Effects of University Teachers' Perceptions, Attitude and Motivation on their Readiness for the Integration of ICT in Classroom Teaching

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Abstract

Research indicates that student achievement enhances if coupled with information and communication technology (ICT). However, regardless of its extreme importance, there are examples of ICT underuse across all levels of classroom teaching and learning in Pakistan. Evidence from previous research studies suggests that teachers' perceptions, attitudes and motivation towards ICT determine the practical use of ICT in classroom teaching. The aim of this study was to find the effect of university teachers' perceptions, attitude, and motivation towards their readiness for the integration of ICT in their classroom teaching. A sample of 377 university teachers from 51 higher education institutions responded to the survey instrument. The data were analyzed by using Exploratory Factor Analysis (EFA) and Multiple Regression Analysis. The analysis of data revealed a statistically significant effect of university teachers' perceptions, attitude and motivation towards teachers' readiness for the integration of ICT in their classroom teaching. Based on the findings, the study recommends that university teachers with basic ICT literacy should be encouraged to have a positive attitude toward technology use for discharging professional responsibilities.

Keywords: attitude, ICT, integration, motivation, perceptions.

Introduction

Information and communication technologies (ICT) are commonplace in educational systems in the developed countries. Currently the higher education

system in Pakistan is passing through a transitional phase to bridge the gap between national educational standards and international standards of education by ensuring quality and incorporating digitalization (Atta-Ur-Rahman, 2006; Choudhary, 2007). The shift to digitalization augments betterment and increased value of higher education in the twenty-first century; as such there is a need for introducing an ICT policy that is implementable (Shaikh, & Ahmed, 2009). This scenario underscores the need for learner-centered teaching and necessitates an environment conducive for student achievement (Kundi, & Nawaz, 2010; Nawaz, & Qureshi, 2010). Realizing the value of technology, the government of Pakistan invested in the integration of ICT in mainstream higher education, but the result was far from expectations (Kundi, Nawaz, & Khan, 2010). Moreover, in the local context, few researches have been conducted on ICT integration in the education sector (Hameed, 2007; Memon, 2007) and the few researches conducted have aimed at assessing suitability and availability of physical infrastructure for ICT integration at higher education (Koo, 2008). Making technology available for use does not necessitate meaningful integration into teaching (Dwyer, 2016). There are mediating factors which influence technology use, including teachers' knowledge, attitudes and content (Penuel, 2006); among these, the teacher is a central factor in determining the extent to which technology integration can be effective (Bebell, & Kay, 2010). Nonetheless, teachers are linked to dismal outcomes of education for their lack of competencies, lack of willingness to improve educational systems, and time limitation to learn ICT skills (Shaikh, & Khoja, 2013). More reasons to underperform are ascribed to teachers' lethargic attitude, unclear focus and lack of commitment and passion (Aziz, Akhtar, & Rauf, 2012). The suggested solution to this problem lies in changing teachers' mindset and establishing institutions which recognize that investment in teachers' development enhances teaching skills and benefits the education system (Amjad, 2006).

University teachers employ innovative strategies in teaching and developing student competencies to face real challenges of the world, which cause changes in society (González-Mariño, 2008). Though technology supplements teachers' to develop on professional grounds, teachers are found to underuse technology, and take lesser educational benefits of ICT use (Lee, 2006). This phenomenon leads to the argument that teachers' knowledge, beliefs, skills, and attitudes hold prime consideration (Cuban, 2000). In addition, research evidence suggests teachers' beliefs and attitudes predict uptake of ICT in the classroom (Watt, 1980). Finally,

a self-sense of efficacy influences people to enhance human success and personal development.

Literature suggests multiple factors that influence teachers' integration of ICT in higher education. These factors focus on the functionalities of external variables on ICT use, but little literature highlights factors related to mere teachers' internal framework that impacts on the adaptation with technological change (Nawaz, & Qureshi, 2010) by conceptualizing and adopting ICT that conclude attitudes of its users as a critical success factor towards educational technologies (Qureshi, Nawaz, & Khan, 2011). More evidence indicates that a thorough understanding of the teachers' perceptions and user-characteristics ascertain their attitudes toward ICT in teaching (Daraz, 2007; Shah, 2011; Nawaz, & Kundi, 2010) because changes around the world necessitate changes in education (Aziz, Akhtar, Rauf, 2012). Thus, the situation necessitates a study to discover university teachers' perceptions, attitudes, and motivation for the integration of ICT in higher education. Despite multifarious research on the topic of this study at international level, there is paucity of research on ICT integration in the local context (Hameed, 2007; Memon, 2007) providing insufficient evidence of technology use in higher education institutions (Koo, 2008).

This study aimed to explore internal factors of university teachers that influence integration of ICT. In addition, the study was an attempt to determine the significance of relationship between perceptions, attitudes, and motivation of university teachers, and their use of ICT. Hence the question which guided the research was what the effect of university teachers' perceptions, attitudes and motivation was on their readiness for ICT integration in their classroom teaching.

Literature Review

ICT Integration in Classroom Teaching

The massive adaptation of ICT in socio-economic landscape necessitates adjustment of educational priorities in line with technological trends because ICT has become a proven success factor of innovation in higher education (Chandio et al., 2018). Among numerous studies conducted, the literature depicts two major

divisions in research foci, the one which focused on the effect of internal factors and the other identifying external factors. Chandio et al., (2018) attempted to study the ICT implementation and acceptance in public sector universities of Pakistan. They reported that ICT implementation was impeded by external factors, such as, non-availability of equipment, and conducive environment, while ICT acceptance and use largely depended on applicability and relevance to the course or field of teaching. Baturay and Gökçearslan (2017) explored variables related to pre-service teachers' intentions for technology acceptance, attitudes towards computer assisted education, and computer competence. They found a significant positive relationship among some internal factors, including intention for technology acceptance, attitudes towards computer assisted education, and computer competence; similarly, a significant and positive relationship was found between enjoyment and perceived ease of use with the attitudes towards computer assisted education.

Teachers' Perceptions and ICT Integration in Classroom Teaching

The internal factors include perceptions that consist of associated meaning to a detected stimulus (Woolfolk, 2012) leading to actions (Baucus, Baucus & Mitchell, 2014).Thus, there exists a confluence between existing external world and individual knowledge. The significance of perceptions led Tondeur, Braak, Ertmer, and Ottenbreit-Leftwich (2017) to review literature to understand the relationship between teachers' beliefs about pedagogy and use of technology in education. Fourteen selected qualitative case studies were reviewed by employing meta-aggregate approach for data analysis. The findings reported a bi-directional relationship between teaching beliefs of teachers and technology. Englund, Olofsson, and Price's (2017) study on teaching and learning concepts of teachers and approaches to technology examined university teachers for a period of ten years (2004-2014). The results exhibited evident differences between novice and veteran university teachers and results revealed that the novice teachers initially were more prone to teacher-centered notions about teaching with technology; however, later the same teachers demonstrated far greater and quicker adaptability to change than the experienced teachers. Conversely, more experienced teachers showed negligible change in their concepts.

The literature indicated a gap in the context of this study about the university teachers' perceptions of ICT integration. Hence, the discussion

necessitated the formulation of first research hypothesis of this study:

H_1: The perceptions of university teachers have a significant influence on their ICT integration for teaching and learning.

Teachers' Attitudes towards ICT Integration

Attitudes use internal beliefs that influence action and show characteristics like honesty, generosity, and commitment (Schunk, 2012, p. 220). Though pre-existing attitudes influence technology acceptance, with gradual increase in technology diffusion, users' attitudes continuously shape for more acceptance and use of ICT (Bögel, Oltra, Sala, Lores, Upham, Dütschke, & Wiemann, 2018). In his study Player-Koro (2012) investigated factors which influence teachers' use of ICT in education. The study devised a model to explore teacher related contributing factor of ICT use. The results indicated that specific positive attitudes and self-efficacy of teachers influenced ICT use. However, teachers' general positive attitudes failed to produce positive results. Moreover, teachers' self-confidence enabled them to benefit their professional stance, and facilitated students' learning. Similarly, Huang, Teo, and Zhou (2017) studied English teachers in Chinese universities by exploring factors that influenced teachers who taught with technology. The findings indicated English language teachers' positive attitudes towards use of technology in teaching. In addition, social impacts, supportive conditions, and usefulness of technology were main factors influencing the acceptance of technology. The study suggested improvement in university education through teacher professional development, and teachers' effective ways of integrating technology in teaching.

The literature indicated a gap in the context of this study about the university teachers' attitudes towards ICT integration. Hence, the literature necessitated formulation of the second research hypothesis of this study:

H_2: The attitudes of university teachers have significant influence on ICT integration in classroom.

Teachers' Motivation for ICT Integration

Motivation is the internal push that gets and keeps one going, and clears the path one tries to follow (Slavin, 2012). Motivation as an essential factor has been studied in several researches. Gasaymeh, Al-hasanat, Kraishan, and Abutayeh (2017) examined Jordanian teachers' motivational factors that affected ICT integration in teaching practices. The findings reported internal and personal factors most significant motivational factors about benefits of ICT use that enhanced teaching practices, increased students' learning, and improved job satisfaction. However, moderate influence evidenced for external, moral, and physical motivational factors like, receiving support and encouragement from university for the uptake of ICT in education.

The literature indicated a gap in the context of this study about the university teachers' motivation for ICT integration. Thus, the literature necessitated the formulation of the third research hypothesis of this study:

H_3: The motivation of university teachers has a significant influence on ICT integration in classroom.

Conceptual Framework

In this study, the conceptual framework showcases the idea that the internal factors of university teachers: perceptions, attitude, and motivation are critical in determining teachers' willingness to accept technology for discharging professional responsibilities. Figure 1 shows the relationship between the dependent variable and independent variables. Further, university teachers' use of ICT is placed at the right-center, whereas on three intersecting edges around university teachers' ICT use are explicated constructs i.e. perceptions, attitudes, and motivation. The three intersecting points indicate influences of the constructs in the acceptance of ICT. The literature failed to mirror value-size for each construct, and, therefore, the present study treats each construct equally. The arrows with pointed heads appearing from independent variables i.e. perceptions, attitude and motivation exhibit their effect on university teachers' readiness to use ICT in teaching and learning. Holistically, three constructs invisibly interact together and influence the decisions of university teachers for the uptake of technology.
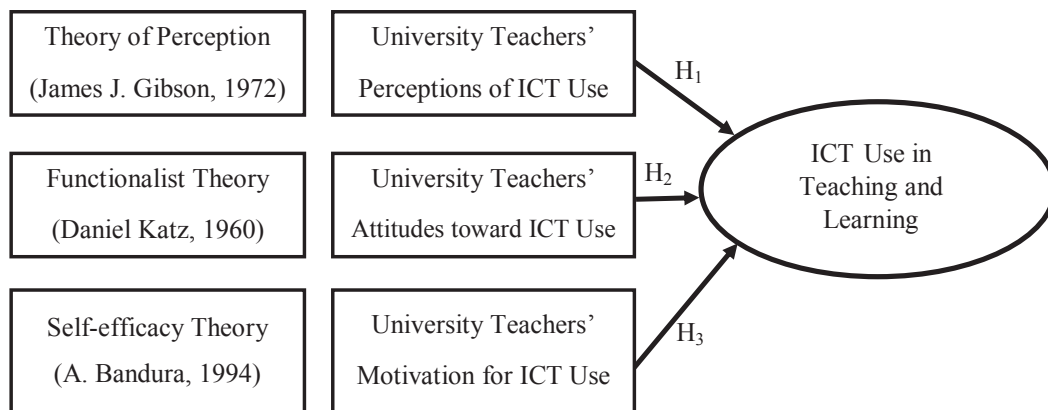
Figure 1. The Conceptual Framework

Methodology

This study employed quantitative approach to explore the research variables, generalize findings, determine psychological tendencies of the respondents and understand relationships between the variables.

Instrument

First a questionnaire was developed, second, the sections in the instrument from various studies were selected based on relevancy with the research area of this study. Third, the selected sections for teachers' perceptions, attitudes, and motivation were adapted and piloted for validity and reliability check.

The instrument designed comprised four main sections and the items for each construct were adapted from research studies. There were seven items developed on teachers' ICT proficiency from literature review. There were nine items adapted for section on teachers' perception of ICT from the works of Almekhlafi and Almeqdadi (2010), Fernet, Senécal, Guay, Marsh and Dowson (2008), and Gulbahar and Guven (2008). There were eight items on teachers' attitudes towards ICT adapted from the works of Hernández-Ramos, Martínez-Abad, Peñalvo, Garcia, and Rodriguez-Conde (2014), Player-Koro (2012), Mills, Wakefield, Najmi, Surface, Christensen and Knezek (2011) and Gardner, Discenza and Dukes (1993). There were nine items adapted in final section of the instrument on motivation, adapted from the works of Han and Yin (2016), Choi (2014), Akdemir and Arslan (2013), Cullen

and Greene (2011), Fernet, Senécal, Guay, Marsh and Dowson (2008) and Sinclair (2008).

Next, the internal validity was checked for the selected constructs of the instrument. The adapted questionnaire was sent for review to a panel of four experts to assess the content and face validity. The panel comprised of three experts from the Department of Education (DoE) and one from the Department of Computer Science. The panel comprised three content experts in the fields of education, psychology and computer science, and one expert in educational assessment. Each expert panelist was handed a copy of the instrument to review and return the instrument in four days. The original instrument was modified according to the feedback received from the experts regarding its size, language difficulty level, order of sections and instruction for the convenience of respondents. After incorporating the experts' review, the revised instrument was taken to experts again for re-examination to fix any issue. The final instrument was piloted to check practicality, language issues and difficulty level of the instrument; it did provide useful information about instructions for the respondents while responding to the pilot questionnaire (Fraenkel, Wallen, & Hyun (2012). The piloted survey tested the responses on SPSS V. 22 to determine internal consistency of the instrument through Cronbach's Alpha coefficient. The Cronbach's Alpha of the pilot instrument produced an overall reliability of .887. Whereas, the reliability for each of the four parts of the instrument was as follows: ICT knowledge and skills (proficiency) = 0.846; perceptions about ICT use = 0.949; attitudes towards ICT use = 0.876; and motivation for using ICT = 0.921.

Sample

After analyzing the face and content validity, in the final survey convenient sampling technique was employed for data collection from the university teachers in Sindh. The questionnaires were sent to 410 teachers of 51 universities, 346 usable responses returned which included 216 males (62.4 percent) and 130 females (37.6 percent).

Table 1

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	216	62.40	62.40	62.40
Female	130	37.60	37.60	100
Total	346	100	100	

There were twenty-four items in the questionnaire pertaining to four variables such as: proficiency in ICT use, perceptions, attitudes, and motivation. Respondents rated responses on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The hypothesized model equation, thus, formulated:

$$U = \propto 0 + \beta 1 \, (PER) + \beta 2 \, (ATT) + \beta 3 \, (MOT) + \varepsilon$$

Where U, PER, ATT, and MOT show university teachers' proficiency in using ICT, perceptions, attitudes, and motivation respectively. Moreover, $\propto 0$ represents constant and ε shows error term in the model.

Data Analysis

SPSSV. 22 was used to analyse the collected data. The study employed exploratory factor analysis, Pearson's correlation, reliability, and multiple linear regression for data analysis. Moreover, convenient sampling technique was adopted for data collection.

Findings

Exploratory Factor Analysis

The exploratory factor analysis (EFA) examined the inter-correlations among all questions of the instrument and then reduced the data size to fit into smaller number of factors. The second application of factor analysis was to refine number of questions in the instrument to develop items (Hooper, 2012, p. 2). In sum, the goal of EFA was to unearth common factors by finding the hidden structure of the data (Hooper, 2012, p. 3). As such, the EFA proved useful in exploring the latent theoretical constructs. Hence, the EFA was run to measure ICT use, perceptions, attitudes and motivation of the university teacher questionnaire. As per hypothesized model only four factors were requested to index respondents' ICT use

(dependent variable), perceptions, attitudes, and motivation (predictors). The value of Kaiser-Meyer-Olkin (KMO) measured sampling adequacy (.949) indicated that the sample size was adequate to run factor analysis. In addition, the Bartlett's Test of Sphericity *(P<.05)* showed that matrix was not an identity matrix. The results of KMO measure and Bartlett's Test of Sphericity indicated to run factor analysis.

In addition, the factor analysis initial solution was rotated using an orthogonal rotation method with Kaiser Normalization that extracted four 'uncorrelated' factors. These factors accounted for 11.31, 2.373, 1.118, and 1.04 percent of the variance. Moreover, the factors explained 66.02 cumulative percent of the total variance. The Cronbach's Alpha test of internal consistency was calculated which yielded .948 of twenty-four item instrument, the factor loading less than |0.40| were discarded. Table 3 shows the factor loadings of items for the rotated factors. All twenty-four items were loaded onto respective components in the rotated solution without any cross-loadings. Thus, the construct and discriminant validity were ensured respectively.

Table 2
Rotated Component Matrix[a]

	Component			
	Use	Per.	Att.	Mot.
1-1 Use MS OFFICE with ease	.814			
1-3 Using computer is easy for me	.811			
1-4 It's easy to use internet for teaching	.785			
1-2 Can print, scan, etc without problem	.775			
1-5 Use ICT for research work	.767			
1-6 Can use research related software with ease	.715			
1-7 Can communicate with students via ICT	.648			
2-5 ICT appreciates student-centered teaching		.783		
2-6 ICT increases academic achievement of students		.738		
2-4 Use of computer is easy in teaching		.736		

2-2 ICT improves quality of instruction	.723		
2-3 ICT makes course work easy	.709		
2-7 ICT facilitates in achieving future goals	.658		
2-1 ICT facilitates in teaching	.591		
3-6 ICT makes professional work easy		.696	
3-3 ICT supports in doing research work		.630	
3-2 ICT makes learning easy for students		.610	
3-5 ICT promotes active learning of students		.609	
3-4 ICT improves students' communication and presentation skills		.548	
4-4 ICT promotes creativity and innovation of students			.721
4-3 I feel good when my students make good use of ICT			.633
4-2 I personally take interest in using ICT for teaching			.632
4-6 ICT is useful tool for students' academic success			.626
4-1 ICT is useful in developing personal and professional skills			.623

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 5 iterations.

Hypotheses Testing

The tested data were used to run multiple linear regression to determine: a) the size of the overall relationship between ICT use (dependent variable), and perceptions, attitudes, and motivation (predictors); and b) to what extent each of the independent variables contribute to predict ICT use of university teachers. Table 3 shows correlation, standard deviations, and means for university teachers' ICT use and its predictors.

Table 3

Mean, Standard Deviation, and Inter-correlations for University Teachers' ICT Use and Predictor Variables (N = 346)

	Mean	Std. Dev	1	2	3	4
U	4.4789	.60692	1			
PER	4.2923	.63940	.560**	1		
ATT	4.2581	.60911	.576**	.716**	1	
MOT	4.1883	.66371	.480**	.792**	.785**	1

**P < 0.01 (2-tailed); *P < 0.05 (2-tailed)

The hypotheses testing results through multiple linear regression to predict university teachers' ICT use. The overall combination of variables explained 38.8 percent of the total variance and predicted university teachers' ICT use F (3,342) = 72.137, P< .000), with all three variables significantly predicated university teachers' ICT use. Moreover, the variance inflation factor (VIF) value indicated less than 10 for each predictor, thus, multi-collinearity issue remained absent.

The coefficients of parameter estimate indicated that 'perception' (.212, P< 0.05), 'attitudes' (.272, P< 0.05), and 'motivation' (.202, P< 0.05) reflect statistically significant with university teachers' ICT use. Thus, all three hypotheses (H1, H2, and H3) were supported.

Table 4
The Coefficients

Hypothesis	Predictors	β	SE	t-stat	Sig.	VIF	Remarks
	(Constant)	1.533	0.203	7.567	0		
H$_1$	PERCEPTION	0.212	0.065	3.275	0.001*	2.594	Supported
H$_2$	ATTITUDE	0.272	0.065	4.196	0.000*	2.23	Supported
H$_3$	MOTIVATION	0.202	0.066	3.066	0.002*	2.509	Supported

(F (3,342) = 72.137, p<.000); Adj. R^2 = .388

P < 0.05

a. Dependent Variable: ICT Use

Discussion

The results of multiple linear regression analysis reported a statistically significant relationship between ICT use and predicator variables. The results reveal that university teachers' perceptions, attitudes, and motivation are significant factors in predicting ICT integration in the classroom.

The results of hypotheses testing indicated that the perceptions, attitudes, and motivation of university teachers significantly related to ICT proficiency for use in HEIs. The findings suggested that indigenous factors of university teachers exhibited enabling personal elements necessary for using technological tools in teaching and learning (Liu, Lin, Zhang, & Zheng, 2017). Moreover, the results of the first hypothesis conform to findings of previous studies which indicate that university teachers' perceptions have a significant and positive relationship with ICT integration (Sang, Liang, Chai, Dong, & Tsai, 2018; Shah, Banerjee, Murthy, & Iyer, 2018). The positive perceptions allow probability to devise innovative techniques to enhance learning; therefore, teachers' ICT use involves aspects like basic computer literacy to operate application software for accomplishing professional tasks. Teo, Sang, and Hoi (2019) confirmed that teachers' perceptions of technology are useful in facilitating teaching and learning processes. Moreover, the built-in features of computers provide learning opportunities at par with twenty-first century advancement (Regan, Evmenova, Sacco, Schwartzer, Chirinos, & Hughes, 2019) to assist professional development of teachers. Thus positive relationship between ICT competency and perceptions' contributes towards effective teaching and learning (Baydas, & Goktas, 2016).

In similar way, the second hypothesis result of respondents' attitudes showed a strong bi-directional relationship with ICT use when ICT users hold positive attitudes towards ICT integration. The literature verifies evidence that attitudes are one of the many factors that influence teachers' ICT use (Semerci, & Aydın, 2018); moreover, general and specific attitudes, and ease of use of technology in education support evidence that the specific attitudes towards ICT in education, and usefulness of ICT strongly affect ICT competency of teachers (Tondeur et al., 2016; Tondeur, Aesaert, Prestridge, & Consuegra, 2018). The study also affirmed that other factors affect teachers attitudes for computer use, such as teachers' own learning and achievement (Bagon, Gacnik, & Starcic, 2018), the social context of teachers (Popovich, Hyde, Zakrajsek, & Blumer, 1987), teachers'

level of computer anxiety or comfort (Blignaut, Burger, McDonald, & Tolmie, 2009), teachers' confidence, and likeness for computer (Delcourt, & Kinzie, 1993; Loyd, & Gressard, 1984a), teachers' encouragement for students' involvement and motivation for ICT use (Ruiz-Jaramillo, & Vargas-Yáñez, 2018), and usefulness of technology, the facility of communication, and the embedded value of ICT (Sahay, & Dawson, 2019) contribute in adapting ICT for professional use.

Further, the result of third hypothesis informed that the motivation of university teachers has a significant influence on ICT integration in classroom. However, self-efficacy is a key concept related to teachers integrating technology in education (Scherer, & Siddiq, 2015). There are factors which enable teachers' use of technology in the classroom. These include: the benefits of ICT, willingness to use technology, encouragement for students to accept technology, appreciate other teachers' use of technology, and considering ICT tools as important educational complements indicate teachers' motivation to adapt ICT for teaching and learning. These results confirm with the results of other researches that the reward-motivation combination impacts teachers' uptake of technology for instructional purposes (Karaseva, Pruulmann-Vengerfeldt, & Siibak, 2018). Further, teachers' willingness and interest gives teachers confidence to use and achieve educational objectives through ICT (Hatlevik, & Hatlevik, 2018). On the one hand, teachers self-efficacy influences teachers' aspirations and professional goals (Muijs, & Reynolds, 2002), enhances teachers' academic performance and institutional milieu (Abulibdeh, & Hassan, 2011), develops teachers' confidence to motivate students, promotes higher order thinking, and equips students with technology skills for future use (Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010), and beliefs predict teacher and student use of ICT in future (Myers, & Halpin, 2002). On the other hand, there are influences of factors, which affect self-efficacy of teachers. For instance, teachers' self-efficacy is affected if they receive any professional development (Brinkerhoff, 2006), get support from their colleagues (Tilton, & Hartnett, 2016), enjoy freedom of time to integrate technology (Curts et al. 2008), and has sufficient knowledge to use technology (Abbitt, 2011). These research evidences indicate the usefulness of self-efficacy of teachers for the use of technology in teaching and learning. This study attempted to provide useful information about teachers' perceptions, attitude, and motivation in enabling them for adapting technology for instructional purpose.

Conclusion and Recommendations

In conclusion, the study examined the relationship between teachers' competency and perceptions, attitudes, and motivation in universities and higher education institutes of Sindh. In the light of results of this study, the enabling nature of technology for instructional use depends on multiple teacher related aspects that offer assistance in technology integration in higher education. Therefore, it is recommended that the strong association between university teachers' ICT competencies and perceptions, attitudes, and motivation exhibit teachers' enthusiasm and readiness for the integration of technology, provided there is a control over administration, infrastructure, and students to allow teachers to uptake technology with ease. In addition, teacher training in ICT needs immediate attention to increase teachers' competencies and confidence for integrating technologies in their mainstream teaching to build on professional experience. Finally, ICT is not a panacea for the entire education system; however, its theoretical and managerial implications highlight areas to address vital issues of teachers and other stakeholders in higher education.

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