ProScholar Insights (PSI)
Volume 4, Issue 1 (Winter 2025)
Pages: 36 – 51

PROSCHOLAR INSIGHTS

ISSN (Print): 3006-838X
ISSN (Online): 3006-7723
DOI: 10.62997/psi.2025a-41042

Research Article **Open Access Journal**

Exploring Student Teachers' Experiences about the Efficacy of the B.Ed. Programme in Preparing Teachers to Teach in the 21st Century

Manzoor Ahmed [1] **Razia Fakir Mohammad** [2]

[1] PhD Scholar, Department of Education, Iqra University, Karachi, Sindh, Pakistan.
✉ manzoor@uot.edu.pk

[2] Professor, Department of Education, Iqra University, Karachi, Sindh, Pakistan.
✉ razia.fakir@iqra.edu.pk

This article may be cited as Ahmed, M., & Mohammad, R. F. (2025). Exploring Student Teachers' Experiences about the Efficacy of the B.Ed. Programme in Preparing Teachers to Teach in the 21st Century. *ProScholar Insights, 4*(1), 36-51. https://doi.org/10.62997/psi.2025a-41042

Abstract: This study examined student teachers' experiences about the efficacy of the B.Ed. Program to prepare teachers to teach in the 21st century. The study used census sampling techniques and selected 314 participants through survey questionnaires from various Universities of Makran, Balochistan. Data was analyzed through SPSS, descriptive statistics was used for demographic study, and regression analyses were used for inferential data. Findings revealed that there is a significant relationship between the Efficacy of the B.Ed (4 years) Program, such as the Relevance of the Course, Technology Integration and Clinical Practice (Practicum) and Field Experiences on Teachers' Preparation to teach 21st Century, pedagogical knowledge and skills, Technological competencies, understanding of teaching in the digital era, Understanding of learning and learner. However, the Learning strategies do not have any significant relationship with technological competencies, Understanding Teaching in the Digital Era, Understanding Learning and Learners. However, a significant relationship was shown between Learning strategies and pedagogical knowledge and skills. Moreover, the study suggested that the B. Ed 4-year program should be updated with modern ICT and continue as a professional development program for instructors to train B. Ed students as effective teachers of the 21st century.

Keywords: Students Teachers, B.Ed. 4 Years' Teacher Education, Preparation of Teachers, 21st Century

Corresponding Author:
Manzoor Ahmed
PhD Scholar, Department of Education, Iqra University, Karachi, Sindh, Pakistan.
✉ manzoor@uot.edu.pk

Introduction

Teacher education programs are recognized as essential components in the development of effective teacher educators (Darling-Hammond, 2017), who argued that teacher preparation should provide aspiring educators with opportunities for meaningful clinical experiences and the integration of theory and practice. Similarly, the meta-analysis of Wilson (2013) revealed that teachers who have undergone rigorous and well-designed teacher preparation programs exhibit higher levels of instructional quality and student engagement. In addition, Darling-Hammond and Bransford (2007) have emphasized that teacher education programs that emphasize pedagogical content knowledge development result in more effective teaching practices.

Moreover, the efficacy of teacher education programs is very crucial for improving educational quality in Pakistan. In this regard, Khalid et al. (2017) and Nadeem et al. (2020) examined the impact of teacher education on classroom practices in Pakistan, and findings revealed that a positive relationship exists between formal teacher training and improved instructional strategies of the teachers. Similarly, Haq et al. (2018) and Hossain (2018) investigated that teacher education programs significantly enhance teachers' pedagogical skills and content knowledge. Furthermore, Imran et al. (2021) indicated that teacher education programs positively influence teacher efficacy and enhance their ability to develop an effective teaching and learning environment. Moreover, based on the literature, the efficacy of

teacher education programs has been demonstrated both internationally and in the Pakistani context as well. The integration of theory and practice, clinical (Practicum) experiences, and a focus on pedagogical content knowledge contribute to increased teacher efficacy and improved classroom practices. Theoretical and empirical evidence from various studies supports the notion that well-designed teacher education programs positively impact student achievement in the digital era.

However, in developing countries like Pakistan, where challenges such as teacher shortages and varying levels of teacher quality persist, robust teacher education programs are essential for achieving meaningful educational reforms. Policymakers and stakeholders in Pakistan should recognize the importance of investing in comprehensive teacher preparation to enhance teacher education programs' efficacy in order to ultimately contribute to preparing teachers to teach in a meaningful way to improve their students' learning outcomes in the digital era.

As identified in the literature, teachers' pedagogical knowledge to integrate theory and practice, clinical (Practicum) experiences have been described as the combination of all professional and essential knowledge, skills, and attitudes that enable teachers to effectively impart knowledge to their students and facilitate their learning (Hattie, 2012). Therefore, it is essential to examine the role of teachers' pedagogical knowledge in developing the essential skills of 21st-century students, particularly in Pakistan, where the quality of education has been a longstanding concern (World Bank, 2020). Pakistan has a high rate of teacher absenteeism and a shortage of qualified teachers, which can negatively impact the quality of education (World Bank, 2020). In addition, Pakistan's education system has been criticized due to its emphasis on rote learning, repetition, and information memorization-based systems rather than developing students' problem-solving and critical thinking skills (Suhail,2021). Moreover, it is important to address the ongoing challenges that are being faced in the Pakistani education system, including low levels of teacher quality and inadequate teaching and learning resources (World Bank, 2018). Additionally, Kumar (2023) said that numerous opportunities are available for teachers to receive training, resources, and updates on 21st-century teaching methodologies and classroom management skills, but it remains uncertain whether the teaching community is ready to accept new ideas and bring about changes in our education system. Furthermore, he mentions that teachers in Balochistan are not prepared to modify their teaching style in line with the modern education system, which is a hindrance to progress. Therefore, it is important to examine the root causes behind this failure and incompetence and determine whether the lack of opportunities for professional development is a contributing factor, or whether mindset issues must be addressed first. For the enhancement of quality education, the mindset of our educators must be challenged, and they must be provided with accurate knowledge of modern teaching skills. Otherwise, the best efforts of governmental and non-governmental organizations to develop our education system remain unfruitful.

However, various studies have consistently demonstrated that quality teaching plays a vital part in the development of students' learning (Darling-Hammond, 2010; Hattie & Timperley, 2007). Accordingly, teachers who possess strong pedagogical abilities are more likely to promote a conducive and supportive teaching and learning environment that supports both academic achievement and the holistic development of their students (Hattie & Timperley, 2007). Therefore, further research is required to understand how the efficacy of teacher education programs in developing undergraduate students gained in the 21st century. This is because teachers' teaching quality is a major concern in Pakistan's education system, where a high percentage of teachers lack the necessary qualifications and training (World Bank, 2019). In this connection, students in the country are not being availed of the advantages of the 21st century.

Though, the essential role of teacher education programs (B. Ed) in the 21st-century classroom is widely discussed in the past and present literature. For instance, Schleicher (2012) has revealed that many countries have brought reform in their curricula, instruction, and evaluations to better prepare learners to tackle the emerging challenges of the 21st century. The development of productive Frameworks for teacher education programs to prepare teachers to teach the necessary skills of the 21st century is the utmost requirement of developing countries. Furthermore, research shows that teachers in the twenty-first century must have a solid grasp of the subjects they teach, a diversity of teaching approaches, and the ability to adapt to feedback. They must be able to collaborate with other professions and understand how learning takes place. Teachers are needed to be technologically competent so that they would be able to utilize digital technologies properly in their instruction and monitor student development (Schleicher, 2012).

Additionally, Sadaf et al. (2017) identify that teachers' technological pedagogical content knowledge enhanced students' creativity and digital literacy skills beneficially. Morris et al. (2021) also found that teachers' pedagogical methods, such as encouraging collaborative learning and giving students opportunities for self-directed learning, are favourably related to students' acquisition of 21st-century competencies. Students of the 21st-century era are required to have a variety of skills, including innovation and creativity, communication and collaboration, critical thinking and problem-solving skills, ICT literacy, information and media literacy, productivity and accountability, initiative and self-direction, flexibility and adaptability, social and cross-cultural interaction, and leadership and responsibility skills (Prensky, 2001; Dishon & Gilead, 2021). As a result, B. Ed (4 years) students are expected to possess these necessary competencies to become effective teachers in the 21st-century classroom. However, Siddiqui et al. (2016) have revealed that B. Ed (Honors) programs in some countries lack the necessary focus on the 21st century. Therefore, it is crucial to know the perceptions of B. Ed students to become effective teachers in the 21st century. According to Choy et al. (2021), pre-service teachers who are equipped with 21st-century knowledge and skills successfully survive in the classroom of the modern era. Education and training are included in those areas where these digital skills play an important role (Waycott et al., 2010).

The development of 21st-century skills has also been proven to be significantly influenced by learning experiences in the classroom on both sides, inside and outside. According to a study by Häkkinen et al. (2017), active learning strategies, including project- and problem-based learning, are significant aspects of 21st-century skills. Additionally, learning activities outside of the classroom, such as internships and volunteer work, can give students chances to put their 21st-century abilities to use and develop (Penuel, 2020). Development of 21st-century skills for B.Ed students is considered an essential component in the sense of students' overall well-being and success inside educational institutions and beyond.

As per the above-mentioned literature, the role of teachers in promoting the 21st-century skills of B. Ed students has gained increasing attention in recent years. Since the reform in teacher education has occurred, this is especially relevant at the undergraduate level, where B. Ed (4 years) students are transitioning into young adulthood and developing important life skills as future teachers. Therefore, to meet the requirements of all students, the current study is conducted on the topic of exploring student teachers' experiences regarding the efficacy of the B.Ed. Programme to prepare future teachers to teach in the 21st century.

Objectives of the Research

The current research addressed the following objectives:

- To examine the efficacy of B.Ed. Programme in preparing teachers to teach in the 21st century
- To explore student teachers' experiences in applying their learning within practicum classrooms, with a focus on the implementation of teaching strategies and their outcomes.
- To identify the challenges that student teachers face in terms of their readiness to teach in classrooms

Research Questions

Main Question

How do student teachers experience the efficacy of the B.Ed. (4-year) program in preparing them to teach in the 21st century?

Subsidiary Questions

Q1. How do B.Ed. (4-year-old) student teachers view their role as future teachers in the digital era?
Q2. What knowledge, skills, and behaviours do they acquire to become a teacher in the 21st century?
Q3. What difficulties do B.Ed. (4-year-old) do students have in developing their pedagogical skills and dispositions as teachers?

Literature Review

The literature sight a thorough discussion about each and every aspect of the proposed variables of the present

study to create a sense of understanding heading-wise of each variable and its theoretical and empirical background in a detailed and clear way.

Undoubtedly, Teacher education is a critical component of educational development in Pakistan, providing a platform for teacher educators to develop their knowledge, skills and attitude to become effective teachers to shape the quality of instruction, student learning outcomes, and educational reform efforts to achieve the 21st-century requirements. Moreover, the historical progression of teacher education in Pakistan showcases its growth from traditional apprenticeship models to modern training programs. In this regard, Hameed et al. (2018) conducted a study on the history of teacher education in Pakistan and highlighted its evolution from informal training to formalized institutions. The study emphasizes the colonial legacy and policy changes that have influenced teacher education's trajectory. Furthermore, Williams et al. (2021) provided comparative insights into the evolution of teacher education, showcasing how global trends have impacted teacher education programs. Malik and Mirza (2018) highlighted the influence of British colonial rule in shaping the initial teacher education system, with a focus on normative pedagogy. The establishment of educational institutions like AIOU and IERs marks pivotal moments in modernizing teacher education (Rizvi, 2015). Moreover, International influences, such as UNESCO's initiatives, have also contributed to reshaping teacher education in Pakistan.

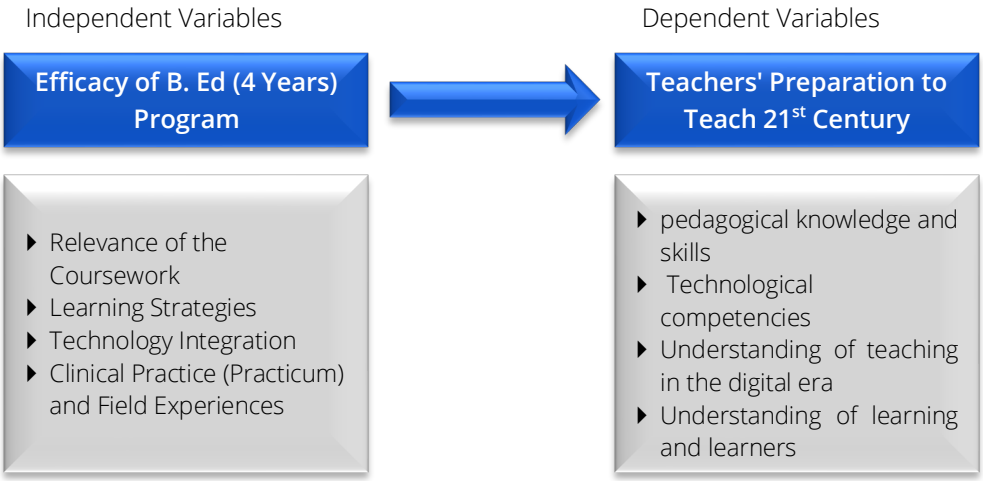
Additionally, Akhtar et al. (2019) and Harun et al. (2021) emphasized the impact of teacher education on enhancing teaching methods, leading to more engaging and interactive classrooms. The study of Darling-Hammond (2017) highlighted that effective teacher education correlates with improved instructional practices, benefiting students' engagement and learning outcomes. Furthermore, a study by Siddique et al. (2023) stated that teacher education programs contribute to teachers' professional development and the adoption of innovative teaching methods. Furthermore, according to Brown et al. (2019) and Martinez and Kern et al. (2022), teacher education equips educators with diverse strategies and skills.

Moreover, Gul et al. (2021) demonstrated that teacher education positively affects student performance in national assessments. Similarly, Pecheone and Whittaker (2016) underscore the need for well-prepared teachers to improve student achievement. Hanushek and Woessmann (2017) revealed that teacher quality influences student learning, emphasizing the importance of rigorous teacher education programs. A study by Malik et al. (2020) identifies a positive correlation between teacher education levels and student achievement, emphasizing the role of pedagogical training.

However, in a diverse country like Pakistan, teacher education is essential for fostering inclusivity. In this regard, UNESCO (2016) highlighted the significance of training teachers to address the needs of marginalized groups. Ahmad et al. (2022) and Naeem et al. (2019) stress that teacher education programs should incorporate modules on inclusive education. Forlin (2019) and UNESCO (2017) underscore the role of teacher education in creating equitable and inclusive learning environments. In addition, Khan and Khan (2019) stress the need for inclusive teacher education to cater to diverse learners. This aligns with international perspectives, as highlighted by Forlin (2019) and UNESCO (2017), emphasizing the importance of teacher education in accommodating diverse learner needs, including those with disabilities and from marginalized backgrounds. To overcome the emerging challenges of teacher education, Ahmad and Raza (2018) revealed that there is a need for ongoing training to address challenges specific to Pakistan's educational landscape. Similarly, Guskey's (2000) studies support the notion that lifelong learning and sustained professional development contribute to teacher efficacy and adaptability. Besides this, various educational policy frameworks and educational reforms are developed by the government to develop better and more effective teacher education programs to achieve the requirements of the 21st century. It was analyzed that the National Education Policy (2021) and its emphasis on improving teacher quality. Fullan (2015) suggested that teacher education is integral to successful policy implementation. Moreover, international organizations like USAID (2018) have supported teacher education initiatives in Pakistan to promote educational development. Furthermore, Zaidi and Nasir (2015) discussed the role of teacher education in supporting national curriculum reforms. Fullan (2013) and Hargreaves (2011) provide insights into how teacher education contributes to the successful implementation of reforms, offering a broader framework for understanding Pakistan's situation. Researchers have also addressed emerging issues and challenges of teacher education in Pakistan in their studies. In this regard, a Study conducted by Ahmed et al. (2016) highlighted

the issues of quality, accessibility, and relevance in teacher education programs. Furthermore, the study by Malik et al. (2018) revealed that the future of teacher education in Pakistan is underscored by efforts to integrate technology and enhance collaboration between teacher training institutions and schools.

Conceptual Framework



List of Proposed Hypotheses

H1:1 There is a relationship between the Efficacy of the B. Ed (4 years) Program and the Pedagogical Knowledge Skill of student teachers to teach in the 21st century.

H1:2 There is a relationship between Efficacy of B. Ed (4 years) Program and Technological Competencies of the students Teacher to teach in 21st century.

H1:3 There is a relationship between the Efficacy of B. Ed (4 years) and Understanding Teaching in the Digital Era to teach in the 21st century.

H1:4 There is a relationship between the Efficacy of B. Ed (4 years) Program and Understanding Learning and Learners to teach in the 21st century

Methodology

Researchers used quantitative research method that includes data collection by surveys, experiments, and observation, as well as data analysis via statistical approaches. Quantitative research approaches seek to quantify social processes using numerical data that may be evaluated to test hypotheses and make population-wide generalizations. Data obtained by quantitative approaches is frequently numerical and is examined statistically utilizing techniques such as regression analysis, correlation analysis, and hypothesis testing (Creswell, 2013).

Furthermore, data for the current study was collected via a survey questionnaire distributed to Bachelor of Education (4 years) students. The survey focuses on Exploring Student teachers' experiences with the efficacy of the B.Ed. Programme to prepare teachers to teach in the 21st century. The survey was administered physically by researchers while visiting the study's actual population.

Participants of the study were included of the Bachelor of Education (4 years) students enrolled in the 8th semester of the program at the universities of Makran, Balochistan in Pakistan. Because the 8th semester is the last semester of the program, and at this level, the student can share their overall experiences during their academic journey. total 314 students were enrolled in the 8th semester of the said universities. Therefore, researchers used the census method to take all students as respondents who were enrolled in the 8th semester as respondents, which sounded like a strong representation of the population. According to Lohr (2021) and Kothari (2004), A census involves collecting data from every individual or unit within the population of interest. The instruments of this study were adapted and partially modified with the help of PhD experts while studying numerous research papers related to the

research topic "Exploring Student Teachers' Experiences about the Efficacy of the B.Ed. Program in Preparing Teachers to Teach in the 21st Century".

The data analysis was done through SPSS 23. Rubin and Babbie, (2016) mentioned that quantitative methods allow researchers to collect large amounts of data quickly and efficiently, which can be analyzed using statistical software packages (SPSS). The data analysis process of the present study included descriptive statistics and inferential statistics techniques. The descriptive statistics technique was used to summarize the characteristics of the sample and demographic study, while in the inferential statistics technique, correlation analysis was utilized to check the statistical relationship between the proposed independent and dependent variables of the study.

Findings and Analysis

Table 1

Items Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.944	.944	54

Table 1 shows the reliability statistics of the research items. The value of Cronbach's Alpha .944 of the 54 items indicates that high reliability exists among the items of the present study.

Discriminant Validity of the Study

Discriminant validity refers to investigating the extent of distinction and correlation of a variable from other variables (Hair et al., 2013, p.115). The discriminant validity of the current study was established by applying Exploratory Factor Analysis (EFA).

Exploratory Factor Analysis (EFA)

Table 2

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.868
Bartlett's Test of Sphericity	Approx. Chi-Square	6053.876
	Df	1128
	Sig.	.000

According to Hair et al (2006) the range of Cronbach' alpha value must be greater than 0.06 for an appropriate factor analysis. Values of Cronbach's alpha in the KMO = 0.860 shows the appropriate adequacy of the sample size which was perfect for factor analysis.

Table 3

Factor Loading	Rotated Component Matrix[a]							
	1	2	3	4	5	6	7	8
ROC1					.520			
ROC2					.736			
ROC3					.620			
ROC4					.481			
ROC5					.449			
ROC6					.573			
LS2						.591		
LS3						.668		
LS4						.644		

Factor Loading	Rotated Component Matrix[a]							
	1	2	3	4	5	6	7	8
LS5						.465		
TI2	.							.397
TI3								.662
TI4								.674
TI5						.		.429
TI6						.		.428
CPFE1	.376							
CPFE2	.522							
CPFE3	.655							
CPFE4	.630							
CPFE5	.521							
CPFE6	.585							
CPFE7	.421							
CPFE8	.406							
CPFE9	.356	.						
CPFE10	.409							
CPFE11	.415							
PKS1				.423				
PKS2				.617				
PKS3				.708				
PKS4				.675				
PKS5				.456				
TTC2			.623					
TTC3			.579					
TTC4			.535					
TTC5			.624					
TTC6			.673					
UTDE1							.513	
UTDE2							.498	
UTDE3							.606	
UTDE4							.557	
UTDE5							.407	
UTDE6							.390	
ULL1		.554						
ULL2		.597						
ULL3		.682						
ULL4		.664						
ULL5		.558						
ULL6		.444						

Table 4

Eigenvalues	% of Variance	Cumulative %
3.903	8.131	8.131
3.674	7.654	15.785
3.387	7.056	22.841
2.912	6.068	28.908
2.857	5.951	34.860
2.825	5.886	40.746
2.546	5.304	46.050
2.376	4.951	51.000

Table 3 highlights that all factors were highly loaded in their respective rows and columns. There was no cross-loading in the rotated components matrix table. Bandalos (2019) recommended that the factors loading of the variables quantify the extent to which the variables are related to the given factors. The second part of the table explains the eigenvalues, variance percentage and cumulative percentage of the instruments. The eigenvalues of each factor were larger than one, which explains the goodness of individual variance. The cumulative percentage of eight factors was explained for 51.00 of the total variances. However, the unloaded items (LS1, LS6, TL1, CPFE12, PKS6, TTC1) were deleted.

Analyzing the Hypothesis of the Study

Hypothesis 1

H1:1 There is a relationship between the efficacy of the B.Ed. program and pedagogical knowledge and skills of student teachers to teach in the 21st century.

Table 5

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.598[a]	.357	.349	2.08490	1.680

a. Predictors: (Constant), Clinical Field experiences, Learning Strategies, Technology Integration, Relevance Coursework
b. Dependent Variable: Pedagogical knowledge Skill

The model shows a moderate overall fit (R = 0.598), explaining around 35.7% of the variance in the dependent variable. The adjusted R^2 considers the number of predictors in the model, providing a slightly more conservative estimate of the model's explanatory power.

Table 6

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	746.133	4	186.533	42.913	.000[b]
	Residual	1343.165	309	4.347		
	Total	2089.298	313			

a. Dependent Variable: Pedagogical knowledge Skill
b. Predictors: (Constant), Clinical Field experiences, Learning Strategies, Technology Integration, Relevance Coursework

ANOVA table 6 assesses the statistical significance of the regression model in explaining the variance in the dependent variable "Pedagogical knowledge Skill" based on the values df 313 (F=value 42.913, P = 0.000) which is <0.05, indicating

that the overall regression model is statistically significant in explaining the variance in the dependent variable "Pedagogical Knowledge Skill".

Table 7

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Decision
		B	Std. Error	Beta			
1	(Constant)	5.526	.833		6.636	.000	Accepted
	Relevance Coursework	.146	.042	.195	3.486	.001	Accepted
	Learning Strategies	.114	.055	.115	2.075	.039	Accepted
	Technology Integration	.143	.044	.177	3.230	.001	Accepted
	ClinicalField experiences	.117	.026	.274	4.435	.000	Accepted

a. Dependent Variable: Pedagogical knowledge Skill

Table 6 of coefficients reveals that there are significance relationship between dependent variable "Pedagogical Knowledge Skill" and independent variables "Relevance Coursework" (B =.146, t(95) = 3.486, p <.001), " Learning Strategies" B =.114, t(95) = 2.075, p <.039, "Technology Integration" B =.143, t(95) = 3.230, p <.001 and " Clinical Field experiences" B =.117, t(95)= 4.435, p <.000.

Hypotheses 2

H1:2 There is a relationship between the efficacy of the B.Ed. Program and developing the technological competencies to teach in the 21st century.

Table 8

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.580[a]	.337	.328	2.49567	2.051

a. Predictors:(Constant), Clinical Field experiences, Learning Strategies, Technology Integration, Relevance Coursework
b. Dependent Variable: Technological Competencies

The above summary model shows a moderate overall fit (R = 0.580), explaining around 33.7% of the variance in the dependent variable "Technological Competencies". The adjusted R^2 considers the number of predictors in the model, providing a slightly more conservative estimate of the model's explanatory power.

Table 9

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	978.035	4	244.509	39.257	.000[b]
	Residual	1924.566	309	6.228		
	Total	2902.601	313			

a. Dependent Variable: Technological Competencies
b. Predictors: (Constant), Clinical Field experiences, Learning Strategies, Technology Integration, Relevance Coursework

ANOVA table 9 assesses the significance of the regression model in explaining the variance in the dependent variable "Technological Competencies" of the present study based on df 313 (F=value 39.257, P= value 0.000), indicating that the overall regression model is statistically significant in explaining the variance in "Technological Competencies".

Table 10

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Decision
		B	Std. Error	Beta			
1	(Constant)	3.018	.997		3.027	.003	Accepted
	Relevance Coursework	.137	.050	.155	2.723	.007	Accepted
	Learning Strategies	-.074	.066	-.063	-1.119	.264	Rejected
	Technology Integration	.234	.053	.246	4.413	.000	Accepted
	Clinical Field experiences	.174	.032	.344	5.475	.000	Accepted

a. Dependent Variable: Technological Competencies

Table 9 of coefficients exposes that there is a significant relationship between dependent variable "Technological Competencies" and independent variables "Relevance Coursework" B =.137, t (95) = 2.723, p <.007, "Technology Integration" B =.234, t (95) = 4.413, p <.000 and " Clinical Field experiences" B =.174, t(95)= 5.475, p <.000. However, the model shows that there is no significance relationship between dependent variable "Technological Competencies" and independent variables "Learning Strategies" B =-.074, t (95) = -1.119, p <.264.

Hypotheses 3

H1:3 There is a relationship between the efficacy of the B.Ed. program and an understanding of teaching in the digital era to teach in the 21st century.

Table 11

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.625[a]	.390	.382	2.76119	1.904

a. Predictors: (Constant), Clinical Field experiences, Learning Strategies, Technology Integration, Relevance Coursework
b. Dependent Variable: Understanding Teaching Digital Era

The model shows a moderate overall fit (R = 0.625), explaining around 39.0% of the variance in the dependent variable "Understanding Teaching Digital Era". The adjusted R^2 considers the number of predictors in the model, providing a slightly more conservative estimate of the model's explanatory power.

Table 12

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1506.489	4	376.622	49.399	.000[b]
	Residual	2355.862	309	7.624		
	Total	3862.351	313			

a. Dependent Variable: Understanding Teaching Digital Era
b. Predictors: (Constant), Clinical Field experiences, Learning Strategies, Technology Integration, Relevance Coursework

ANOVA table 12 of the current study evaluates the significance of the regression model in explaining the variance in the dependent variable "Understanding Teaching Digital Era" which is based on the df 313(F=value 49.399, P= 0.000). the mentioned values indicate that the overall regression model is statistically significant in explaining the variance in the dependent variable "Understanding Teaching Digital Era".

Table 13

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Decision
		B	Std. Error	Beta			
1	(Constant)	3.685	1.103		3.341	.001	Accepted
	Relevance Coursework	.172	.056	.169	3.101	.002	Accepted
	Learning Strategies	.004	.073	.003	.060	.952	Rejected
	Technology Integration	.177	.059	.161	3.014	.003	Accepted
	Clinical Field experiences	.240	.035	.413	6.853	.000	Accepted

a. Dependent Variable: Understanding Teaching Digital Era

Table 13 of coefficients discovers that there are significance relationship between dependent variable "Understanding Teaching Digital Era" and independent variables "Relevance Coursework" B =.172, t (95) =3.101, p <.002, "Technology Integration" B =.177, t(95) =3.014, p <.003 and " Clinical Field experiences" B =.240, t(95)=6.853, p <.000. However, the model shows that there is no significance relationship between dependent variable "Understanding Teaching Digital Era" and independent variables "Learning Strategies" B =.004, t (95) =.060, p <.952.

Hypotheses 4

H1:4 There is a relationship between the efficacy of the B.Ed. program and developing an understanding of learning and learners to teach in the 21st century

Table 14

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.564[a]	.318	.309	2.63448	2.085

a. Predictors: (Constant), Clinical Field experiences, Learning Strategies, Technology Integration, Relevance Coursework

b. Dependent Variable: Understanding Learning and Learner

The summary model of the present study shows a moderate overall fit (R = 0.564), explaining around 31.8% of the variance in the dependent variable. The adjusted R^2 considers the number of predictors in the model, providing a slightly more conservative estimate of the model's explanatory power.

Table 15

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	999.812	4	249.953	36.014	.000[b]
	Residual	2144.605	309	6.940		
	Total	3144.417	313			

a. Dependent Variable: Understanding Learning and Learner

b. Predictors: (Constant), Clinical Field experiences, Learning Strategies, Technology Integration, Relevance Coursework

ANOVA Table 15 provides information on the overall significance of the regression model and the variance explained by the model compared to the unexplained variance (residuals). In this table, 313 (F=value 36.014, P = 0.000) indicates that the overall regression model is statistically significant.

Table 16

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Decision
		B	Std. Error	Beta			
1	(Constant)	7.778	1.052		7.392	.000	Accepted
	Relevance Coursework	.158	.053	.172	2.985	.003	Accepted
	Learning Strategies	.035	.070	.029	.507	.613	Rejected
	Technology Integration	.120	.056	.121	2.148	.032	Accepted
	Clinical Field experiences	.189	.033	.360	5.648	.000	Accepted

a. Dependent Variable: Understanding Learning and Learner

The table 16 of coefficients shows that there are significant relationship between dependent variable "Understanding Learning and Learner" and independent variables "Relevance Coursework" B =.158, t (95) =2.985, p <.003, "Technology Integration" B =.120, t(95) =2.148, p <.032 and " Clinical Field experiences" B =.189, t(95)=5.648, p <.000. However, the model shows that there is no significance relationship between dependent variable "Understanding Learning and Learner" and independent variables "Learning Strategies" B =.035, t (95) =.507, p <.613.

Discussion

Findings discovered a statistically significant relationship between the Efficacy of B. Ed (4 years) Program, such as Relevance of the Course, Technology Integration and Clinical Practice (Practicum), and Field Experiences on Teachers' Preparation to teach 21st Century such as pedagogical knowledge and skills, Technological competencies, understanding of teaching in the digital era, Understanding of learning and learner. However, the independent variable Learning strategies do not have any significant relationship with the dependent variables' technological competencies, Understanding of teaching in the Digital Era, Understanding of Learning and Learner. However, the model showed a significant relationship between independent variable learning strategies and dependent variable pedagogical knowledge and skills.

Hence, the most important elements of the B. Ed (4 years) Program, such as the relevance of the Course, Technology Integration and Clinical Practice (Practicum) and Field Experiences, play a crucial role in the preparations of Teachers to teach 21st Century in developing their pedagogical knowledge and skills, Technological competencies, understanding of teaching in the digital era, Understanding of learning and learner. It is also emphasized that the Learning strategies practised in the development of 21st-century teaching must be improved to develop the essential competencies of the student teachers' technological competencies, Understanding Teaching in the Digital Era, Understanding Learning and Learner. Similarly, the findings of Niess et al. (2023) explored the need for teacher educators to develop a deep understanding of technological pedagogical content knowledge (TPACK) to integrate technology into their teaching practices effectively.

Furthermore, it is indicated that teachers are moving beyond traditional approaches to embrace student-centred and collaborative learning facilitated by technology. The literature of Yuan et al. (2021) stated that teachers who participate in online CoPs experience increased professional identity development and a sense of belonging. Such engagement enables them to access diverse perspectives and resources to understand learning and learners. In addition, Xiao et al. (2020) and Laffey (2020) have discovered that teachers engaged in online CoPs engage in discussions, share innovative teaching practices, and collectively address challenges, fostering a dynamic learning ecosystem. Supporting literature of Gunarathna et al. (2023) also concluded and suggested that teachers who embrace connectivism learning strategies can empower students to discern credible sources, distinguish misinformation, and develop a critical mindset. Furthermore, Lee et al. (2020) demonstrated that teachers incorporating connectivist approaches guide students to navigate biases, question sources, and become responsible digital citizens in an era of information overload.

Conclusion

Based on the quantitative, it is concluded that the Learning strategies being practised in the development of 21st-century teaching are required to be improved to develop the essential competencies of the student teachers' technological competencies, Understanding Teaching in the Digital Era, Understanding Learning and learning. Moreover, future teachers' training through teaching practicums ensures that future teachers are well-prepared to apply classroom management techniques and engage students effectively as future teachers. Additionally, the incorporation of modern teaching methodologies and ICT tools equips prospective teachers with the modern technological proficiency which are necessary to navigate and enhance contemporary educational environments. The above-mentioned multifaceted approach prepares prospective teachers to meet diverse students' needs and adapt to the evolving demands of teaching professionalism.

Recommendations and suggestions for Stakeholders

- B. Ed 4 years students are required to Participate in continuous learning opportunities such as workshops, seminars, and online courses to stay updated with the latest educational methodologies and technologies.
- B. Ed 4 years students should foster a mindset of lifelong learning and professional development to adapt to the evolving demands of the modern HEI s must support the professional development of teachers by providing access to training programs, resources, and opportunities for continuous learning.
- The faculty of teacher education institutes must be educated on the curriculum using innovative pedagogy and assessment methods.
- Administrations of HEI, s must encourage collaboration among teachers to share best practices and innovative teaching strategies, nurturing a culture of continuous improvement for the faculty members.
- HEI, s authority must invest in technological infrastructure and resources to ensure that teachers have the sufficient tools to integrate ICT effectively into their teaching practices.
- HEIs authority should promote online training and courses to strengthen instructors and train B. Ed students with modern ICT and computer skills.
- Government and policymakers are required to develop and implement policies that prioritize continuous professional development for teachers and ensure that they have access to ongoing training and resources.
- Government and policymakers must allocate funds for technological advancements in education, including ICT tools and digital learning platforms, to support modern teaching practices.
- Government and policy make must take action to Promote research and innovation in teacher education programs to continuously improve the quality and effectiveness of the B. Ed 4 years' curriculum to meet the needs and demands of the contemporary education.
- Government and policymakers are required to implement a B. Ed degree that is compulsory for the field of teaching, but it is not compulsory for schoolteachers in Balochistan.
- Government and policy make should develop a monitor team to investigate, whether B. Ed degree holder teachers are implementing their learned knowledge and skills in their practical teaching after their appointment as government teacher.

References

Ahmad, M., Badusah, J., Mansor, A. Z., Abdul Karim, A., Khalid, F., Daud, M. Y., ... & Zulkefle, D. F. (2016). The Application of 21st Century ICT Literacy Model among Teacher Trainees. *Turkish Online Journal of Educational Technology-TOJET, 15*(3), 151-161.

Ahmad, S., Mehmood, K., & Junaid, M. (2022). Content Analysis of Training Program for Secondary Schools' Heads. *Journal of History and Social Sciences, 13*(1), 37–47. https://doi.org/10.46422/jhss.v13i1.201

Akhtar, H., Hasanati, N., & Istiqomah, I. (2019). GAME-BASED LEARNING: TEACHERS ATTITUDE AND INTENTION TO USE QUIZIZZ IN THE LEARNING PROCESS. *ICEAP 2019*, 49–54. https://pdfs.semanticscholar.org/168f/17ae2b7581e05cf001ba17b1ee201555abd8.pdf

Brown, E. L., Phillippo, K. L., Weston, K., & Rodger, S. (2019). United States and Canada pre-service teacher certification standards for student mental health: A comparative case study. *Teaching and Teacher Education, 80*, 71–82. https://doi.org/10.1016/j.tate.2018.12.015

Choy, S. C., Tunku Abdul Rahman University College, Malaysia, Dinham, J., Sau-Ching Yim, J., Williams, P., Curtin University, Tunku Abdul Rahman University College, Malaysia, & mme moe Pty Ltd. (2021). Reflective thinking practices among pre-service teachers: Comparison between Malaysia and Australia. *Australian Journal of Teacher Education, 46*(2), 1–15. https://doi.org/10.14221/ajte.2021v46n2.1

Creswell, J. W. (2013). *Steps in conducting a scholarly mixed methods study*. https://digitalcommons.unl.edu/dberspeakers/48/

Darling-Hammond, L. (2010). Evaluating teacher effectiveness: How teacher performance assessments can measure and improve teaching. *Center for American progress.*

Darling-Hammond, L., & Bransford, J. (Eds.). (2007). *Preparing teachers for a changing world: What teachers should learn and be able to do.* John Wiley & Sons.

Darling-Hammond, Linda. (2017). Teacher education around the world: What can we learn from international practice? *European Journal of Teacher Education, 40*(3), 291–309. https://doi.org/10.1080/02619768.2017.1315399

Dishon, G., & Gilead, T. (2021). Adaptability and its discontents: 21st-century skills and the preparation for an unpredictable future. *British Journal of Educational Studies, 69*(4), 393–413. https://doi.org/10.1080/00071005.2020.1829545

Forlin, C. (2019). Teacher education and inclusion in the Asia-Pacific region. In *Oxford Research Encyclopedia of Education*.

Fullan, M. (2013). Commentary: The new pedagogy: Students and teachers as learning partners. *Learning Landscapes, 6*(2), 23–29. https://doi.org/10.36510/learnland.v6i2.601

Government of Pakistan, Ministry of Education. (2009). *National Education Policy 2009. Islamabad: Ministry of Education.*

Gul, F., Yousaf, A., Masood, S., & Yaqub, S. (2021). Relationship between teachers' professional development, instructional strategies and its impact on students' learning outcomes. *Ilkogretim Online, 20*(2). https://doi.org/10.17051/ilkonline.2021.02.101

Gunarathna, C., Yang, R., Wijeratne Mudiyanselage, P., Amarasinghe, G., Samarasinghalage, T., Weerasinghe, R. N., ... & Dev Sureshkumar Jayakumari, S. (2024). Project-based learning for proactive skills development of postgraduate students in solar energy building design digitalisation. *Smart and Sustainable Built Environment, 13*(4), 828-855. https://doi.org/10.1108/SASBE-08-2022-0173

Guskey, T. R. (2000). *Evaluating professional development.* Corwin Press.

Häkkinen, P., Järvelä, S., Mäkitalo-Siegl, K., Ahonen, A., Näykki, P., & Valtonen, T. (2017). Preparing teacher-students for twenty-first century learning practices (PREP 21): a framework for enhancing collaborative problem-solving and strategic learning skills. *Teachers and Teaching, 23*(1), 25–41. https://doi.org/10.1080/13540602.2016.1203772

Hameed, F., Ahmed-Baig, I., & Cacheiro-González, M. (2018). Job satisfaction of teachers from public and private sector universities in Lahore, Pakistan: A comparative study. *Economics & Sociology, 11*(4), 230–245. https://doi.org/10.14254/2071-789x.2018/11-4/15

Hanushek, E. A., & Woessmann, L. (2017). School resources and student achievement: A review of cross-country economic research. In *Methodology of Educational Measurement and Assessment* (pp. 149–171). Springer International Publishing. https://link.springer.com/chapter/10.1007/978-3-319-43473-5_8

Hargreaves, D. H. (2011). Leading a self-improving school system. National College for School Leadership. https://core.ac.uk/download/pdf/4159772.pdf

Harun, R. N. S. R., Hanif, M. H., & Choo, G. S. (2021). The pedagogical affordances of e-portfolio in learning how to teach: A systematic review. *Studies in English Language and Education, 8*(1), 1-15. https://jurnal.usk.ac.id/SiELE/article/view/17876

Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning.* Routledge.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of educational research, 77*(1), 81-112. https://doi.org/10.3102/003465430298487

Hossain, A. (2018). The Implementation of Learning Together in Improving Students' Mathematical Performance. *International Journal of instruction, 11*(2), 483-496.

Imran, M. E., Sopandi, W., Mustafa, B., & Riyana, C. (2021). Improving primary school teachers' competence in teaching multi-literacy through RADEC-based training programs. *Cypriot Journal of Educational Sciences, 16*(6), 3033–3047. https://doi.org/10.18844/cjes.v16i6.6494

Kern, B. D., Wilson, W. J., Malinowski, P., & Wallhead, T. (2022). Pedagogical practices among teachers of different demographics and dispositions toward change: Results of a multi-region survey of US physical educators. *Journal of Teaching in Physical Education, 42*(2), 256-266. https://journals.humankinetics.com/view/journals/jtpe/42/2/article-p256.xml

Khalid, A., Dukmak, S. J., & Dweikat, F. F. I. (2017). Pre-service teachers' perception of their educational preparation. *International Journal for Research in Education, 41*(1), 273-303. https://scholarworks.uaeu.ac.ae/ijre/vol41/iss1/9/

Khan, S., & Khan, R. A. (2019). Online assessments: Exploring perspectives of university students. *Education and Information Technologies, 24*(1), 661–677. https://doi.org/10.1007/s10639-018-9797-0

Kothari, C. R. (2004). *Research Methodology.* New Age International Publishers.

Laffey, D., & Professor, Department of English Language and Literature, Pukyong National University. (2020). Vocabulary learning strategies preferred by Korean university students. *English Teaching, 75*(4), 81–100. https://doi.org/10.15858/engtea.75.4.202012.81

Lee, H. S., Mojica, G. F., & Lovett, J. N. (2020). Examining how online professional development impacts teachers' beliefs about teaching statistics. *Online Learning, 24*(1). https://doi.org/10.24059/olj.v24i1.1992

Lohr, S. L. (2021). *Sampling: design and analysis.* Chapman and Hall/CRC. https://doi.org/10.1201/9780429298899

Malik, A., & Mirza, R. A. (2022). Pre-colonial Religious Institutions and Development: Evidence through a Military Coup. *Journal of the European Economic Association, 20*(2), 907-956. https://doi.org/10.1093/jeea/jvab050

Malik, M. I., & Akram, M. (2020). Effect of Head Teacher's Effectiveness on School Performance at Secondary School Level. *Journal of Educational Sciences & Research, 7*(1).

Martinez, J. S. (2022). English Teachers' Educational Attainment: Its Impact on the Elementary Learners' Metacognitive Reading Skill Development. *Topics in Early Childhood Special Education, 13*(02), 2086-2093. https://doi.org/10.48047/intjecse/V13i2.211226

Morris, J., Song, Y., Soloway, E., & Norris, C. (2021). Teacher professional development in STEM education. *Journal of Educational Technology & Society, 24*(4). http://index.j-ets.net/Published/24_4/ETS_24_4_06.pdf

Nadeem, M., Arif, S., & Naeem, M. (2020). The role of principals and administrators in performance appraisal of schoolteachers in Punjab. *SJESR, 3*(2), 132-142. https://doi.org/10.36902/sjesr-vol3-iss2-2020(132-142)

Naeem, M., Gul, F., Asghar, Z., & Zafar, N. (2019). Human Rights Education in Pre-Service Teacher Education–Pakistan. *UMT Education Review, 2*(1), 39-61. https://doi.org/10.32350/uer.21.03

Pecheone, R. L., & Whittaker, A. (2016). Well-prepared teachers inspire student learning. *Phi Delta Kappan, 97*(7), 8–13. https://doi.org/10.1177/0031721716641641

Penuel, W. R. (2020). Promoting equitable and just learning across settings. In *Handbook of the Cultural Foundations of Learning* (pp. 348–364). Routledge. https://doi.org/10.4324/9780203774977-24

Prensky, M. (2001). Digital natives, digital immigrants part 2: Do they really think differently? *On the Horizon, 9*(6), 1–6. https://doi.org/10.1108/10748120110424843

Rizvi, M. (2015). Teacher education pedagogies related to preparing preservice teachers as leaders in Pakistan. In *International teacher education: Promising pedagogies (Part B)* (pp. 7-30). Emerald Group Publishing Limited. https://doi.org/10.1108/S1479-368720150000025002

Rubin, A., & Babbie, E. R. (2016). *Empowerment Series: Research methods for social work.* Cengage Learning.

Sadaf, A., & Johnson, B. L. (2017). Teachers' beliefs about integrating digital literacy into classroom practice: An investigation based on the theory of planned behavior. *Journal of Digital Learning in Teacher Education, 33(*4), 129–137. https://doi.org/10.1080/21532974.2017.1347534

Schleicher, A. (2012). *Preparing teachers and developing school leaders for the 21st century: Lessons from around the world*. OECD Publishing. 2, rue Andre Pascal. F-75775 Paris Cedex 16, France.

Siddiqua, N., Parveen, N., & Khan, M. Z. (2016). Evaluating the outcomes of four-year B. Ed program: A case study of Graduates of Public Sector University. *Journal of History and Social Sciences, 7*(1). https://doi.org/10.46422/jhss.v7i1.58

Suhail, K. (2021). Re-defining and re-designing public education in Pakistan: The case of critical thinking. In *Educational Reform and International Baccalaureate in the Asia-Pacific* (pp. 291-315). IGI Global.

Haq, E. U., Tirmazi, S. H., & Zulfqar, A. (2018). An Analysis of Teachers' Professional Development Program at Elementary Level. *Pakistan Journal of Education*, *35*(2). http://dx.doi.org/10.30971/pje.v35i2.269

Waycott, J., Bennett, S., Kennedy, G., Dalgarno, B., & Gray, K. (2010). Digital divides? Student and staff perceptions of information and communication technologies. *Computers & Education, 54*(4), 1202–1211. https://doi.org/10.1016/j.compedu.2009.11.006

Williams, S. A., Johnson, A. D., & Cross, L. B. (2021). Meta-techniques for faculty development: A continuous improvement model for building capacity to facilitate in a large interprofessional program. *Journal of Interprofessional Education & Practice, 24,* 100444. https://doi.org/10.1016/j.xjep.2021.100444

Wilson, S. M. (2013). Professional development for science teachers. *Science, 340*(6130), 310-313. https://doi.org/10.1126/science.1230725

World Bank. (2018). *World development report 2019: The changing nature of work.* The World Bank.

Xiao, J., Sun-Lin, H.-Z., Lin, T.-H., Li, M., Pan, Z., & Cheng, H.-C. (2020). What makes learners a good fit for hybrid learning? Learning competences as predictors of experience and satisfaction in hybrid learning space. *British Journal of Educational Technology: Journal of the Council for Educational Technology*, *51*(4), 1203–1219. https://doi.org/10.1111/bjet.12949

Zaidi, S., & Nasir, M. (2015). *Teaching and learning methods in medicine (No. 12519).* Springer International Publishing.