ICTs in learning: Problems faced by Pakistan

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The paper investigates the barriers to the integration of Information and Communication Technologies (ICTs) at secondary level learning in Pakistan, with special emphasis on Punjab province. Exploring major barriers to the integration of ICTs at the school level, teacher level and student level and possible enablers to these barriers is the major focus of study. Sequential mixed method design is used. Interviews were analysed qualitatively whereas survey questionnaire were analysed quantitatively. It is observed from the findings that most of the participants have positive perceptions about integration of ICTs into their teaching and learning. Administrators and ICT coordinators revealed many barriers and possible enablers to the integration of ICTs. Many of these barriers are verified by the teachers and students. Later on however there were some barriers which were not endorsed by the teachers and students.

Keywords: Information and Communication Technologies (ICTs), learning, integration, barriers, enablers

Introduction

Information and Communication Technologies (ICTs) are important addition into modern technology. ICTs include internet, television, radio, mobile, networks, etc. which are playing vital role in various fields such as health, education, entertainment. The field of education has confronted many social, cultural, technical and economical problems since the beginning of this century. The educational technology helps in eradicating these problems by developing new ways, models and technologies in order to facilitate performance of learning and teaching (Januizewski & Molenda, 2008). Modern technologies have the potential to support education across the curriculum and provide opportunities for effective communication between teachers and learners in ways that have not been possible before.

According to Toffler (1991), *"The illiterate of the 21st century, will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn"* (p.7). Jategaonkar and Babu (1995) indicated that ICTs suggests an extraordinary opportunity for the delivery of better instructional delivery styles. *"Basic Education for All", "Core Work Skills for All"* and *"Lifelong Learning for*

All*",* are the basic educational and training necessities in latest global economy as defined by the International Labour Organization (Tinio, 2003, p3).

Information and communication technologies (ICTs) came out as a mixture of actually influential tools for the advancement, change and reform in education. Enhancement in reach of education, strength gaining for the educational relevance are aided by the usage of different ICTs in order to help in converting learning and teaching into an energetic, attracting, delighting and active procedure that is attached to routine life. Despite this, introduction of ICTs into educational settings such as classroom across the world during the past few years indicates that the true actualization of the actual benefits of using ICTs is not robotic (ibid, 2003).

The successful ICTs incorporation in the system of education is composite, many-sided procedure that fully devotes to provision of ample basic principal but also the provision of technology, effective pedagogy, readiness of institutions, competency of teachers, curriculum and long-run funding, etc. In this way, new ideas and actions for the increase in information spreading and meeting

the challenges are embodied by the Information and Communication Technologies (ICTs).

There are many hurdles to the integration of ICTs both in developed and developing countries. Since Pakistan is a developing country facing numerous problems in almost every sector including education and unluckily, far behind from the race of progress. Here ICT literacy is almost zero. There is no unified policy at government level to effectively integrate technology into teaching and learning. Almost entire world is practicing modern tools and methods of teaching and learning but unfortunately here situation is not very good. Traditional methods which are almost obsolete in developed world are still being practiced. Most of the schools in rural areas of Pakistan are facing lack of physical and technical infrastructure and facilities which are supportive to ICTs. Poor school buildings, limited supply of electricity and poor telecommunication links are major problems faced by schools. Capacity-building at different areas like professional development of teachers, technical support, specialist development and content development are real challenges faced by education sector of Pakistan.

Objectives

The main objective of the present study is to assist policymakers for developing nations especially Pakistan so that they may determine a frame to integrate ICTs in teaching and learning in an effective and result oriented manner. The study first provides a general summary about the possible benefits of ICT usage in teaching and learning and then various ways of using ICT tools in education. Secondly, the study aims to address the problems in the educational use of ICTs, for example, cost, impartiality, sustainability and usefulness, etc. The study also aims to suggest remedies for key challenges that policymakers in Pakistan must consider while planning ICTs integration into teaching and learning, i.e. capacity building, administration, policy making and planning of education, content and language, infrastructure building and financial matters. The study also intends to help in identification of potential barriers to the incorporation of ICTs at secondary level learning and finding solutions for the removal of these barriers hence helping others to find ways of

progress and improvement. ICTs are *innovation* and need to be effectively employed by our educationists so conducting research in this field is really beneficial. Since effective usage of ICTs is neglected area in our educational and communication systems so present study will help in highlighting the issue as well.

Literature Review

In the past twenty years, ICTs have earned extended significance and importance. The availability of huge amount of information sources via Internet, advancements of technology in the ICT sector and an extended elasticity in enterprises and organizations have heightened the knowledge growth and information in the world (Adelsberger, Collis & Pawlowski, 2002).

According to Barnett (2001), schools should formulate a thoughtful technology plan to ascertain that there is an impact on students by the investments in ICTs. According to Patrikas and Newton (1999), it is essential to allocate enough funds to ICTs and to absolutely utilize those expenditures through careful targeting of identified needs. For this, devising a thoughtful technology plan is very crucial. An appraisal of the infrastructure, planning and use of information and communications technology (ICT) in instructing and learning was imparted by the Inspectorate during 2005-06 in primary and post-primary schools. Survey, case-study, observation and follow-up online survey were the methods of evaluation comprised of following main findings:

Computer rooms at primary level were characteristic of the bigger schools in general. Though, students' access to computers was greater where the computers were placed in classrooms whereas there is a bigger pervasion of computers within specialist rooms instead of classrooms at the post-primary level. ICT peripherals of limited range, mainly printers, scanners, and digital cameras were used in the schools. Digital projectors were found in post-primary schools. At primary level, interactive whiteboards were present only in a small number of schools. Schools having enthusiastic computer facilities for teachers reported that they are able to use more high-quality and creative teaching possessions in classrooms, (Stack, 2008).

According to Schoepp (2005), integration of ICTs into teaching and learning is a complicated process which has many difficulties. These difficulties are known as barriers. A barrier is defined as *"any condition that makes it difficult to make progress or achieve an objective",* (WordNet). According to Martin, et.al. (2004), role of instructors in effectively integrating ICTs is very much important.

Many studies explored the reasons for not using computers by the instructors, in the lessons. Rosen & Wei (1995) found many obstacles into the usage of computer by the teachers, such as *"*lack of computer availability, lack of teaching experience with ICTs, lack of ICT specialist teachers to teach students computer skills, lack of financial support, lack of on-spot support for teachers in using technology, lack of help supervising children when using computers, and lack of time required to successfully integrate technology into the curriculum*"*.

In another study, Mumtaz (2000) identified the reasons inhibiting the teachers from using ICTs in an effective manner. These include experience of instructing with ICTs, on-the-spot aid for instructors employing ICTs, financial support, monitoring learners when employing ICTs, ICT specialist instructors to instruct skills of computer to pupils and time required for incorporation of technology in the course of study.

Dawes (1999) cited in Mumtaz (2000) talked about the impression of 'teacher resistance' to change that it is widespread in the related literature and especially in work related to the incorporation of novel technology. Types of obstacles to the integration of ICTs are *"obstacles that are extrinsic to teachers"* such as "lack of access to ICTs", inadequate time for instruction planning and familiarization of teachers with ICTs, "insufficient administrative and technical support", "the deficiency of training rendered to instructors in ICT integration", (Rosen & Weil, 1995, p.30).

Several researchers indicate that one barrier that prevents teachers from using ICTs in their classes is lack of confidence. Dawes (2001) sees this as a relative factor which might act as an obstacle. Becta (2004) claims that it is proposed from major researchers that lack of confidence is a major barrier to intake ICTs in the classroom by the instructors. In Becta's survey of practitioners (2004), the problem of confidence lacking was the most responded area of the participants of the survey. Teachers' "fear of failure" is another main cause behind lack of confidence as categorically stated by the Beggs (2000). On the other hand, Balanskat et al. (2006) found that restrictions in teachers' ICT knowledge make them anxious about usage of ICT in their classroom resultantly they are not confident of using it. Similarly, Becta (2004) concluded its study with the statement: *"many teachers who do not consider themselves to be well skilled in using ICTs, feel anxious about using it in front of a class of children who perhaps know more than they do".*

In Becta's survey (2004), many of the teacher respondents who acknowledged that they are not confident enough in ICT usage and were mainly afraid of entering the classroom with limited knowledge in the area of ICTs. It was indicated that lack of experience and confidence with technology manipulate teachers' motivation regarding usage of ICTs in classes, (Cox, Preston and Cox, 1999).

Multimedia Portables for guide of instructors was very favourable in contributing to a substantial augmentation of skills related to ICTs, of a large number of instructors participated was the conclusion of the study. Same type of determinations were detected by Selinger (1996) in a study measuring the affect of lending the computers on 1000 learners at distance learning at the UK Open University on a part time initial course of teacher education (Selinger, 1996 cited in Mumtaz, 2000). It might be significant to note that any substantial association was not observed with application of ICTs by the teachers.

In Syria, for example, teachers' lack of technological competence has been cited as the main barrier (Albirini, 2006). Likewise, in Saudi Arabia, lack of ICT skills is a serious impediment to the integration of technologies into science education (Al-Alwani, 2005). Empirica (2006) developed a report on ICT usage in schools of Europe. The data used for the report came from the Head Teachers

and Classroom Teachers via Survey carried out in 27 European countries. The findings revealed that teachers who do not use computers in classrooms claim that "lack of skills" is a restricting factor, forbidding teachers from using ICTs for teaching.

Another worldwide survey conducted by Pelgrum (2001), of nationally representative samples of schools from 26 countries, found that teachers' lack of skills and knowledge is a major obstacle to using ICTs in primary and secondary schools. The results of a study conducted by Balanskat et al. (2006) have revealed that in Denmark, lot of instructors still prefer not using media and ICTs in the situations of teaching due to the reason that ICT skills are lacking by them instead of didactics/pedagogical reasons while in Holland, ICT skills and knowledge of instructors is not viewed any more as the major obstacle to the usage of ICTs. Hence lack of teacher competence and resistance to change may be the strong barriers to the integration of technologies in education.

Similarly Cavas et al. (2009) in a study revealed that young teachers having age from 20 to 35 years were more convinced postures which dissented between old age group teachers. Similarly Husing and Korte (2007) exposed that young educators are less doubtful regarding the remunerations of ICTs in learning.

European Commission report (2002) cited in Becta (2004) determined that a major factor in the usage of computer and internet is also age factor. It is found that as the teachers grow older their computer usage decreases, though it was admitted in the report that significance of this factor is slumping.

Theoretical Framework

According to Joseph Obe (2008), research and theories are directly associated by the scientific means and they can be considered as the two sides of the same coin. Any scientific affirmation requires both empirical and logical support which is aligned with real world observations. Logical support is provided by the theory whereas pragmatic or observational support is provided by the research. "Knowledge based economy", "Knowledge Gap", "Development media" and "Diffusion of innovation" theories are the founding theories in present study . Information and communication technologies (ICTs) are uprising in developing countries like Pakistan with the objective of bringing change in the mindset of local people and give them benefits of these technologies. These technologies are calling the attention of academicians and researchers. The theoretical framework intended to help understand the process of integration, diffusion and adoption of these technologies by the local people. These theories provide a conceptual framework for integration of ICTs.

Research Design / Method

The study was intended to investigate the barriers to the incorporation of Information and Communication Technologies (ICTs) at Secondary Level Learning. In order to answer the research questions, sequential mixed method design was used in the study. Both qualitative and quantitative instruments were employed.

Table 1: List of Participants (Data Sources)

Sr. No.	Data Sources	Data Collection Instrument	Types of Data Collection
1.	Administrators	Interviews	Face-to-face interviews
1a.	ICT Coordinators	Interviews	Email interviews
2.	Secondary School Teachers	Questionnaire 1	Likert-type questionnaire
3.	Secondary School Students	Questionnaire 2	Likert-type questionnaire

Population of the study

ICT Coordinators, Administrators, secondary school teachers and students of Punjab province were the segment of population.

Sample

Two types of schools were selected for this purpose, i.e. private schools and NGO based schools located at Lahore, Muridke, Phool Nagar, Sheikhupura, Manhala and Islamabad based commercial organization working in ICTs.

Instrumentation

Data were collected in two forms, i.e. through interviews from administrators and ICT coordinators. Collected data were carefully examined and used for next part of instrumentation, i.e. survey designing. Likert-type scale was used for data collection from secondary school teachers and students. Schools where ICT infrastructure was available and they voluntarily agreed to participate in the study were selected for data collection. Initially 20 schools' administrators / ICT coordinators were contacted for interviews through purposeful sampling approach and out of these only 4 agreed for face-to-face interviews whereas 6 answered interview questions via email.

Research Questions

Administrators/ICT coordinators of these schools were interviewed through email and face-to-face whereas survey questionnaires were framed for secondary level teachers and students in order to solicit answer to following questions:

RQ1. What are the barriers to the integration of ICTs at secondary level learning?

RQ2. What procedures should be adopted for enhancing integration of ICTs?

Data analysis

It was revealed through analysis of responses from all the participants of study that a variety of barriers exist at their level. Also possible solutions for the removal of these barriers were suggested by them. Grounded Theory was applied for analysis of interview data gathered from ICT Coordinators / Supervisors of the schools. Responses were identified first which were categorized and grouped as per views of the respondents. Later on the results were categorized by main barriers and possible enablers.

Qualitative Analysis

ICT Coordinators / Supervisors were required to tell about the goals, importance of ICTs, integration category, i.e. as a subject or as a tool, major barriers, possible solutions to these barriers and plan of action of their organizations to overcome these barriers. They were interviewed for this purpose as per their convenience. Some respondents agreed for face to face interviews whereas majority of respondents preferred to respond interview questions through email. Interview questions were emailed to them and their responses were gathered, categorized and represented in following table:

Table 2: List of barriers revealed by ICT coordinators / supervisors

Lack of financial resources		Bad internet connections
English Language barrier		Illiterate family background
Economic hurdles		Security of ICT equipments
Excessive failure of electricity		Time shortage for teachers
Lack of background support		Ineffective examination system
Non familiarity of teachers with ICTs		Lack of training
Lack of motivation		Shortage of skilled persons
Embarrassment of teachers from far advanced learners		Reluctance / Unwillingness of teachers, staff and parents

Further they were also required to suggest possible enablers to overcome the barriers faced by their institutions. Many enablers were suggested by the ICT coordinators / supervisors which they think can enhance integration. List of enablers is tabulated as under:

Table 3: List of possible enablers revealed by ICT coordinators / supervisors

	Providing monetary and technical support to schools	Making examination system more interactive so that it can encourage usage of ICTs.
	Financial support from Government	Teacher training at large
	Providing better / alternate internet connections (though it adds to costs)	Training master teachers on ICT applications
	Constant training and motivational sessions	Training subject teachers by Master Teachers
	Offering incentive scheme for teachers	Providing uninterrupted electricity
	Making ICT usage essential	Making ICT interesting for respondents
	Creating and enhancing awareness	Enhancing motivational sessions
	Hiring skilful professionals	Altering curriculum

ICT Coordinator of commercial organization while revealing possible solutions for removing the barriers stated that, *"we have initially started the integration process as an awareness campaign followed by frequent service demonstrations and presentations with schools, colleges, teachers and students. One of our TeleCenter established in Gujar Khan is serving the same purpose, where people (Students, teachers and General public) visit to interact and explore the system"*.

Quantitative Analysis

The second phase was that of quantitative research, with distribution of 220 questionnaires among the randomly selected teachers and 600 questionnaires among students of private and NGO based schools. On the basis of findings of qualitative data the following hypothesis were framed:

HO- 1) Overcrowded classes 2) Insufficient time for integrated classes 3) ineffective use of computers are not main barriers in ICT integration at secondary level

ICT integration is the dependent variable whereas the above three factors are independent variables.

Survey questionnaires were distributed among teachers and students since interviewing such a large number of respondents was not workable. Questionnaires were distributed to 220 teachers, out of which 90 were filled and returned. Most of the participated teachers had a vast experience. As

concerned with the age of the teachers, 32 were less than 30 years old whereas 34 teachers were 30 to 39 years old. 16 teachers were 40 plus years old whereas 8 teachers had not mentioned their age. Majority of teachers participated in the study, i.e. 60% were female. There were 52 teachers from formal schools and 38 from NGO based schools. A large number of teachers, i.e. 85 were having computer at their homes out of them 71 were using their home computer for studies.

Similarly, 600 questionnaires were distributed among students, out of which 472 were filled and returned. Most of the students, i.e. 65% were from 9th class whereas 32% were from 10th class and 3% were from O-Level. As age of students is concerned, 5.7% were up to 13 years old, 32.6% of 14 years old, 30.9% of 15 years old, 13.3% of 16 years old, 4.7% of 17 years old. There were 12.3% students who were 18 and above years old. Only 2 students concealed their age. Majority of students, i.e. 283 were male whereas 23 students disguised their gender. 220 students belonged to NGO based schools and 252 were from formal schools. A vast majority of students, i.e. 78% were having computer at their homes out of them only 61% were using their home computer for studies.

Almost all teachers were of the view that course contents are appropriate for ICT integration. Mean score, i.e. 3.78 with standard deviation of only .921 confirmed that majority of teachers were in favour of the statement. When teachers were required to tell that whether they feel fear while using computer in class, a dispersed view appeared. Majority of

teachers, i.e. 61% were not feeling any fear whereas 19% teachers were feeling fear while using computer in class. 20% of teachers remained neutral or they cloaked their opinion.

Since lack of motivation of teachers was another major barriers revealed by the ICT Coordinators / Administrators. When asked from teachers, 85.5% were agreed that they are motivated before using ICTs in class whereas only 2 teachers believed that motivation is not important. It is clearly visible from mean score of 4.30 with standard deviation of .814 only. When teachers were required to respond that whether pre-service training of computer usage is essential, a vast majority of them, i.e. 81.2% were either agree or strongly agree to the statement. Only 5.5% teachers were of the view that pre-service training of computer usage is not essential. Mean score was 4.2 with standard deviation of .914 only which confirmed that majority of teachers are in favour and data is not much scattered as well. Similarly in-service training is beneficial as confirmed by majority of teachers, i.e. 81% were in favour whereas only 2.2% were not in favour of the statement. Mean score, i.e. 4.12 with standard deviation of .805 also confirmed that in-service training of ICTs is beneficial.

When asked about class time that whether it is enough for effective computer aided teaching, majority of teachers, i.e. 65.6% were of the view that class time is not enough whereas only 17.8% were of the view that class time is enough. 16.7% teachers were neutral or they failed to respond the statement. Teachers from NGO based schools were largely in favour of the statement, i.e. 73.7% comparatively to teachers from formal schools, i.e. 59.6%. Similarly 70% teachers believe that classes are over-crowded due to which ICT integration is difficult. Only 11 teachers disagreed to the statement. For majority of female teachers (44%) as compared to male teachers (25%) classes are over-crowded due to which effective integration of ICT is not easy.

71% teachers think that administrative support is very important and available to them, 11% were on the opposite side whereas 17.8% remained neutral. A large number of teachers (32%) disguised their opinion or they remained neutral about immediate rectification / replacement of ICT equipments

whereas according to 20% teachers, immediate rectification / replacement of equipments was not available in their schools. Majority of teachers, i.e. 77.7% confirmed that using educational software is very beneficial. Only 8.9% were against the statement. Teachers having 1 to 5 years experience were largely (82.1%) in favour of the statement that using education software is very beneficial.

Forty eight teachers confirmed that educational software was easily available to them. 22 teachers said that educational software was not easily available as they disagreed to the statement. 20 teachers concealed their views as they remained neutral or they failed to respond to the statement. 38.9% teachers were in favour of the statement that negative attitude towards computer exists in parents whereas 40% consider that negative attitude towards computer did not exist in parents. 21% were neutral or they did not respond. 27 teachers think that learners are reluctant to computer aided classes whereas 37 teachers think otherwise. 26 teachers are neutral. Similarly majority of teachers below 30 years and above 40 years of age were not in favour whereas majority of teachers between 30 to 39 years of age were in favour of the statement. Male teachers who were in favour and against are almost equal whereas majority of female teachers were not in favour of the statement. Majority of teachers from NGO based schools were not in favour whereas majority of teachers from formal schools were in favour of the statement.

Some questions were asked regarding enablers or rectification of barriers. Teachers were required to give their feedback on some predetermined enablers. Such as when asked that whether creating technology plan can help removing these barriers, 83% teachers favoured whereas only 3% were disagree to that. Male teachers mostly agreed whereas female teachers' responses were almost equal. When asked that for effective ICT integration incentives should be provided to teachers, 76 teachers agreed to that whereas only 1 teacher denied as evident from mean score, i.e. 4.28 with standard deviation of .750.

Likewise 73% teachers agreed that course load should be decreased whereas 10 teachers disagreed the decreasing of course load. 79 teachers agreed

that course contents should be revised / updated. 93% teachers think that computer labs should be updated. 68 teachers favoured that ICT related courses should be increased which means that they were not satisfied with ICT related courses, already offered in their respective schools. 82.2% teachers were in favour whereas only 4.4% teachers were not in favour of the statement that training opportunities should be enhanced.

For 59% students, class time for computer aided lessons was not enough whereas 22.8% students were neutral or they concealed their opinion. Only 15% students were satisfied with the class time for computer aided lessons. Majority of students, i.e.73.7% confirmed that internet facility is provided in the labs whereas only 17.4% students were of the view that internet facility is not provided. 8.9% students were neutral. 60.3% students agreed that computers in schools are easily accessible / available to them whereas 29.9% disagreed and 9.7% were neutral. 43% students feel fear of non-functioning while using computers whereas 40.5% don't feel any such fear.16.5% were neutral to the item. Majority of 9th class students feel fear of non-functioning while using computer whereas 10th class students who feel fear of non-functioning and who don't feel fear were almost equal. Majority of O-level students don't feel fear of non-functioning.

51.2% students agreed that computers are repaired / replaced easily when they become out of order whereas 27.1% responded otherwise. 21.6% students were neutral or they don't know. Majority of students from all three classes, i.e. 9th, 10th and O-level were in favour of the statement, i.e. 52.7%, 47.1% and 66.7% respectively. Similarly majority of students from all age groups were in favour of the statement. 51.1% male students and 49.4% female students were in favour whereas 23.7% male and 34.4% female students were not in favour of the statement. 25.4% male students and 16.3% female students were neutral to the statement.

46% students agreed that computers in the lab are not sufficient. Only 36.7% disagreed and 17.4% remained neutral to the item. When asked whether teachers are excited or not for using ICTs in the class, 37% students confirmed that teachers are not excited whereas 41.7% disagreed and 21.3% remained neutral. Views of 9th class students were equally bifurcated whereas majority of 10th class and O-level students disapproved the statement. Whereas replying to similar question that teachers are not comfortable while using ICTs in the class, 213 students disagreed, 117 were neutral and 142 students agreed that it is so. Majority of students from all three classes disapproved the statement as they were either strongly disagree or disagree whereas 16 years old students approved the statement.

When asked whether the teachers are not well trained, large number of students i.e. 294 disagreed, 95 students agreed and 83 students were neutral. Majority of all class students, i.e. 181 of 9th class, 103 of 10th class and 10 O-level students were not in favour of the statement. 68.2% students disagreed that teachers are not helpful whereas only 18.9% students agreed that they are not helpful. 59.4% male students whereas 86.1% female students disapproved the statement. Majority of students, i.e. 58.1% disagreed that they face negative attitude from teachers, only 25.6% students agreed and 16.3% were neutral. Students from all classes and all age group students mostly disapproved the statement. 31.1% male students and 15% female students were in favour of the statement whereas 50.6% male students and 71.7% female students were not in favour of the statement.

Similarly, 48.7% students disagreed that teachers resist to computer aided teaching, only 28.4% students agreed. 22.9% students were neutral.

Likewise, according to 46.8% students staff doesn't resist to computer aided teaching, 25% students were neutral. Whereas for 28.1% students there is resistance to computer aided teaching from staff. Similarly, 26.2% students were of the view that they have to face negative attitude from staff too. For majority of students, i.e. 42.8% computer aided classes are over-crowded due to integration of ICTs becomes difficult.

Similarly, 48.4% students agreed that computer is not effectively used in the classes whereas 32.8% students disagreed and 18.9% remained neutral or they concealed their opinion.

For majority of students, i.e. 56.5% English language is not a barrier in computer aided classes

whereas a reasonable number of students (26.9%) consider English language as a barrier. For majority of male students comparatively to female students this barrier exists.

Similarly majority of students, i.e. 57.6% disagreed that their parents are indifferent to their computer usage whereas 17.6% students remained neutral or they denied to respond. A reasonable

number of students, i.e. 24.7% were of the view that their parents are not supportive and indifferent to their usage of computer.

Hypothesis 1 was "overcrowded classes" are one of the major barriers to the integration of ICTs. As evident from above detailed data and applying statistical tools as under, this hypothesis approved and null hypothesis.

Table 4: Over-crowded classes

	Observed N	Expected N	Residual	Test Statistics	
Strongly Disagree	4	18.0	-14.0	Chi-Square	41.444[a]
Disagree	7	18.0	-11.0	Df	4
Neutral/Don't Know	16	18.0	-2.0	Asymp. Sig.	.000
Agree	37	18.0	19.0	**Conclusion:**	
Strongly Agree	26	18.0	8.0	Since Chi-Square=41.44 lies in the critical region. So, reject H0.	
Total	90				

Similarly Hypothesis 2 was "insufficient time form computer aided classes". As evident from above detailed data and applying statistical tools as

under, this hypothesis approved and null hypothesis (H0) is rejected.

Table 5: Insufficient time for integrated classes

	Observed N	Expected N	Residual	Test Statistics	
Strongly Disagree	2	18.0	-16.0	Chi-Square	47.667[a]
Disagree	14	18.0	-4.0	Df	4
Neutral/Don't Know	15	18.0	-3.0	Asymp. Sig.	.000
Agree	42	18.0	24.0	**Conclusion:**	
Strongly Agree	17	18.0	-1.0	Since Chi-Square=47.66 lies in the critical region. So, reject H0.	
Total	90				

Hypothesis 3 was ineffective use of computer in classes is another barrier to the integration of ICTs. As evident from above detailed data and applying

statistical tools as under, this hypothesis approved and null hypothesis (H0) is disapproved.

Table 6: Ineffective use of computer in classes

	Observed N	Expected N	Residual	Test Statistics	
Strongly Disagree	53	94.4	-41.4	Chi-Square	27.216[a]
Disagree	102	94.4	7.6	df	4
Neutral/Don't Know	89	94.4	-5.4	Asymp. Sig.	.000
Agree	114	94.4	19.6	**Conclusion:**	
Strongly Agree	114	94.4	19.6	Since Chi-Square=27.21 lies in the critical region. So, reject H0.	
Total	472				

RQ1 is what are the barriers to the integration of ICTs at secondary level learning?

The answer is that there are a number of barriers to the integration of Information and Communication Technologies (ICTs) at various levels, i.e. administration level, teacher level and student level as revealed by the respondents. Almost all administrator and coordinators confirmed that access to ICT resources is the major problematic area. There is also problem with the existing curriculum. Majority of respondents were of the view that the curriculum which is the basic framework of education is static and does not cater modern tools and techniques such as computer, internet, e-learning, etc. ICTs are not being taught as a tool of pedagogy in most of the schools rather computer as a separate subject is taught. Lack of financial resources is the most problematic area for schools as revealed by almost all participants of the study. Since ICT equipments are very costly so schools find it difficult to apply it effectively into education. Many other barriers revealed by the respondents of the study are resistance to change, shortage of skilled staff, ineffective examination system, bad internet connections, unproductive curriculum, excessive failures of electricity, lack of motivation, confidence and competence by the teachers and staff, time shortage, English language, lack of training, fear of technology, illiterate family background of teachers and learners, etc. However majority of teachers rejected the view that they feel fear while using computer in class and there was scattered view regarding negative attitude of parents.

RQ2 is what procedures should be adopted for enhancing integration of ICTs?

The first thing that the participants emphasized was enhancing training opportunities for both teachers and learners. School heads also be trained. Making ICT interesting for students could help in enhancing the integration of ICTs. ICTs may be made compulsory to achieve better results. By making education of ICTs compulsory, it is expected that this step would help in enhancing the integration of ICTs. It was found that shortage of funds was the most problematic area into the effective integration of ICTs. Offering incentives to teachers and students was suggested. It was found that our examination system is not supportive to productive activities. It was suggested that it must be updated and revised in order to incorporate modern methodologies and techniques.

A teacher suggested following steps:
1. *Increase of practical*
2. *Shift to E-based assignments*
3. *Discussing gadgetry with students*
4. *Creating a more interactive learning environment with use of internet, blogs etc. and*
5. *To establish a do-it-yourself attitude amongst students*

Similarly the administrators and ICT Coordinators were required to reveal an action plan of their organization for enhancing integration of ICTs and removing the barriers faced by them. It was suggested that state of the art ICT systems that include labs and student management systems may be inducted.

Conclusion

ICTs have enormous benefits in every field of life where it has been employed. The education sector has benefitted a lot from the ICTs in developed world whereas developing countries are on the way to fully integrate it into their education systems. Turkey is the major example from developing countries where ICTs are being implemented at major level. Pakistan is far behind in the integration process and a poor ICT-related development is observed. There are numerous hurdles in the effective integration of ICTs into education, especially the school level education. The study was carried out to explore these barriers and come up with possible solutions so that integration process may be geared up and benefits may be solicited. The study focused majority of stakeholders of education, i.e. school administrators, ICT coordinators, teachers and students which are crucial to successful implementation of tools of change and progress. All of the respondents confirmed that the utilization of ICTs is beneficial, result oriented and valuable for the overall improvement of the education sector especially secondary level learning. Provision of basic infrastructure, curriculum up gradation and teachers' training are the preferred areas of focus. Respondents of the study largely confirmed the presence of barriers at various levels of teaching and learning.

Recommendations

Based on the findings and discussions presented in preceding chapters, several recommendations are offered. Future research is needed to verify the effectiveness of the following recommendations and to identify other important ones:

- Awareness among teacher educators and prospective teachers regarding benefits of ICTs should be created.
- Technology plans should be devised for implementing ICTs in schools.
- ICTs may be made interesting for the teachers and learners.
- Use of ICTs should be made compulsory at certain occasions.
- Awareness campaigns may be launched followed by frequent service demonstrations and presentations with schools, teachers and students.

- Reasonably skilled persons may be hired.
- The teachers who integrate ICTs in their classes should be supported (i.e., through incentive payments).
- Teachers should act as role models for learners by using ICTs in their courses.
- Monetary and technical support should be provided to schools.
- Quantity and quality of pre-service and in-service teachers' training of ICTs may be improved.
- School heads should be trained on the basics of teaching with technology.
- Master teachers may be trained for applying ICTs.
- Subject teachers should be trained by the master teachers.
- Examination system may be made more interactive so that it can encourage usage of ICTs.
- Financial support from the Govt. can make the difference which should be provided to schools.
- Motivational sessions should be conducted for school heads, teachers and learners.
- Alternate / better internet connections (though it adds to costs) should be provided.
- Computer labs should be updated.
- Alternate energy / UPS in labs should be provided.
- Curriculum should be altered keeping in view modern trends and practices.
- Course contents should be redesigned to acquire more benefits from ICTs.
- Students' portals, websites for sharing the views and ideas should be created.
- E-based assignments should be preferred instead of paper based assignments.
- More interactive learning environment (by using internet, blogs etc.) should be developed.
- Do-it-yourself attitude should be developed amongst learners.
- Local languages (Urdu, Punjabi, Pushto, etc.) should be used for the ease of teachers and learners.
- Course load should be lessened.
- More time should be allocated for ICTs integrated classes.
- At least one computer with internet access and an LCD projector should be provided in every class.

- More ICT-related courses should be offered for teachers and learners.
- Every ICT-related course should be practice-oriented.
- ICT-related courses should be included in teachers' training of prospective teachers.

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