Teachers' Attitude and Level of Knowledge towards Integration of ICT into Pedagogy

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Abstract

Current paper investigates attitudes of secondary school teachers towards integration of ICT into pedagogy and their level of knowledge on ICT. This research was conducted in the context of barriers in integration of ICT by the teachers. Through quantitative method questionnaire was distributed to 100 teachers in 10 secondary schools of Rawalpindi district. Attitude scale containing 15 items and teachers level of knowledge on ICT scale containing 14 items was used to identify teacher's attitude and level of knowledge towards the use of ICT into pedagogy. Data was analysed by using SPSS 16 for descriptive statistics. Through mean score and standard deviation, attitudes and knowledge level of teachers were identified as high, moderate and low level. Findings of the present study revealed that overall teachers had positive attitudes towards the use of ICT with mean score (3.5), and high level of knowledge towards 3 areas out of 14 mentioned in the scale. Teachers' held positive attitudes towards ICT use. However teachers lack of knowledge in use of ICT was identified as a main barrier in integration of ICT. The results suggest additional work and consideration in the use of ICT in educational settings than it currently receives.

Keywords: Teachers' attitude, Teachers level of knowledge, Integration of ICT, Pedagogy.

1. Introduction

In the process of teaching and learning, ICT (Information and Communication Technology) changes the way it occurs in the classroom (Neo & Neo, 2004; Chien et al., 2021). There is strong potential in the field of educational technology to influence instructional practices of classroom teachers. ICT create a best-practice learning environment for students. By using ICT in teaching learning process teachers can aid their students to take active part in their educational experience. It can be used to develop the skills in students for their future success (Neo, 2005). Furthermore, it is also useful when it is used to support pedagogy (Chaptal, 2002; Andyani et al., 2020). In the Information Age skills that are necessary for success are

problem-solving, critical-thinking, and higher-order thinking skills. Thus, integration of ICT is viewed as a tool with the potential to develop these skills. (Hopson et al., 2001-2002; Supardi et al., 2021).

2. LITERATURE REVIEW

Information and Communication Technology is a blend of information technology (IT) and communication technology (CT). Therefore, information and communication technology (ICT) consists of variety of software and different applications related to computer and internet (Marcelle, 2000; UNESCO, 2007; Al Rahmi et al., 2020).

2.1 Importance of technology in teaching and learning

It is the role of teacher to make schools efficient and transform teaching-learning process into an active experience (Solhaug, 2009). Nevertheless these reforms cannot bring through ICT alone; it can work as a catalyst. ICT encourages teachers to use effective teaching methods rather than more traditional teacher centered approaches (Culp et al., 2005; Jalalzai, 2005; Erbas et al., 2021).

ICT integration in the classroom has benefits for teachers and students. Students' way of learning can enhance by the use of ICT (Okan, 2007; Solhaug, 2009). ICT has a potential to increase creativity when teaching and fostering creativity in students (Zhao, 2006). Creative potential of ICT provide active learning experience for students. Students learn more in authentic and attractive learning environment (Keengwe et al., 2008). Interactive ICT used into pedagogy involve students' in learning and develop innovation in learning (Neo & Neo, 2004). ICT is a tool and therefore it is dependent upon the work, willingness and motivation of teachers for its effective use (Scardamalia & Bereiter, 2008). To achieve measurable learning objectives and ICT integration students need access to computers in the classroom (Tuck, 2004; Abel et al., 2022).

2.2 Barriers to the implementation of ICT in education

Teachers face some barriers in successful integration of ICT. Barriers include lack of financial and material resources. Others include technical problems, and teachers' factors. Teachers' factors comprises of teacher attitudes toward computers, lack of teacher confidence, resistance to change and lack of training (Mueller et al., 2008). Teachers' knowledge and competencies in ICT is also of value. Lack of knowledge about ICT affects its use in the classroom and act as a barrier (Albirini, 2006). Teachers having lack of competencies in areas of ICT showed that they seldom use it in their classrooms. Low level of knowledge about ICT creates hindrances and constraints to the integration of ICT in pedagogy (Al-alwani, 2005; Empirica, 2006; Warioba et al., 2022).

Many teachers may simply view ICT as an unnecessary interruption because of already overbooked schedule (Gordon & Still, 2007). Teachers are under pressure as they have to cover all of the curriculum materials within a specific time period (Prensky, 2008; Levin & Wadmany, 2008; Hester et al., 2020).

Researchers have identified a range of factors involved in ICT integration. These researchers divide factors involved in integration into barriers that teacher cannot control. These include lack of resources and school culture. Barriers which are within the teachers control, including

personal beliefs, attitudes, knowledge and skills (Hixon & Buckenmeyer, 2009).
Teacher attitudes are considered the strongest factor in ICT integration (Russell et al., 2003; Jeong & Lambert, 2002; Garland & Noyes, 2004; Aral et al., 2006; Aydın, 2007a; Teo, Chai, Hug & Lee, 2008a). The leading factors of all the teacher factors involved in ICT integration is teacher attitudes. Teachers' attitudes have mainly considerable impact on ICT integration in the classroom (Thomas & Vela, 2003; Raygan et al., 2022).

2.3 Teachers' Attitudes towards ICT

Teachers' attitude has been found to be major predictors of the integration of new technologies in existing instructional settings (Almusalam, 2001). Central to integration is teacher's attitudes about teaching and learning with ICT (Mumtaz, 2000). Research has proved that to successfully integrate ICT into pedagogy, it largely depends upon teachers' attitudes (Albirini, 2006; Baylor & Ritchie, 2002; Kluever et al, 1994). Teachers who consider ICT as a creator of pressure and causes difficulties for them denying ICT integration. However researchers conclude that these views are related to teachers' attitudes and because of their level of ICT knowledge (Kozma, 2003; Pelgrum, 2001; Garland & Noyes, 2004; Torkzadeh et al., 2006; Lim & Khine, 2006; Zhang, 2007; Paraskeva et al., 2008). Therefore, teachers who have positive attitudes towards ICT will be motivated, willing to integrate and positively disposed towards using it in the classroom (Moseley & Higgins, 1999). Researchers found that participants with negative computer attitudes had limited skills and competencies in ICT use (Harrison & Rainer, 1992). Such attitudes are developed when teachers have sufficient knowledge and build competencies about its use (Afshari et al., 2009; Alvarado et al., 2020).

2.4 Teachers' level of knowledge on ICT

Teachers' competencies and experience of ICT use is positively correlated to ICT attitudes. When teachers have more experience of ICT; there is likelihood of favorable attitudes toward ICT (Al Khaldi & Al Jabri, 1998; Levine & Donitsa-Schmidt, 1998; Potosky & Bobko, 2001; Rozell & Gardner, 1999; Shashaani, 1997; Williams et al., 2000). Research demonstrated a strong and positive relationship between teachers' ICT attitudes and ICT experience. Knowledge about ICT and experience in its use all affect and shape teachers' attitude towards integration of ICT (Hong & Koh, 2002; Mailizar & Fan 2020).
Teachers develop their attitude toward ICT use through general innovativeness and familiarity with computers (Van Braak et al., 2004; Tuck, 2004). In order to be empowered to worldwide use and integrate ICT into their pedagogy, teachers need to develop particular attitudes, skills, confidence, and intentional classroom practices (Chen & Chang, 2006).

2.5 Situation in Pakistan/ Need for this research

To meet international standards, Pakistan a developing country is trying to incorporate ICT facilities in schools. In the year 2009, Policy and Planning Wing, Ministry of Education, Government of Pakistan, set 10 professional standards for initial preparation of teachers in Pakistan. One prominent strand among those was effective communication and proficient use of information and communication technologies (Government of Pakistan, Education policy, 2009).
Achieving this goal it is clearly stated in National Educational Policy 1998-2010 of Pakistan

that "computer shall be introduced in secondary schools" and "Educational institutions shall be provided internet facilities". It sounds attractive to go with the stream of virtual education, although world is going to digital age and ICT works as supportive agent in teaching and learning but ground realities are different especially in developing countries like Pakistan. In Pakistani schools where ICT facilities are available, it is identified that teachers do not deliberately use ICT in classroom instruction (Shaikh, 2009; UNESCO, 2007; Abbasi & Ali 2022). Therefore, the focus of current study was to find out the attitude of teachers towards the use of ICT, as teachers attitudes play a pivotal role in integration of ICT into teaching.

3. METHODOLOGY OF THE STUDY

3.1 Research Design/ Methodological Design

The study intended to investigate the attitudes of teachers to the integration of Information and Communication Technologies (ICTs) into pedagogy and their level of knowledge on ICT at Federal Government (FG) secondary schools of Pakistan. In order to investigate the mentioned issue, the research questions are:

1. What are the attitudes of teachers towards the use of ICT into pedagogy?
2. What is the teachers' level of knowledge on ICT?

In order to answer the research questions, the quantitative method including quantitative standardized instrument (Creswell, 2003) is applied explicitly.

3.2 Sample

Through purposive sampling 10 schools were selected having computer lab facility in them. Government secondary schools of Rawalpindi Pakistan were selected as a sample of the study. The reason for the selection of the institutions is that keeping in view the challenges and barriers teachers face while integrating technology included lack of computer labs in the schools. I wanted to explore the extent to which attitudes of teachers create difficulties to the integration of technology into pedagogy by having facilities of labs. Ten schools both boys and girls were selected through purposive sampling technique. Data was collected from teachers of both morning and evening shifts schools. Ten teachers were selected as a sample from each Secondary school that made 100 teachers in total.

3.3 Instrument of the study

To identify teachers' attitudes towards the integration of ICT into pedagogy, and to answer the research questions (as mentioned above), a scale teachers attitude towards use of ICT and teachers level of knowledge on ICT developed by Papanastasiou, & Angeli, (2008) was used. This scale was administered to 100 teachers and yield quantitative data.

3.4 Internal consistency reliability of scale

Keeping in view that the scale was not used in Pakistan therefore it was important to calculate the alpha reliability in order to find out the suitability of this scale in the Pakistani context. For this purpose, scale was administered to 50 secondary school teachers as pilot study.

Table 1
Cronbach alpha reliability coefficient

Scale	Reliability Coefficient
Teachers' attitude towards ICT	0.861
Teachers level of knowledge on ICT	0.881

Table indicates that scales were satisfactorily reliable for use in the Pakistani context.

4. Results

4.1 Teachers' attitude towards ICT

Teachers' attitude scale consists of 15 items and teachers' knowledge on ICT consists of 14 items, developed by Papanastasiou, & Angeli, (2008) was used in the study. To identify secondary school teachers' attitudes towards the use of ICT into pedagogy, respondents were asked 15 items regarding attitude of teachers ranged from completely disagree= 1, disagree=2, neutral= 3, agree= 4, completely agree= 5. Descriptive statistics (Mean, Standard Deviation, Percentages) of scores presented in the following table indicated teachers, attitudes towards use of ICT into pedagogy.

Highly positive attitudes towards computer were identified towards the items that, "The computer is a valuable tool for teachers" with (Mean score= 3.98, SD= 1.137) followed by "The concept helps teachers to teach in more effective ways" (M= 3.94, SD= .973)," The computer will change the way students learn in my class" (Mean= 3.87, SD= 1.089), "I feel comfortable with the idea of the computer as a tool for teaching and learning" (M= 3.85, SD= 1.067), "The computer helps students learn because it allows them to express their thinking in better and different ways" (M= 3.84, SD= 1.070), "The computer helps students understand concepts in more effective ways, (M= 3.80, SD= 1.054), "The computer will change the way students learn in my class" (M= 3.78, SD= .927), "The use of the computer as a learning tool excite me" (M= 3.74, SD= .981), "The use of computer in teaching and learning stresses me out" (M= 3.43, SD= 1.067).

Teachers showed moderate level of attitude towards following items "I can do what the computer can do equally as well" with (M= 3.22, SD= 1.168), "The use of computer in teaching and learning scares me" (M= 3.07, SD= 1.320), "The idea of using computer in teaching and learning makes me skeptical" (M= 3.04, SD= 1.091).

On the other hand negative attitude towards were "If something goes wrong I will not know how to fix it" (M= 2.98, SD= 1.054), followed by "The computer is not conducive to good teaching because it creates technical problems" (M= 2.98, SD= 1.197) and "The computer is not conducive to student learning because it is not easy to learning" (M= 2.94, SD= 1.213).

Table 2
Teachers' attitude towards ICT
(n=100)

Items	**Mean**	**Std. Deviation**
I feel comfortable with the ….	3.85	1.067
The use of computer……..	3.43	1.085
If something goes wrong…….	2.98	1.054

The idea of using computer…	3.04	1.091
The use of the computer as …	3.74	0.981
The use of computer in teaching….	3.07	1.320
The computer is a valuable……	3.98	1.137
The computer will change……..	3.87	1.089
The computer will change the…..	3.78	0.927
I can do what the computer…….	3.22	1.168
The computer is not conducive …	2.94	1.213
The computer helps student ……..	3.80	1.054
The computer helps students….	3.84	1.070
The concept helps teachers ……	3.94	0.973
The computer is not conducive ….	2.98	1.197

4.2 Teachers' level of knowledge on ICT

Teachers' knowledge about ICT was determined through "Teachers level of Knowledge on ICT" section of the SFA-T3 scale. Results on 5 point Likert scale was measured through descriptive statistics (mean and standard deviation) which presented in the given table below.

It is designated through the highest mean scores and standard deviation of items that teachers have adequate level of knowledge in three areas namely (email, internet and word processing). With the highest mean score (3.38) of internet usage and standard deviation (1.213) Followed by use of word processing with mean score (3.35), standard deviation (1.038) and email with mean score (3.17), standard deviation (1.400).

Moderate level of knowledge indicated through the scores of six areas of ICT. Mean score of Spread sheets (2.89) Std. deviation (1.136), usage of Presentation software with mean score (2.76), Std. deviation (1.264), and usage of Graphics with mean score (2.58), Std. deviation (1.224), mean score (2.54) for Data bases and Std. deviation (1.337), mean score (2.14) in usage of Concept mapping, std. deviation (1.279), mean score (2.08) and std. deviation (1.308) in using multimedia authoring software.

The least widely use of ICT can be seen in the areas of Publishing software mean score (1.94), std. deviation (1.213), followed by programming language (1.83), std. deviation (1.272), Web page authoring software mean score (1.79), std. deviation (1.183), Micro worlds/ simulations mean score (1.78), std. deviation (1.203), modeling software mean score (1.70) and std. deviation (1.115).

Table 3
Teachers' level of knowledge on ICT
(n=100)

Items	**M**	**S.D**
Word processing	3.35	1.038
Data bases	2.54	1.337
Spread sheets	2.89	1.136

Graphics	2.58	1.224
Multimedia authoring software	2.08	1.308
Presentation software	2.76	1.264
Internet	3.38	1.213
Concept mapping	2.14	1.279
Email	3.17	1.400
Publishing software	1.94	1.213
Webpage authoring software	1.79	1.183
Programming languages	1.83	1.272
Modeling software	1.70	1.115
Micro worlds/Simulations	1.78	1.203

5. Discussion

Present study intended to investigate teachers' attitudes and level of knowledge towards integration of ICT into pedagogy. For this purpose two research questions were stated. Teachers' attitude was identified through attitude scale consists of 15 items. Results indicated that teachers show highly positive attitudes towards 9 items on the attitude scale, followed by moderate level of positive attitude towards 3 items on scale. Comparatively negative attitude was measured by low level of mean score on 3 items. Teachers who consider ICT as a creator of pressure and causes difficulties for them denying ICT integration. However these views depicted teachers' attitudes and because of their level of ICT knowledge (Kozma, 2003; Pelgrum, 2001; Garland & Noyes, 2004; Torkzadeh et al., 2006; Lim & Khine, 2006; Zhang, 2007; Paraskeva et al., 2008; Perienen, 2020). Study gives interesting findings that high percentage of teachers showed positive attitudes. These positive attitudes of teachers can be help full in integration of ICT as they are willing, motivated disposed towards ICT use although they have low level of knowledge and ICT use as it is confirmed by the findings of (Moseley & Higgins, 1999).

Findings related to second research question indicated teachers' level of knowledge and revealed that teachers have adequate knowledge about ICT in some selected areas. This includes Email, internet and word processing. However lack competencies in areas of simulations, modeling software, publishing software and programming. Lack of knowledge about ICT affects its use in the classroom and act as a barrier (Albirini, 2006). Teachers having lack of competencies in areas of ICT showed that the use of IT in teaching was limited. Low level of knowledge about ICT creates hindrances and constraints to the integration of ICT into pedagogy (Al-alwani, 2005; Empirica, 2006; Warioba et al., 2022).

6. Conclusion

This study examines the attitudes of teachers towards the use of ICT in classroom. The current study has contributed to the research about the attitudes of teachers to the use of information and communication technology in classroom. Present study contributed in existing literature about ICT integration and teachers' attitudes. This study finds out that although teachers have positive attitudes towards integration of ICT however, teachers' level of knowledge related to ICT was limited. That indicated the cause of limited integration of technology in classroom.

Studying this barrier in integration of ICT provide an insight to professional development organizations. Their investment in the area of integration of technology should be according to teachers' attitudes. As teachers is the change agent in teaching learning process. Training related to ICT tool will bring about knowledge in the use of ICT. At the result teachers will eventually resulted in increased use of ICT in classroom. In the new era of technological development teachers need to keep up with ICT development. With the very first step of training fear and low self-confidence can be reduced in implementing ICT. Once teachers have competencies and skills in area of technology and possess positive attitude they would be more eager to integrate ICT in classroom. The top beneficiaries of this integration would be students of schools. As they receive quality education and meet standards of digital age then they can stand in line with international standards.

The study recommended for future researchers to correlate teachers' knowledge about ICT and level of ICT using and learning. Further exploration of other factors need to be done that affected use of ICT in teaching and learning. Further work can be done by in-depth qualitative studies through interviews. Observation of classrooms will also be beneficial to investigate the extent of ICT use in classroom.

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