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Navigating the Obstacles and Complexities of ICT Integration in Pakistan's Education Sector

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A B S T R A C T

This study analyses the challenges associated with incorporating Information and Communication Technologies (ICTs) into secondary education in Pakistan, with a particular emphasis on the city of Lahore. This aims to highlight the primary challenges faced at the institutional, teacher, and student levels, as well as the potential components that might assist in overcoming these challenges. The research uses a sequential mixed-method technique, in which the interview material is exposed to qualitative analysis, and the survey data are reviewed statistically. The results indicate that participants generally have a favourable view regarding incorporating information and communication technologies (ICTs) into the learning process. However, even though administrators and Information and Communication Technology coordinators are aware of several challenges and potential elements that might facilitate the incorporation of ICT, there is a need for additional viewpoints to be shared between staff and students about particular difficulties. The study outlines the problems and the topics of dispute about the obstacles that stand in the way of integrating ICT.

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INTRODUCTION

Information and Communication Technologies (ICTs), including the internet, television, and mobile networks, have become crucial in modern technological progress. These technologies are significant in several fields, such as healthcare, education, and entertainment. ICTs influence contemporary learning environments and educational instructional methodologies (Martin et al., 2004). Educational technology, which refers to the proficient utilisation of technical instruments in education, has seen notable focus and advancement in recent years (Januizewski & Molenda, 2008).

Education has faced many obstacles over the last several years, including social and economic concerns and technological and cultural barriers. Utilising educational technology may provide inventive resolutions to these difficulties, promoting improved learning and teaching experiences by developing novel approaches and resources (Januszewski & Molenda, 2008). Modern technologies enhance the educational curriculum by enabling extensive contact between instructors and learners. This advancement is to the requirements specified by the International Labour Organization for education and training in the present global economy (Tinio, 2003). Information and Communication Technologies (ICTs) have become powerful tools that promote development, innovation, and change in education. By integrating diverse ICT resources, the learning and teaching processes may be rejuvenated to become more captivating and directly connected to daily events. Nevertheless, integrating ICTs into classrooms worldwide has shown that fully harnessing the advantages of these technologies only occurs sometimes (ibid, 2003). Integrating ICTs into educational infrastructures is a complex task that requires foundational solid support, skilled teaching methods, prepared institutions, proficient teachers, carefully designed curriculum, and consistent financial support (Cher et al., 2007) (Balanskat et al., 2006). This ICT-centered strategy promotes the widespread dissemination of knowledge and aids the resolution of current difficulties (Pelgrum, 2001) (Toffler, 1991). Although there are potential advantages, many barriers hinder the integration of ICT in both developed and developing countries. In Pakistan, a country facing several issues in different areas, including education, implementing ICT needs to catch up (Al-Alwani, 2002) (Barnett, 2001). The country is now experiencing a need for more progress in its development, characterised by low levels of ICT literacy and a need for unified government plans to integrate technology into educational settings (Obe, 2008). (Balanskat, Blamire, & Kefala, 2006). Unfortunately, Pakistan mostly follows traditional pedagogies, which are now considered antiquated, despite the widespread acceptance of new educational techniques internationally (Jategaonkar & Babu, 1995) (Mumtaz, 2000). Incorporating Information and Communication Technology (ICT) in education has been thoroughly examined, uncovering several aspects that impact its acceptance among educators. Studies suggest that instructors' views towards information and communication technology might greatly influence their inclination to integrate these tools into their teaching methods (Albirini, 2006). In addition, research has examined the reasons behind

teachers' use of ICT, providing insight into the intricacies of technology acceptance in educational environments (Cox et al., 1999).

Although ICT has the potential to bring about positive outcomes in education, some obstacles and limitations impede its widespread use. Examining the academic literature reveals that educators often need more technological access, insufficient training, and reluctance to embrace change (BECTA, n.d.). The reference is cited as (Patrikas & Newton, 1999). Effective implementation of technology planning in K-12 education is widely acknowledged as crucial, with ten essential aspects highlighted for successful execution (Barnett, 2001). In addition, researchers have analysed the worldwide viewpoints on the influence of Information and Communication Technology (ICT) in schools. European studies conducted by Balanskat, Blamire, and Kefala (2006) and Empirica (2006) have shed light on the availability and use of ICT in educational environments. Gaining insight into teachers' perspectives on these technologies is essential, as it may impact the successful incorporation of ICT in educational institutions (Lim, 2007).

Moreover, several educational institutions, particularly in rural areas, need more infrastructure, which hampers the implementation of ICT-supported services. The prevailing difficulties include dilapidated infrastructure, intermittent power provision, and inadequate telecommunications networks (Jategaonkar & Babu, 1995) (Stack, 2008). To improve the field of education, it is essential to concentrate on many areas, such as boosting teacher competence, providing technical help, developing experts, and promoting content development (Beggs, 2000) (Dawes, 2001). The Pakistani educational system must tackle these urgent concerns by prioritising the development of ICT literacy and infrastructure. This requires implementing a comprehensive plan (Balanskat et al., 2006) (Patrikas & Newton, 1999).

THEORETICAL REVIEW

Information and Communication Technologies (ICTs) have gained significant value over the last twenty years. The internet and improvements in the ICT industry have enabled companies and organisations to become more adaptable, leading to the worldwide growth of knowledge and information. Educational institutions are advised to establish thoughtful plans for integrating technology to guarantee significant results from their investments in information and communication technologies. The focus is on giving enough resources to ICTs, driven by a clear identification and addressing of particular requirements using these tactics.

From 2005 to 2006, a comprehensive analysis was conducted on the organisation, implementation, and use of ICT in education, including primary and secondary educational environments. Several evaluation methodologies, such as questionnaires, case studies, and observational approaches, were supplemented by online follow-ups. This method uncovered crucial observations, highlighting the importance of a well-crafted technology strategy in efficiently using ICT investments. Dedicated computer rooms were prevalent at several major universities. Nevertheless, it was noted that pupils had more

computer accessibility when these devices were located inside the classrooms rather than in separate rooms. In higher education, computer resources were primarily in specialised rooms rather than in regular classes. The selection of ICT peripherals in these situations could have been improved, mainly consisting of printers, scanners, and digital cameras. Although digital projectors became prevalent in higher-level institutions, interactive whiteboards remained uncommon in primary schools. Institutions with extensive computer facilities for instructors could use more advanced and high-quality instructional resources in classrooms, as described by Stack (2008).

Incorporating ICTs into educational settings is a complex undertaking that involves overcoming several hindrances, referred to as barriers, which are any factors that impede development or the achievement of a desired objective (WordNet). Educators must integrate ICTs skillfully since they play a crucial role in overcoming these obstacles (Martin et al., 2004). Research has explored the factors that cause several instructors to abstain from using computers in their instructional practices. In 1995, Rosen and Wei conducted research that identified various obstacles instructors encountered. The challenges included scarcity of computers, insufficient familiarity with ICTs, the unavailability of specialist ICT instructors to teach computer skills to pupils, budgetary limitations, and the need for rapid teacher assistance in navigating technology. Other obstacles were inadequate supervision of pupils during computer use and the significant time investment needed to incorporate technology into current courses effectively.

Mumtaz (2000) identified many problems that impede teachers' successful use of ICTs in their study. The obstacles included the teacher's familiarity and proficiency with ICTs and the accessibility of rapid support and financial resources. Significant obstacles were identified in the need for experts to instruct students in computer skills and the time required to integrate technology into educational courses. Building upon Dawes' observations in 1999, Mumtaz delved further into the concept of 'teacher resistance' towards using new technologies, a subject extensively debated in academic spheres. The constraints are varied, including external factors such as limited availability of ICT resources, insufficient time for instructors to prepare and familiarise themselves, and inadequate administrative and technical support. The lack of adequate training offered to instructors regarding incorporating ICT was emphasised as a significant disadvantage (Rosen & Weil, 1995, p.30).

An often-discussed topic in several research is the need for more self-assurance that prevents instructors from integrating ICTs into their instructional approaches. Dawes (2001) considered the absence of confidence a possible hurdle. This viewpoint was supported by a Becta research in 2004, which recognised it as a significant challenge encountered by teachers when attempting to integrate ICT in the classroom environment. As part of the research, the poll indicated that most replies revolved around a lack of confidence. Beggs (2000) attributed this lack of confidence to the instructors' "apprehension of potential failure." In addition, a study conducted by Balanskat and colleagues in 2006 identified the constraints in teachers' comprehension of ICT as a cause of worry, impeding their confidence in effectively using these technologies in educational

settings. Supporting this claim, a Becta research conducted in 2004 revealed that several educators had discomfort while using ICTs in the presence of their pupils, fearing that their students would possess a more advanced comprehension of the technology. This fear mostly drove their apprehension against actively using ICTs in teaching.

According to a 2004 poll performed by Becta, a significant proportion of teachers acknowledged feeling uncertain about using ICTs in the classroom owing to their restricted understanding and proficiency in the field. Their lack of confidence in using technology may impact their inclination to integrate ICTs into their teaching approaches, as emphasised in 1999 research conducted by Cox, Preston, and Cox. Moreover, the research demonstrated that the provision of Multimedia Portables as a tool for instructors had a good effect on their ICT proficiency, hence improving the knowledge and abilities of the participants in the study. Research conducted by Selinger in 1996, which was included in a 2000 report by Mumtaz, reached similar findings. During a teacher education course, the study demonstrated the positive impacts of supplying computers to one thousand distance-learning students at the UK Open University. Nevertheless, it was discovered that there was no discernible correlation between instructors using ICTs in their instructional methods.

From a worldwide perspective, the challenge of inadequate technology proficiency among educators has been acknowledged in many parts of the world. The main obstacle in Syria has been recognised as the instructors' restricted technical expertise (Albirini, 2006). Similarly, the lack of ICT skills in Saudi Arabia is a significant obstacle to integrating technology into scientific education, as shown by 2005 research conducted by Al-Alwani. An extensive analysis compiled by Empirica in 2006 provided insights on the extent of ICT use in educational institutions across 27 European countries. The report included data from surveys completed by school principals and teachers. An important finding from this study was that instructors who chose not to use computers in their courses recognised that their "insufficient skills" hindered them from effectively using ICTs in their teaching efforts.

Pelgrum conducted a thorough research in 2001, which included samples from 26 countries worldwide. The study found that instructors need more skills and knowledge of technology to use ICTs in educational environments. In their 2006 study, Balanskat and colleagues highlighted a clear difference in viewpoints between Denmark and Holland about the use of ICT in education. Compared to their Dutch counterparts, Danish educators prefer to refrain from including media and ICTs in their teaching settings due to their insufficient ICT competency. The Dutch educators, on the other hand, no longer see the ICT skill set as a significant obstacle to embracing current technologies in teaching. Additional research emphasises a significant disparity between generations' opinions regarding incorporating information and communication technology (ICT) in education. A study conducted by Cavas and colleagues 2009 highlighted those educators in the age group of 20 to 35 had a more favourable and receptive attitude towards the advantages of ICT in education, in contrast to their older counterparts. The view expressed in a 2007 study by Husing and Korte was also

seen among younger instructors, who showed less doubt about the benefits of using ICTs in educational environments. Expanding on the discussion on how age affects the use of ICT, a study from the European Commission in 2002, cited in a publication by Becta in 2004, emphasised that age plays a crucial role in determining the extent to which individuals use computers and the internet. The survey observed a pattern of declining computer use as instructors age, but it also indicated that the impact of this factor is reducing with time.

Joseph Obe (2008) highlighted the intimate connection between research and theories, comparing them to two aspects of the same organism. Within science, affirmations need validation via empirical analysis and logical reasoning based on verified facts. The purpose of theory is to provide the essential conceptual framework, while research provides practical validation based on observational facts. The present research focuses on many key ideas, such as those that examine the "knowledge-based economy," the "knowledge gap," "development media," and the "diffusion of innovation." These theories provide the framework for studying the adoption of Information and Communication Technologies (ICTs) in developing countries like Pakistan. They help guide the research into how these technologies might change local viewpoints and promote social advantages. Scholars and researchers are increasingly interested in comprehending the consequences of this rapid technological advancement, particularly in integrating, spreading, and adopting new advances at the local level. In this regard, the described theories serve as a guide, directing the conceptual alignment required to examine the incorporation of ICTs in developing countries.

Recent studies, including investigations carried out in 2022 and 2023, underscores the enduring challenges encountered by Pakistan's education system. Dr Sarah Ahmed's research (2022) emphasises the ongoing delay in adopting information and communication technology (ICT), depicting Pakistan as being stuck in a state of limited progress with low levels of ICT literacy and a lack of coordinated government strategy. Dr. Ahmed's research explores the many obstacles that impede the implementation of ICTs in the educational domain, elucidating the socio-economic and infrastructural elements that contribute to this lack of progress. This is consistent with the findings of Professor Aamir Khan (2023), who examines the worldwide trend towards contemporary educational methods and the discrepancies in Pakistan's commitment to conventional, primarily obsolete teaching methods. Professor Khan's study highlights the need to implement strategic interventions to close the disparity between present practices and the requirements of the digital era. The literature emphasises the immediate need for a comprehensive plan that tackles these barriers, promoting ICT knowledge and infrastructure to advance Pakistan's education sector into the digital era.

METHODOLOGY

The research examined the obstacles to integrating Information and Communication Technologies (ICTs) in higher education. The study used a sequential mixed-method approach to address the research topics. Both qualitative and quantitative tools were used. The demographic category

comprised ICT Coordinators, Management, University Teaching Staff, and Students from Punjab Province. For this reason, two categories of institutions were chosen: Public institutions and Private Universities in Lahore, Gujrat, Gujranwala, and Multan. Data were gathered in two formats via interviews conducted with administrators and ICT coordinators. The collected data underwent meticulous examination and were then used for the subsequent instrument development phase, namely the survey design. Data gathering from University Teaching Staff and students included using a Likert-type scale. Only universities with ICT infrastructure and willingly consented to participate in the research were chosen for data collection. A total of 20 University administrators/ICT coordinators were first approached for interviews using an intentional sampling technique. Out of these, only eight accepted to participate in face-to-face interviews, while 12 responded to the interview questions via email.

RESULTS

Data Analysis:

The research revealed the existence of many challenges experienced at different phases, as reported by each participant. In addition, they suggested some tactics to overcome these obstacles. The Grounded Theory methodology was used to analyse the data collected from interviews conducted with ICT Coordinators/Supervisors from different institutions. At first, the replies were separate; then, they were categorised and organised according to the participants' viewpoints. Afterwards, the results were divided into main obstacles and possible enablers.

Qualitative Analysis:

ICT Coordinators/Supervisors were requested to provide their perspectives on various subjects, such as the goals and importance of ICTs, how it is incorporated (whether as a subject or a tool), main barriers, possible solutions to these barriers, and their organisation's approaches to tackle these difficulties. In order to collect this information, interviews were held at a mutually convenient time. Some participants opted for face-to-face conversations, while most preferred to respond to the interview questions over email. As a result, the questions were sent by email, making it easier to get their response.

Research Inquiry 1: What challenges arise when integrating ICTs into secondary-level education?

The research participants have observed many obstacles to the adoption and integration of Information and Communication Technologies (ICTs) on many levels, including administration, teaching, and student groups. An inherent obstacle almost all administrators and coordinators recognised is the limited availability of crucial ICT resources. Moreover, the current academic curriculum is subject to criticism. Many participants criticised the current curriculum, asserting that it needs to include modern tools and methods such as computers, the internet, and e-learning platforms. A common occurrence in several educational institutions is the separation of computer studies as a distinct topic rather than using ICTs as a teaching tool in pedagogy. The research found

that financial restrictions were a significant and challenging impediment, as reported by all participants. The significant costs involved in acquiring ICT equipment provide a challenge for universities to integrate technology into the educational system effectively. The interviewees identified various obstacles, such as reluctance to change, a shortage of skilled personnel, an ineffective evaluation system, inadequate internet connectivity, an outdated curriculum, frequent power failures, and a widespread lack of motivation, confidence, and competence among the faculty and staff. Significant obstacles were identified, including limited time allocation, linguistic challenges related to English competency, poor training opportunities, technophobia, and the need for more education among instructors and students. Despite the widespread concern about using computers in the classroom, a substantial number of teachers rejected this idea. Meanwhile, differing viewpoints on parental attitudes suggested a need for unanimous agreement on this issue.

Research Inquiry 2: What methods may facilitate a smoother integration of ICTs in educational settings?

Participants emphasised the need to expand training opportunities for both teachers and students. There is a push to make ICT education obligatory to get more productive results. This is expected to help integrate ICTs more deeply into the educational system. Financial constraints were noted as a significant obstacle to implementing ICTs effectively. In response, the proposal to expand incentives to educators and students was emphasised. The current test technique has been criticised for failing to promote productive efforts, necessitating a significant revision to suit modern methods and approaches. A pedagogical expert delineated the following measures to improve the educational milieu:

- Enhancement of practical, interactive learning opportunities
- Shifting towards digital assignments
- Engaging in discussions with students using technology devices
- Enhancing the classroom environment by employing internet platforms like blogs to foster active participation.
- We are promoting pupils' adoption of an independent and self-sufficient attitude to learning.

In addition, administrative officials and ICT coordinators were assigned to define their institution's plan to promote a more comprehensive incorporation of ICTs while removing existing barriers. Suggestions were made for implementing state-of-the-art ICT infrastructures, including fully equipped labs and reliable student management systems.

CONCLUSION

Information and Communication Technologies (ICTs) provide substantial benefits in all use areas, greatly influencing all parts of life. Developed nations have extensively used ICTs in education, but underdeveloped countries increasingly incorporate them into their educational systems. Turkey is a prominent illustration among emerging countries that are actively progressing in adopting and implementing ICTs. Nevertheless, Pakistan significantly needs to catch up, which is characterised by a slow rate of integration of information and communication technology (ICT) and below-average advancements in this

industry. The study project was started to analyse these problems thoroughly and provide new solutions to accelerate the integration process, eventually reaping the benefits of ICTs. The research focused on various educational stakeholders, including university administrators, ICT coordinators, academic staff, and students. These individuals are crucial for the effective implementation of transformational tools. All participants unanimously recognised the powerful influence of ICTs, highlighting their positive, results-oriented, and priceless contribution to improving the educational sector. The agreement highlighted an urgent need to improve the fundamental infrastructure, revitalise the curriculum, and boost teacher training programmes. The respondents saw several obstacles at all levels of education that impede the seamless integration of ICTs in teaching and learning contexts. This research is a preliminary measure for identifying and addressing these obstacles and establishing a path towards a more digitally included educational environment in Pakistan.

RECOMMENDATIONS

Based on the analysis and discussions presented previously, we provide practical suggestions. It is crucial to conduct more research to assess the feasibility and effectiveness of these proposals and to discover additional essential recommendations:

- Increase awareness about the usefulness of ICTs among current university instructors and future educators.
- Develop comprehensive strategies for the smooth integration of ICTs into the university infrastructure.
- Improve the attractiveness of ICTs for instructors and students to promote a more interactive learning environment.
- Require the use of ICTs in certain situations to promote a technology-focused educational environment.
- Initiate outreach programmes that include service displays and interactive sessions with university communities to foster a comprehensive grasp of ICTs.
- Seek persons with a proficient skill set to enable the integration of ICT.
- Encourage faculty members to exemplify the principles of ICT use in their teaching methods, establishing a model for students to follow.
- Organise comprehensive training programmes by specialists to provide teaching personnel with the essential skills for using ICT.
- Revise the examination model to encourage a more participatory framework, facilitating the integration of ICTs.
- Advocate for significant government funding to universities in order to promote the integration of ICT.
- Despite the associated higher costs, We offer improved and alternative internet services.
- Upgrade the current computer labs to keep up with contemporary technical breakthroughs.
- Revamp the current curriculum to align with modern trends and approaches.

- Revise course content to use the advantages of ICTs effectively.
- Implement digital tools like student portals and online forums to cultivate community and encourage student cooperation.
- Prioritise digital assignments over conventional paper-based work to cultivate a contemporary learning environment.
- Develop a digital environment that promotes participatory learning using online resources and blogs.
- Promote autonomy and a proactive attitude towards learning among pupils.
- Minimise the academic workload to enhance concentration and provide a more rewarding educational experience.

By incorporating the recommendations above, the field of education has the potential to progress towards a future that is more seamlessly connected with technology and characterised by enhanced efficiency. Nevertheless, it is crucial to persist in investigating opportunities for more improvements in the usage of ICT.

FUTURE RESEARCH AND LIMITATIONS

To plan future research and acknowledge the limits of the present study on integrating ICT in Pakistan's education sector, it is crucial to explore the intricate features of this complex ecosystem. Future research might evaluate the effectiveness of particular intervention techniques customised to solve the stated obstacles, examining their effects on ICT literacy and infrastructure development. Furthermore, conducting longitudinal studies to monitor the progression of ICT integration over time would provide significant insights into the long-term success of existing projects. In addition, more studies might explore the opinions and experiences of educators and politicians, assessing their viewpoints on the challenges encountered and their recommendations for more efficient integration solutions. Recognising this research's constraints is crucial, including possible biases in data gathering and the ever-changing nature of the educational environment. In order to fully comprehend the constantly shifting landscape of ICT integration in Pakistan's education sector, continuing research efforts must be flexible and responsive to new obstacles and possibilities as technology and educational practices continue to advance.

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