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Hindering and enabling factors towards ICT integration in schools: A developing country perspective

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Abstract: ICT in education has emerged as a widespread phenomenon and has been widely considered and explored. While remarkable achievement in ICT use in the teaching and learning process has been observed in the developed part of the world, schools in the developing countries still fail to do so. Pakistan, as a less developed country, has still been in its infancy stage of ICT integration in schools. The purpose of this paper was thus, to explore the existing state of affairs in relation to ICT integration in schools via reviewing both the hindering and enabling factors. The study employed a systemic review method to review the available research, conducted in Pakistan, in the last ten years. The results inform about several fundamental issues and provide a way forward towards effective ICT integration in the process of teaching and learning.

Keywords: Information Communication Technology (ICT), ICT integration, Teaching and Learning, Developing world

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INTRODUCTION

ICT integration in education generally refers to technology-based teaching and learning processes that involve the proper utilization of technology in schools (Warwick & Kershner, 2008). Williams (2003) considers using any of the ICT tools like the internet, CD ROMs, or other software, for example, MS excel to assist instructions, as ICT integration. ICT integrated or technology-based teaching and learning is found to offer various exciting ways which include educational videos, stimulation, storage of data, the usage of databases, mind-mapping, guided discovery, brainstorming, music, and world-wide-web (www) that lead to making the learning process more exciting and meaningful (Finger & Trinidad, 2002). ICT in education is any technology that deals with knowledge sharing or, in other words, a means of communication in the teaching and learning process. Technology, in the context of education, according to Churchill (2006), is understood as a set of tools and resources that amplify individuals' physical and intellectual capacity.

The aim and purpose of using technology in the process of teaching and learning are to improve and increase the quality, accessibility, and cost-efficiency of the delivery of education (Schrum & Levin, 2016). ICT use in school and, more specifically, in the classroom setting is very crucial to enhance teaching and learning processes. The use of ICT as teaching and learning resources is significantly associated with a measurable increase in students' achievement (Kisirkoi, 2015). Effective ICT integration is found with significant impacts on students as they become confident after being engaged with ICT tools and, more importantly, work together with teachers as co-learners (Grabe & Grabe, 2007). The aspect of co-learning informs bout ICT integration as an effective instructional means towards enhancing students' learning via creating a learner-centered environment within the school. Kim (2009) probing about students' skills that ICT integration enhances, states that effective ICT integration promotes students' critical thinking and problem-solving skills that enable successful living. The same, as an instructional media, does not only enhance student learning outcomes but also helps significantly in preparing them for the challenges of the globalization in the 21st century (Lim, 2002) via improving their higher order thinking to construct and process knowledge (Kisirkoi, 2015). In realization with its effectiveness in teaching

and learning ICT integration, in recent years, earns serious and considerable recognition worldwide and is widely explored (Egea, 2014; Harris & Hofer, 2011; Horzum, 2013; Mishra & Koehler, 2006; Razzak, 2013, Rosenberg & Koehler, 2015; Swan & Hofer, 2011).

The effectiveness of ICT integration has resulted in requiring teachers with more skills and knowledge. As a result, an apex of discussion is the introduction of a newer form of skills referred to as technological pedagogical content knowledge (TPCK) (Koehler & Mishra, 2006). Koehler and Mishra inform about TPCK as teachers' capacity of ICT integration via considering both the value and alignment of ICT tools with the content knowledge of a particular subject or curriculum objectives in general. Their introduction to TPCK leads to generate discourse about looking into ICT integration from the perspective of achieving the ultimate objectives of a subject or curriculum as a whole. So, both the process of ICT integration and the achievement of curriculum objectives earn equal consideration. Having only ICT expertise or technical knowledge of ICT resources may not help to achieve the purpose of effective ICT integration in teaching and learning.

At instances, in schools in Pakistan, research (e.g., Qadir & Hameed, 2014) informs about ICT being taught as a subject rather than an instructional tool. Such behavior towards ICT integration remains very much alarming and shows schools' incapability to deal with ICT integration for attaining curriculum objectives. Similarly, schools across the globe, confront with and struggle to face challenges impeding ICT integration. Research studies, from across the world (Samin & Sani, 2015; Niekerk & Blignaut, 2014; Agbatogun, 2012) and in the context of Pakistan, (Kanwal, Jan & Azharl, 2014; Nisar, Munir & Shad, 2011) underpin certain challenges hindering ICT integration in teaching and learning. Despite all the challenges, studies (Hassan & Sajid, 2013; Majoka, Fazal & Khan 2013), for example, still observe a significant improvement in teachers' skills of ICT integration once their capacity was enhanced. Nisar, Munir and Shad (2011) finds noteworthy development in students' learning outcomes as a result of teachers' engagement in ICT integration in teaching and learning. The integration of ICT positively associated with improved students' learning outcomes informs that despite the challenges, ICT integration in schools in Pakistan can still bear fruit. Despite several research studies, aiming to find the usefulness of ICT integration (e.g., Qadir & Hameed, 2014; Nisar, Munir & Shad, 2011) and challenges associated with its use (e.g., Hassan & Sajid, 2013) have been conducted, yet an effort to review the available literature in Pakistan, in this regard, has not been made. Most importantly, ICT integration-related research has not investigated the factors that can enable ICT Integration in schools in Pakistan. Through the literature review process, this paper aims to fill such research gaps and to help identify both impairing and supporting factors in the integration of ICT into schools in Pakistan.

Background

Less ICT use in developing parts of the world, including Pakistan, has broadened the gap of the digital divide. ICT-led reforms and initiatives promise to nip up the digital divide and speed up business development, and above all, to foster quality education (Mujahid 2002). The importance of ICT integration in education has been gradually realized and well recognized by Pakistan. Specific policy-level initiatives, for example, Pakistan's Medium-Term Development Framework 2005-2010, Vision 2030 and National ICT strategy are the key efforts that portray a realization of ICT use in education and the process of teaching and learning.

Realizing the importance of ICT integration, the National Education Policy (NEP- 2009) is cognizant of the need for integrating ICT in the educational system. It stipulates the use of ICT as "...to assist teachers and students with a wide range of abilities and from varied socioeconomic backgrounds" and "...to strengthen the quality of teaching and educational management" (p.45). It further informs that the "use of Information Communication Technologies (ICTs) in Education shall be promoted in line with the National Information and Communication Technology Strategy for Education in Pakistan [NICTSEP]" (p.45). NICTSEP recommends the use of ICT to strengthen the quality of teaching to enhance student learning.

METHOD

This paper utilized a descriptive qualitative form of a systematic review of research (Hallinger, 2013; Gough, Oliver, & Thomas, 2012). Systematic review aimed at identifying relevant studies and assessing their validity when reaching a conclusion (Petticrew, & Rberts, 2006). One of the key characteristics of a systematic review, like Dexter and Dornan (2010) inform, was to help in answering the questions regarding the phenomena under investigation. A systematic review, being guided by a formulated question or purpose, and encouraging a transparent method of research, as supported by Langan, Blake, and Lonsdale (2013), was highly relevant for this review. In this review, the key question at the back of the mind was what hinders and enables ICT integration in schools in Pakistan. It was the clarity of the purpose that led the researchers to identify and select relevant research. This systematic review consisted of four steps. These, as illustrated in figure 1, included inclusion criteria, search strategy, and summarizing and reporting results.

Inclusion criteria

The primary purpose of this exploratory review of research was to investigate the existing state of affairs of ICT integration by identifying enabling and hindering factors. The selection of literature was guided by this very purpose and was identified based on ICT relevant work, conducted in Pakistan as a developing country. The review included research studies published in international journals and conference proceedings. The selection of school level ICT integration was one of the critical inclusion criteria. The time frame, as a prominent aspect of a systematic review (Parahoo, 2006), was selected as the last ten years. So, articles published in 2010 onwards, in any journal or conference proceedings, were included in the search criteria. Overall, 15 studies were found, fulfilling the set criteria related to factors enabling and or hindering ICT integration. However, four of them were dropped because they were conducted in higher education settings rather than at school level.

Table 1. *Inclusion criteria*

S.No	Inclusion Criteria
1	Empirical research published in international journals and conference proceedings
2	Research related to school level ICT integration
3	Research conducted since 2010 onwards

Search strategy

Following set criteria, the literature search was done. So, a full range of studies was downloaded accessing prominent research databases, like google scholar. This search was further supplemented by an extensive manual search across relevant journals in the field of educational technology and through the university library subscribed databases with using staff and student passwords. Searching of the relevant literature was made through specific keywords (Ely & Scott, 2007) like ICT integration in developing countries, ICT integration in teaching and learning, factors associated with ICT integration, challenges associated with ICT integration, and ICT integration in developing world.

Summarizing

The analysis of the literature involved reading articles' summary or abstract to know the purpose of the articles. All the reviewed literature was grouped by type of sources. After literature was selected and finalized, the content of all the literature was critically reviewed. For a properly structured analysis of the literature, Cohen's (1990) PQRS (Preview, Question, Read, and Summarize) system was employed. More importantly, the factors highlighted in the study in

relation to hindering ICT integration were also summarized. Meanwhile, researchers also included their comments on the critical thoughts of the studies. The final stage involved writing a summary of each article, which included key thoughts, comments, and issues related to ICT integration.

Reporting the results

The results obtained from the review are reported in narration under the headings of enabling and hindering factors. A frequency table is also presented to provide more clarity of hindering and enabling factors. The table depicts the intensity of factors in terms of its frequency and percentage identified by the previous studies. Moreover, the summarized table is also presented at the end of results to portray a comprehensive and concise view of the previous studies (Table 2).

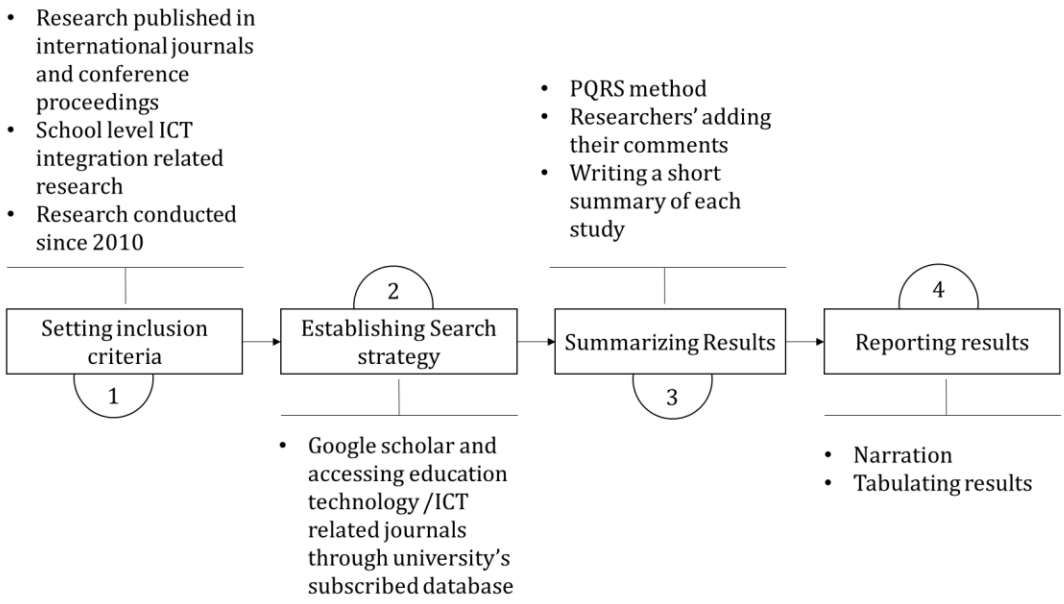

Figure 1. *Summary of methodology*

Ethical Considerations

The existing research was treated accurately and reasonably to ensure the ethical dimension. The ethical parameters involved reporting the data concerning the topic under review. The ethical consideration of being honest and fair with using research findings accurately was maintained throughout the process of completing this review.

FINDINGS

A systematic review of the literature finds enormous challenges that schools in Pakistan are confronted with while integrating ICT in teaching and learning. There also revealed certain insights towards effective ICT integration. This section presents the current scenario of ICT integration along with highlighting the challenges and enablers towards ICT integration in schools in Pakistan. Table 2 presents a detailed summary of both hindering and enabling factors identified by all the research studies conducted in Pakistan. Frequency and percentage of each factor report the intensity of factors. The results show the non-availability of ICT resources, teachers' incapability of using ICT resources as the most dominant hindering factors. Amongst the studies, 73% inform about these two as dominant challenges related to ICT integration. Access to ICT resources has been identified by 64% of the studies as a hindering factor. Studies (27%) reported the lack of ICT

policy in the schools, while others (18%) reported a lack of support and a reluctance on the part of teachers to use ICT. The provision of ICT resources and enhancing teachers' capacity for ICT use has been suggested by 73% of the studies as a critical enabling factor towards ICT integration in schools in the country. The following section describes all these findings in detail.

ICT integration in public schools in Pakistan

Research in most of the developing countries for example in Pakistan Jogezai, Ismail and Ahmed (2016), Jogezai, Ismail and Baloch (2018) Kenya (Kirskoi, 2015), South Africa (Niekerk & Blignaut, 2014; Ramorola, 2013), Tanzania (Mwalongo, 2011), inform about their countries to have invested a lot into integrating ICT in the process of teaching and learning. Considerable attention of the state governments, policymakers, educational authorities, and research has highly underpinned ICT integration. Since 2011 a sizeable research (e.g., Jogezai, Ismail & Baloch, 2018; Kanwal, Jan & Azhar, 2014; Qadir & Hameed 2014; Tunio, Rashid & Abro, 2013; Shaikh & Khoja, 2013; Adil, Masood & Ahmed, 2013; Majoka, Fazal & Khan 2013; Hassan,2013; Hassan & Sajid, 2012; Nisar, Munir & Shad, 2011) has been conducted in Pakistan in this regard. Concerning ICT integration in the process of teaching and learning, research though finds significant outcomes in terms of student learning, but most of them find ICT integration in schools far behind the desired level. Research (Kanwal, Jan & Azhar, 2014; Qadir & Hameed 2014; Tunio, Arshad & Abro, 2013; Shaikh & Khoja, 2013; Adil, Masood & Ahmed, 2013; Majoka, Fazal & Khan 2013; Hassan & Sajid, 2012; Nisar, Munir & Shad, 2011) also underpin certain factors that hinder ICT integration in schools. Most of the studies, other than Shaikh and Khoja (2013) and Adil, Masood and Ahmed (2013), investigate about ICT integration in schools. The studies conducted in the context of schools find certain factors being responsible for hindering ICT integration in the process of teaching and learning in schools in Pakistan.

Hindering factors associated with ICT integration

Kanwal, Jan, and Azhar (2014) find that schools have improper and insufficient ICT resources at the upfront with less or no skills of teachers towards their use in the process of teaching and learning. The same, according to them, hamper the implementation of ICT integration. They found teachers with little knowledge of ICT crippled with very minimal ability to use it in teaching and learning. Their study reveals teacher inefficacy and non-availability, of ICT resources, as key factors that, according to them, hinder ICT integration.

Qadir and Hameed (2014) also find that shortage of time for teachers, lack of confidence, and access to resources all affected the use of ICT in secondary schools in the Punjab province of Pakistan. It was found that in schools where ICT facilities were provided, only ICT teachers used computers in their teaching and learning as other subject teachers were not trained and hence were not able to do so. More interestingly, the study also finds that only those students were using computers in the IT Lab who were studying computer science. It only describes the ICT being still considered as a separate subject rather than a learning tool due to teachers' unawareness with regards to ICT integration in teaching and learning. As a result, as they argue, ICT integration in such a scenario was not made effective but somewhat limited to ICT teachers and students, which discouraged other teachers from using the same as means of learning.

The study of Majoka, Fazal and Khan (2013) aims to explore the implementation of ICT in education in teacher training programs in the Khyber Pakthunkhwa, and Punjab provinces of Pakistan find that only ICT teachers were able to use ICT. According to their findings, the same teachers were engaged in professional development programs while other teachers, in contrast, were neither engaged in such programs nor were able to use these tools in their pedagogical practices.

Hassan and Sajid (2012) find access to ICT resources as a significant problematic area crippled with teachers' inability to using ICT in their teaching practices. They also mention in their

study that ICT was treated as a separate subject rather than a learning tool. The reason for teachers being unable to use ICT, according to them, was teachers' detachment from any ICT integration-related capacity building program. Alternatively, in other words, they had no professional development opportunities available about ICT integration. Consequently, teachers were even not ready to use the available ICT tools in their teaching and learning. Their findings, though, highlight the non-availability of ICT resources as a hindering factor, but at the same time, teachers' ICT inefficacy did not allow them to use those resources.

Adil, Munir and Shad (2013), while investigating age and gender association with ICT usage into educational institutions of Pakistan, finds no difference to change in the category of gender with relation to the use of ICT. Their findings inform about both male and female teachers with equal ICT integration inefficacy. They have come up with some interesting findings related to age and use of ICT as they found that the younger was a teacher; the more ICT integration was observed. It reveals younger teachers being more inclined towards and interested in using ICT in their teaching practices.

Rahim, Begum, and Sahar (2013), while exploring about ICTs in education for the Mountainous Area Development through an application-based study of Gilgit Pakistan revealed that ICT awareness level, especially in Government schools, was shallow and schools had computers with old infrastructure. The non-availability of ICT resources, as almost all the studies have highlighted as a hindering factor, makes a big difference. However, in instances despite the availability of ICT resources, teachers were not able to initiate with ICT integration (Jogezai et al. 2018). The reason associated with ICT not being used by teachers was their nonawareness and lack of information about ICT tools and its use in teaching and learning. So, access to ICT resources, as proposed by Pernia (2003), may not be considered only allowing teachers to use specific ICT resources, but access, in a real sense, needs to be interpreted concerning teacher's ICT knowledge and skills. Otherwise, access in only physical terms and provision of ICT resources in such a scenario may only be associated with dumping ICT material at schools.

Similarly, a regional survey (2010) conducted about ICT for Education in India and South Asia finds a dearth of quality teachers as a significant hindering factor towards ICT based teaching and learning at schools in the region. With limited access to ICT facilities, for example, they found internet access being limited that left minimal scope to use it to increase literacy levels in these underprivileged areas. ICT usage in government schools was observed extremely low.

Thus, so far, the review of literature transpires non-availability of and accessibility to ICT resources and teachers' skills as key challenges that hinder ICT integration in the process of teaching and learning. Existence of no or little ICT related knowledge and skills, as Jamieson (2013) argue, cause fear and frustration amongst teachers in using ICT resources while teaching. They found that teachers' lack of such skills was a significant problem in this regard as teachers got discouraged from being unable to integrate ICT. Such inefficiency of teacher skills exists at the level of understanding of the ICT resources and less or minimal knowledge of integrating ICT as a tool for learning to deliver their lessons. Findings from across Europe (Winzernried et al. 2010), North America (Hermans, Tondeur, Braak. & Valcke, 2008) and Asia (Simin & Sani 2015) also inform that majority of the teachers had minimal ICT knowledge and the same reveals as one of the most prominent factors that prevent the use of ICT in teaching and learning in schools in Pakistan.

Enabling factors associated with ICT integration

Making ICT resources available and accessible to teachers is one aspect of using technology in teaching and learning. The infusion of the same could be made through having ongoing support available at schools (Schrum & Levin, 2016). Even the accessibility, as described by Pernia (2008), requires that teaches get acquainted with ICT tools and can choose the relevant tool for instructions for a specific content area. Churchill (2006) rightly says that behind any technology, there is always a person who can utilize it, work with data, consume information, create knowledge, solve

problems, and innovate. He further elaborates that "Technology in this context must be understood as a set of tools and resources that amplify individuals' physical and intellectual capacity p. 29".

Investigating about ICT enabling factors, Kirkman (2000) informs that the instructional approaches and beliefs of teachers and their attitudes and skills relating to ICT, remain as fundamental and play a key role in integrating ICT in teaching and learning. They state that teachers can only start using ICT when they are frequently engaged in using it within their work context. Research (Rosenberg & Koehler, 2015; Mumtaz, 2000) related to ICT integration in schools determines that teachers' professional development matters most in enhancing their skills, but the educational context in which it takes place had a significant role in ICT integration. Teachers' abilities with ICT integration require to consider the technical aspects of teachers' work and their working context (Durrant & Green 2000).

Research, other than Hassan and Sajid (2013) in the context of Pakistan, for example, Mwalongo (2011), in Tanzania, Agbatogun (2012), a study conducted in Kenya, Simin and Sani (2015), in the context of Malaysia, suggest that factors like the availability of and access to ICT resources, and teachers' professional development influence teachers' ICT competence. As they inform, it is, however, the school context that defines the scale of ICT integration. These studies also state that by providing only ICT resources or training teachers, the integration of ICT could not be made possible. It is rather their working conditions that need to be supportive of ICT integration in the process of teaching and learning. Agbatogun (2012), a study conducted in Kenya, also suggests the availability of school-level support. Otherwise, as Simin and Sani (2015), found in schools in Kuala Lumpur Malaysia, that ICT resources were in teachers' access, but they could still not adequately deal with ICT integration due to school-level support being not in place. In the same way, other research studies (Agbatogun; 2012; Mwalongo, 2011) do conclude that teachers, even though find ICT integration effective but bridging the gaps of the provision of sufficient ICT tools and providing them with on the job support is critical.

Bingimlas's (2009) review of a literature rightly informs about the barriers to ICT integration at two levels, one at the school and the other at the teacher level. School-level factors include teachers' access to ICT resources, their training, and regular support. Factors at teachers' level consist of their competency of ICT use and resistance to change their practices. His review considers teachers training, accessibility to ICT resources, and teachers' confidence and their belief as key ICT enablers. It suggests that teachers must work collaboratively to minimize the hindrances and enable effective ICT integration in the process of teaching and learning. Kirkman (2000) argues that teachers feel confident and start believing in ICT as a learning tool when they are frequently engaged in using it within their work context. A recent study (Rosenberg & Koehler, 2015) also suggests that supportive school context is a crucial enabler towards ICT integration.

Table 2. *Summary of hindering and enabling factors*

	Hindering Factors	
S.No	Factors	Percent
1	Non-availability of ICT resources & facilities	73%
2	Lack of finances	18%
3	Access to resources	64%
4	Teachers' ICT integration capacity issue	73%
5	School ICT policy	27%
6	Teachers' motivation towards ICT use	18%
	Enabling Factors	
1	School level support	18%
2	Provision of ICT resources	73%
3	Teachers' capacity building	73%

Characteristics of the school setting, such as cultural and structural conditions, remain essential for the integration of ICT (Vanderlinde, Braak, & Dexter, 2012). Otherwise, as Simin and Sani (2015), found that though ICT resources were in teachers' access, but they could still not adequately deal with ICT integration due to unavailability of school-level support. In the same way, other research studies (e.g., Agbatogun; 2012; Mwalongo, 2011) do suggest that teachers only consider ICT integration effective once the gap between the provision of sufficient ICT tools and enhancing teacher capacity is minimized through providing them regular support at the school level.

DISCUSSION

The review, with highlighting both hindering and enabling factors, has provided insights for schools, policymakers, and researchers to consider while looking into ICT integration in schools. The studies (Adil, Munir & Shad 2013; Hassan & Sajid, 2012; Kanwal, Jan, & Azhar, 2014; Nisar, Munir, & Shad, 2011; Rahim, Begum, & Sahar, 2013; Shaikh & Khoja 2013) inform that to meet the purpose of ICT integration the provision of adequate technological resources to the schools be considered at the first place. Moreover, schools are to be facilitated with electricity and improved access to computers in classrooms. Study findings of Nisar, Munir, and Shad (2011) suggest that the availability and usage of ICT in the education sector increase the efficiency of students. A most fundamental aspect of making accessibility in terms of teachers' understanding of ICT tools in teaching and learning (Pernia, 2003) calls for teachers' capacity enhancement. Adil, Munir and Shad's (2013) perspective of training teachers is viable. However, the capacity development programs need to be continuous and school-based towards enabling teachers to better cope with the challenges of innovations, forms, and usage of ICT tools. ICT integration does not only require the provision of necessary infrastructure but asks for curriculum up-gradation and teachers' capacity building as preferred areas of focus (Hassan & Sajid, 2012).

Shaikh and Khoja (2013) recommends the development of a systemic and politically committed method of implementation of robust, effective and target-oriented ICT policy at first instances to make progress towards the use of ICT in teaching and learning and the overall education system. The same implicates to other developing countries, like Kenya (Kirskoi, 2015), South Africa (Niekerk & Blignaut, 2014 & Ramorola, 2013) and Tanzania (Mwalongo, 2011) as they do urge to have an ICT supported mechanism in place at the policy level that remains integral to and monitor school level ICT use.

All the previous research rightly suggests that in addition to the provision of ICT resources the most important aspect is the alignment of ICT with curricula, emphasizing both theoretical as well as the practical use of ICTs via analyzing the current state of schools' curriculum, pedagogy, infrastructure, capacity building, language and educational content and financing. To effectively facilitate the implementation of ICT integration, teachers must be provided rigorous training for the improvement in this regard (Majoka, Fazal & Khan, 2013). Similar to the context of Pakistan, the capacity building of teachers, for effective ICT integration also has implications for many other countries. In Malaysia, for example, as highlighted by Samin and Sini (2013), despite the availability of ICT resources, it was teachers' incapability that could not make effective use of ICT in teaching and learning. The capacity-building aspect of ICT integration remains pivotal for schools across the globe. It is because of the frequent changes in forms, and the use of ICT (Mishra & Koehler, 2006) that demands the continuous capacity building of teachers.

A more critical facet of ICT integration in terms of considering the school's context being made more supportive must be considered before devising any ICT policy and plans. The most explicit amongst the constituents of the school context should be school-based continuous professional development of teachers concerning ICT integration. Making ICT resources accessible to the teachers and having technical support available to them in the form of posting ICT experts

may make that accessibility more of worth (Pernia, 2003). Moreover, to meet the purpose of ICT integration, it is worth to capacitate the institutions responsible for both pre and in-service teacher education, curriculum review and development, assessment and monitoring and evaluation to help schools in ICT integration. One of the key implications would be for the school leadership as their role becomes pivotal in this regard. A recent study (Jogezai et al. 2016), in this regard, though, informs about headteachers being aware of the importance of ICT integration, but they still are not able to deliver in this regard. Capacitating headteachers or principals as technological leaders (Anderson & Dexter, 2000, 2005) and mentors to facilitate the continuous professional development of the teachers earn a more serious consideration to managing school-based facets of ICT integration. Towards making school level aspects of ICT integration intact, there is a need for strong policy-level support. Policies need to consider ICT a cross-cutting theme in curriculum development, curriculum delivery and assessment, teacher education, and educational management. The review has implications for future research to consider the investigation of factors associated with effective ICT integration in schools in Pakistan. The current research, in the context of Pakistan, falls short in this regard.

CONCLUSION

Review of the literature, in the context of Pakistan and other parts of the world, informs that ICT integration in schools suffers due to the non-availability of ICT resources and lack of teachers' relevant skills and knowledge and ultimately about taking measures towards these ends. The integration of information and communication technology in teaching and learning, as the review of the literature reveals, is a continuous process (Kohler & Mishra, 2006), and the role of teachers remains more central in this regard (Jamieson, 2013). All the previous research (e.g., Hassan & Sajid, 2012; Kirskoi, 2015) highlights the availability of and accessibility to ICT resources very much imperative to enable teachers to use the same in their teaching and learning.

Considering only the provision of ICT resources to the schools cannot ensure its integration. In order to support teachers in implementing their learning of ICT integration, there is a need to create a conducive school environment. Research (e.g., Samin & Sini, 2015) considers such a supportive environment to be configured with ICT expert human resources and administrative support from the headteachers, available for the teachers that encourage them towards frequent use of ICT in their instructions. More importantly, the role of continuous school-based professional development of teachers regarding ICT integration in teaching and learning earns higher consideration. Since school is part and parcel of the overall education system and therefore, a policy level support is very much imperative (Shaikh & Khoja, 2013). Such support needs to encompass empowering schools and capacitating headteachers to act as technological leaders. Within policy parameters, the use of ICT needs to remain a cross-cutting theme in terms of its integration into educational management, curriculum review, and development, pre and in-service teacher education, and assessment.

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