after, which helped to improve the questionnaire and make it more closely aligned with the study's overall goals. The survey was made to help us learn more about what teachers think. We did thorough tests to check if the tool worked well. The researcher wanted to ensure that every question was clear and easy to understand. After carefully checking, the finished survey was sent to the teachers by email in an organized way. They collected the answers in an organized way using the same system, making it easy to gather important information and data for the research.

Data Analysis

The researcher looked at the interview results using a method called content analysis. It helps us make sense of the data we collected and draw valid conclusions. Elo and Kyngäs (2008) explained that content analysis is a way to understand and describe the thing being studied in a detailed and complete way. Finding the codes was the first step in understanding the information. After that, the researcher looked for patterns and ideas based on these codes. After looking carefully at all the teachers' answers, we combined similar answers and used them to make important codes that show different opinions.

Next, the researcher looked closely at the coded information to see what the same was and what was different. Then, the researcher organized the codes based on the relationships the researcher found. The information was organized into big groups, which helped the researcher understand it better. Also, the codes and topics were checked by showing them to an expert in educational science, and they agreed with them. Using multiple methods, the content analysis becomes trustworthy, showing that the analytical framework is strong and the conclusions from the teachers' answers are accurate.

Validity and Reliability

Before using the data collection tool (i.e., the questionnaire) in the research, its validity was considered and validated in discussion with some well-learned educationists, including the researcher’s supervisor. Similarly, the dependability of the data collection tool was assessed using a pilot study. As subjects, two hundred twenty-five teachers from the secondary schools were taken randomly, and then they were given the questionnaire to respond to. SPSS was utilized to determine and ensure the reliability of the survey. The dependability of the information shown in Table 2 was analyzed using Cronbach's alpha.

Data Analysis and Interpretation

Quantitative Analysis

Findings of the survey managed to secondary school teachers and based on Likert-scale with five options were tallied, and the percentage and frequency of responses to the questionnaire items were analyzed utilizing SPSS-2023. The descriptive analyses are given in the table 1.

Table 1: Descriptive statistics to check min., max., mean, and standard deviation values

	N	Min.	Max.	Mean	Std. Deviation
Online courses	225	1.23	3.98	2.496	.50363
Availability of resources	225	1.12	3.87	2.2740	.53752
Teachers' Trainings	225	1.02	4.41	1.9360	.65791
Teachers' adoptability	225	1.01	4.43	2.6720	.70851
Students' response	225	1.02	4.35	2.4960	.65150
IT skills	225	1.10	4.01	2.5121	.56789
Instructional competency	225	1.20	4.73	2.4750	.69015
Valid N (list wise)	225				

The explanation of the descriptive statistics of the different variables might be found in table 1 which shows the lowest and highest numbers, and also the average and how much the numbers vary in the data we got from people filling out a survey. All the average numbers are between 1 and 5, so all our data is accurate and there are no issues. 225 secondary school teachers answered the questionnaire in total. We also figure out the smallest, biggest, and average difference of the numbers. The lowest passing score for online courses is 1.23, and the lowest acceptable value for resource availability is 1.12 At least one dollar is needed to have access to resources. The smallest value for factors related to teachers being able to adapt and students' reaction is one (1), and the smallest value for variables related to IT skills is also one (1). The best score you can get for online courses is 3.98, and for availability of resources, it is 3.87 The highest score for Teachers' Trainings is 4.41 and the highest score for teachers' adoptability is 4.43 The highest score students can get is 4.35 The highest value for IT skills is 4.01, and the highest value for instructional competency is 4.73.

Table 2: Reliability analyses on Cronbach's alpha value of the variables

Variable	Alpha	
Technological skills	0.811	6
Instructional strategies	0.715	5

Note: Alpha=reliability

In table 2, Cronbach alpha measures how reliable and consistent the system is. When checking how trustworthy something is, Cronbach alpha should be higher than 0.7, as said by Nunally and his team in 1967. If a value is higher than 0.9, it is not acceptable. We will get rid of some things connected to that value to make it between 0.7 and .09, which is acceptable. The study found that all the measures used in the investigation are reliable with a Cronbach alpha value of over 0.7 instructional strategies was rated at 0.715 out of 5 possible items.

The test for technological skills had a score of 0. 704, and there were only six questions on the test. The instructional strategy has a reliability score of 0.659, based on five questions. The teachers' training test has a score of 0.766 and consists of 5 questions. For online the Cronbach alpha value is 0.704 with a total of four items. For instructional competencies, the Cronbach alpha value is 0.821 with a total of 5 items and career decision has the value of 0.712 with a total of 4 items.

Table 3: Correlation values of variables

		Online courses	Availability of resources	Teacher Training	Teachers adoptability	Student response	IT skills	Instructional competency
Online courses	Pearson Correlation	1	.567**	.019	.068	.332**	.983**	.321**
	Sig. (2-tailed)		.000	.804	.356	.000	.000	.000
	N	225	225	225	225	225	225	225
Availability of resources	Pearson Correlation	.557**	1	-.040	.167*	.520**	.551**	.519**
	Sig. (2-tailed)	.000		.593	.023	.000	.000	.000
	N	225	225	225	225	225	225	225
Teachers' Trainings	Pearson Correlation	.019	-.040	1	.127	-.020	.009	-.015
	Sig. (2-tailed)	.805	.593		.083	.788	.908	.835
	N	225	225	225	225	225	225	225
Teachers' adoptability	Pearson Correlation	.068	.167*	.128	1	.238**	.049	.238**
	Sig. (2-tailed)	.356	.023	.083		.001	.511	.001
	N	225	225	225	225	225	225	225
Students' response	Pearson Correlation	.332**	.520**	-.020	.238**	1	.311**	.994**
	Sig. (2-tailed)	.000	.000	.788	.001		.000	.000
	N	225	225	225	225	225	225	225
IT skills	Pearson Correlation	.983**	.551**	.009	.049	.311**	1	.330**
	Sig. (2-tailed)	.000	.000	.908	.511	.000		.000
	N	225	225	225	225	225	225	225
Instructional competency	Pearson Correlation	.321**	.519**	-.015	.238**	.993**	.330**	1
	Sig. (2-tailed)	.000	.000	.835	.001	.000	.000	
	N	225	225	225	225	225	225	225

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

One can find the sample correlation (r) using the Pearson correlation. It shows how much and how strong two sets of data are related to each other in a straight line. The Pearson correlation looks at whether there is evidence that two sets of numbers are related in a straight line, based on a number called the correlation coefficient. It's just to make sure it's accurate. Pearson correlation is a number that shows how two things are connected. The Pearson correlation coefficient is used to see how

two things are related. For example, it can show if there is a connection between how much people exercise and how healthy they are.

Pearson correlation can be utilized to find how strongly two sets of numbers are related to each other. This helps to see if there is a straight line relationship between them. The Pearson correlation checks if there is evidence of a straight-line connection between similar sets of numbers in the population, using the population correlation coefficient, just to make sure it is accurate. Pearson correlation is a way to find out how two things are connected. It is a way to see how two things are related. For example, if one thing goes up, does the other thing also go up.

The focus of the study at hand is on examining the correlations between different sets of variables. When looking at two sets of data and calculating the Pearson correlation, we can find the following information:

To find out a statistically significant linear relationship between two progressing variables, we use a correlation coefficient. The strength of the relationship between two things in a straight line. The arrow shows if the connection is going up or down in a straight line. The meanings of the information in table 2 are:

Table 3, indicates the findings from testing our structural model and hypotheses which are research questions based using SPSS program on the data. The results showed how things might be connected in the future and how much one thing affected another, as well as the things that might make this connection stronger or weaker. The closer the two factors are related, the closer the finding is to one. Correlation is computed from -1 to +1. The first item in table 3. shows that there is a strong connection between having resources available, with a value of .556, which is favorable. The number that is important and has two sides, in this case is .000

In table 3, the correlation value for teachers' trainings is .019, and it has a significant value of .805. In table 3., the third item shows that the correlation between teachers' adoptability is 0.068, with a significant value of 0. 356. In table 3, item 4 shows that the students' response correlation value is .321 and the significant value is .000. In 3. item 5 shows that IT skills are strongly related with a correlation value of .993, and this relationship is highly significant with a value of .000. In table 3, item 6 demonstrates the effectiveness of a teacher's instructional abilities, with a correlation of .5.321 and a significant value of .000.

Statistical Tests

This section comprehensively unveils the study's findings, meticulously aligned with the problem delineated in the research framework.

Table 4: Regression analysis of IT skills and instructional competencies

Model	R	R Square	Adjusted R Square	S.E of the Estimate
1	.983	.986	.987	.06613

a. Predictors: (Constt.), IT Skills

Table 5: ANOVA explains the significant and F value of the research hypotheses

Model	Sum of squares	Df	Mean of Square	F	Sig.
1 Regression	57.237	1	58.227	13326.311	.000
Residual	.798	181	.003		
Total	58.004	185			

Table 6: Coefficients show the standard error, significance and t value of the hypotheses

Model	Unstandardized Coefficients B	S. E	Standardized Coefficients Beta	t	Sig.
1 (Constt.)	-.014	.022		-.604	.546
IT skills	1.004	.009	.993	115.401	.000

a. Dependent Variable: instructional competencies

The determination coefficient tells us how good something is at working. Serrador and R. say the correlation coefficient (R2) shows how well a model predicts outcomes and how two variables are related. It also shows the differences in the data. R is a number that shows how closely two variables are related to each other. Make sure to check the direct path between all the different factors in the linear regression.

Tables 3 to 5 show a model that connects IT skills and teaching abilities. The R square value is 0.987, which means that if IT Skills change, there would be a 98. 7% change in teaching abilities. The amount that the result changes is the same as the beta number for every one unit change in the predictor, divided by the number of units that the predictor changes. Having well IT skills and teaching abilities is linked to having high Beta values. The F value for parental attitude and instructional competencies is 13317.321, which is a lot higher than the 4.00 threshold This shows that there is a strong relationship between parental attitude and instructional competencies. This shows that the model is a good fit for the data.

T-tests are used to come up with ideas, and then these ideas are checked using the t-values from the test results. The number is used in applied statistics because of the influence of Ronald Fisher's famous book, Statistical Methods for Research Workers, which came out in 1925. If p is smaller than 0. 05, we choose the alternative idea. If p is greater than 0.05, we choose the null idea. We think our idea is true because of these guesses. It is to make sure to check the direct path between all the variables in linear regression.

Table 7: Regression analysis of IT skills and instructional competencies

Model	R	R Square	Adjusted R Square	S. E of the Estimate
1	.332	.110	.105	.65287

a. Predictors: (Constt.), IT Skills

Table 8: ANOVA tells the significant and F value of the hypotheses

Model	Sum of squares	Df	Mean of Square	F	Sig.
1 Regression	9.565	1	9.565	22.439	.000
Residual	77.575	184	.426		
Total	87.140	185			

a. Dependent Variable: instructional competencies

b. Predictors: (Constt.), IT Skills

Table 9: Coefficients show the standard error, significant and T values of the hypotheses

Model	Unstandardized Coefficients B	Std. Error	Std. Coefficients Beta	t	Sig.
1 (Constt.)	1.453	.221		6.568	.000
PA	.407	.086	.331	4.737	.000

a. Dependent Variable: instructional competencies

The determination coefficient shows how effective something is. Serrador and R. found in simple words, the correlation coefficient (R2) shows how well a model can predict outcomes and how different variables are connected in the data. R is a number that shows how much two sets of data are related to each other. We need to check that there is a direct connection between all the variables in linear regression.

Tables 7 to 9 show that in the IT Skills and instructional competencies association, if IT skills change, instructional competencies change by 11%. The amount the outcome changes is the beta coefficient for every change in the predictor, divided by the number of changes in the predictor. Having well IT skills and teaching abilities is linked to having good Beta values. The F-value for IT skills and instructional competencies is 22.439 that are greater than the 4.00 minimum. This shows that the model we suggested is right for the information we have.

T-test is utilized to come up with ideas, which are then checked utilizing the t-value from the test results. The number is used in statistics and it is connected to Ronald Fisher's famous book. The book was published in 1925. If p is less than 0.05, we accept the alternative idea. If p is more than 0.05, we accept the original idea. Our idea is believed because of these guesses. We need to make sure that there is a direct connection between all the different factors in the linear regression**.**

Table 10: Regression analysis of instructional competencies

Summary of the model

Model	R	R Square	Adjusted R Square	S. E of the Estimate
1	.049	.002	-.003	.56879

a. Predictors: (Constt.), Online courses

Table 11: ANOVA tells the significant and F value of the hypotheses

Model	Sum of squares	Df	Mean of Square	F	Sig.
1 Regression	.141	1	.141	.435	.521
Residual	57.278	184	.321		
Total	57.419	185			

a. Dependent Variable: Instructional Competencies

b. Predictors: (Constt.), Online courses

Table 12: Coefficients shows the standard error, significant and T-value of the hypothesis

Model	Unstandardized Coefficients B	Standard. Error	Standardized Coefficients Beta	t	Sig.
1 (Constant)	2.418	.132		18.578	.000
CG	.042	.064	.049	.659	.521

a. Dependent Variable: Instructional competencies

The determination coefficient shows how good something is at doing its job. Serrador and his colleague R. stated. The correlation coefficient (R2) tells us how well a model can predict outcomes and shows the relationship between variables and the differences in the data. R is a number that shows how strong the relationship is between two sets of data. The direct path between each variable must be checked in the linear regression.

Table 10 shows that in online courses, a small change in IT skills is linked to a small change in instructional competencies. The amount that the result changes is the beta number for each small change in the predictor, divided by the number of changes in the predictor. Good IT skills and teaching abilities go hand in hand with positive Beta values. The F value for online courses and instructional competencies is .435, much lower than the 4.00 limit. This means that the model we were considering could not work better with our data.

T-tests are used to come up with ideas, and then we check if those ideas are true by looking at the results of the tests. This number is connected to how it is used in statistics, and it is related to a book by Ronald Fisher called Statistical Methods for Research Workers, published in 1925. If p is more than 0.05, we do not accept the alternative idea and reject the null idea. Our idea is not accepted because of these ideas we started with.

Main Findings

This research shows that secondary school teachers with technological skills have better teaching skills. It was discovered that students' reactions to teachers significantly impact teaching skills. It has also been shown that online classes significantly impact teaching methods, as proven by the regression table with a significance value of zero. Similarly, the way teachers can adapt to different situations also has a big impact on how well they can teach. The study asked teachers about the skills they use to teach in high schools. The study showed that teachers in secondary schools in the district of Malakand, Khyber Pakhtunkhwa, have good technology skills and positive attitudes towards teaching, which shows that the overall results are significant.

Conclusion

Previous studies have shown how technology helps in education. It makes teaching and learning better and more fun and leads to successful learning. It shows how important it is for teachers to use digital tools well, make educational games, keep students safe online, and show how good they are with technology by using it in their teaching. However, data analysis and interpretation look at numbers and tests to understand how good teachers are with technology, if there are enough resources, and how well students learn. Using tools like SPSS helps us to analyze numbers, such as variables, correlations, reliability, regression, and ANOVA results. The literature review provides insight into the advantages and disadvantages of integrating technology in education. The data analysis gives us numbers and stats to support these findings. Together, they completely

understand how technology is used in education. They look at both the benefits and the impact on teaching and learning.

This study examined how teachers use technology in the classroom and found many opportunities, challenges, and experiences. The first part of the problem showed how teachers feel about using technology to prepare for and give classes, with most saying they use it a lot. This matches recent studies showing teachers are very good at using technology. The research shows that using technology in learning can help students succeed and be happy. This means that teachers need help and support to learn how to use technology.

Another thing we looked at was how teachers used technology to test and grade students, and it showed that they used technology in different ways. Some people decided not to use technology to evaluate and track progress, even though many others did. The study shows that we should use technology more in these areas and how technology can help us in a good way.

Most teachers felt they needed to learn more about using technology. This was shown in their feelings about how well they could use technology in the fifth issue we studied. The research shows that teachers need the right knowledge, attitude, and skills when using technology in the classroom. Teachers should receive more training and opportunities to develop their skills.

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