

Implementing ICT in Rural Community Schools: Challenges and Strategies for Effective Integration

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Abstract

This article explores the challenges of integrating information and communication technology (ICT) in rural community schools in Nepal. It also discusses the obstacles and examines the strategies teachers employ to overcome these obstacles in the language classrooms. Employing a phenomenological qualitative research design, semi-structured interviews were conducted among twenty teachers across five rural community schools to explore the challenges of ICT integration. The gathered data were thematically analyzed to identify the key obstacles and strategies to overcome them. Findings reveal that teachers were struggling to integrate ICT in their classroom teaching due to the challenges of inadequate ICT resources, insufficient ICT training, lack of technical support and poor internet connection and inconsistent electricity supply. Despite these obstacles, teachers implement various mitigation strategies, such as using mobile data during electricity cuts, applying ICT training knowledge and skills, and taking support from local government. This study suggests the practical approaches for enhancing ICT integration in under-resourced rural settings and provides mitigating ways for overcoming these challenges.

Keywords: *ICT integration, rural education, teacher strategies, implementation challenges*

Introduction

Information and communication technology (ICT) has brought changes in the traditional way of teaching and learning by integrating technological devices (Khadka, 2021). ICT tools are powerful tools which need to be used for educational change and reform (Tonui et al., 2016). The use of ICT in the classroom is crucial as it provides students with the opportunities to learn and apply the required 21st-century skills (Dhital, 2018). The use of ICT makes teaching and learning more interactive, which ultimately results in a more student-centred learning setting despite some challenges to teachers and students (Oliver, 2002). The teachers in this digital era need to be technologically savvy (Khadka, 2021). As technology is a powerful and flexible tool for learning, it is needed to meet challenges, to boost up country's financial status, and to motivate and help students to learn things in a better and different way.

Implementing ICT in school education provides additional support to change the way of teaching (Ghavifekr et al., 2016). ICT enhances learning as it increases interaction among teachers and students, providing opportunities for sharing thoughts, ideas, and problems with learners' friends and teachers. (Rana & Rana, 2020). Rabah (2015) claimed that the purpose it serves and how it is employed by the teachers and students in the classroom determine the usefulness of ICT integration in academic settings.

National Curriculum Framework, 2007 emphasized the need for ICT to be implemented in school education throughout the country (Rana & Rana, 2020). This framework advised teachers to make maximum use of ICT in lesson planning and pedagogical activities to facilitate teaching and learning. Similarly, *Teacher Competency Framework 2016* listed digital skills as one of the eight competencies of teachers. This framework stated that teachers need to be able to use ICT for enhancing students' learning, assessing students' achievement and providing feedback (MoE, 2016).

School Sector Development plan 2016 - 2023 also prioritizes the importance of integrating ICT in education to uplift Nepal into the global community and to produce competitive skilled manpower (MoE, 2016). This plan aimed at providing students with ICT skills and use ICT as an important tool to improve classroom learning and teaching, increase access to learning materials and improve the effectiveness of educational governance and management. Adoption and integration of ICT is a challenging and complex process for those schools where there is limited previous experience in the use of technology to enhance teaching and learning (Wilson-Strydom et al., 2005). In rural community schools, there is a tendency of using ICT for learning about ICT rather than learning with or through ICT. There is little evidence of ICT integration into classroom teaching and learning, such as systematic planning and implementation of ICT-based lessons that encourage students to think and act critically, work collaboratively, and ICT integration for fostering learning.

Bingimlas (2009) argued that though teachers have a strong desire to integrate ICT in education, they face many challenges in implementing it in the classroom. Ghavifekr et al. (2016) reported that the barriers of ICT use in classroom teaching and learning are extrinsic to teachers and argued that teachers face challenges like a lack of resources, time, access, and technical support. Inadequate infrastructure, resistance to change and lack of technical support, lack of electricity, financial problems, and lack of ICT tools like computers, insufficient training, insufficient devices, and internet access are the obstacles to effectively implement ICT in the education of Nepal (Rana et al., 2018). Rana and Rana (2020) argued that although teachers tried their best to use available ICT tools in their classroom instruction, teachers get frustrated because of the obstacles including poor and unreliable internet and insufficient computers in the lab. There are numerous challenges in implementing ICT, especially in rural community schools, which need to be explored and should be mitigated as far as possible. Many private schools and public schools in urban areas have been implementing ICT in their classrooms but the community schools in rural areas are still either deprived of ICT tools or have poor ICT literacy.

Literature Review

The integration of ICT in education in rural and developing contexts has been widely researched, revealing persistent barriers at teacher, institutional, infrastructural, and policy levels. With a particular focus on rural settings, this review synthesizes key international and national studies on the challenges of ICT implementation in schools. It examines proposed strategies to overcome these obstacles, providing a foundation for understanding the specific case of rural schools in Nepal.

Challenges of Implementing ICT in Rural Schools

Many studies, including international and national ones, have reported various challenges related to ICT policies and their implementation in teaching and learning in schools. For example, a study in Australia by Bingimlas (2009) found out from his research that there are mainly two types of barriers to ICT integration in instruction: teacher-level barriers and school-level barriers. He explained that teacher-level barriers included barriers such as lack of teacher confidence, lack of teacher competence, resistance to change and negative attitudes and school-level barriers included lack of time, lack of effective training, lack of accessibility and lack of technical support.

In the context of Canada, Rabah (2015) conducted a study on the benefits and challenges of ICT integration in English schools and revealed that the lack of supporting school leadership, inconsistent investments in ICT equipment, infrastructure and resources, inflexibility of funding, the need for additional professional development and support are the challenges of ICT integration in school education. In a similar study in South African context, Ramorola (2013) revealed that unavailable ICT policy, insufficient ICT resources, lack of ICT qualified teachers, technophobia in teachers, lack of qualified technicians for maintenance, risks and security problems, poor parental involvement, insufficient time for teachers as well as for students for using ICT, computer jargons are major obstacles for ICT integration in school education.

Similar study on issues and challenges of ICT tools in teaching and learning in Malaysian context, Ghavifekr et al. (2016) reported that the barriers of ICT use in classroom teaching and learning are extrinsic to teachers and argued that teachers face challenges, including a lack of resources, time, access, and technical support. However, Alkahtani (2017) reported in his study conducted in Saudi Arabia that lack of basic understanding of how ICT works in both teachers and students, inadequate equipment maintenance, lack of resources, failure to take initiative, poor internet access are major obstacles for the implementation of ICT in secondary schools which resulted in poor academic performance of students as well as of teachers. Similarly, Wang et al. (2018) argued that uneven levels of information, a lack of a favourable e-learning environment, and an inadequate guaranteed mechanism for resource construction and application are the barriers to e-learning in China. Moreover, Pegu (2014) reported that poor access of internet to the students living in rural areas, low IT literacy, issue of local language in IT tools and applications, poor IT infrastructure for are major hurdles in transforming schools into knowledge society. There has been big gap between government policy and ICT implementation in Japanese schools (Aoki, 2010).

However, Hoyles (2018) found four major aspects of ICT implementation in schools, viz. environmental, personal, social and curricular factors affecting technology integration. He further explained that environmental factors like computer facilities, budget, training, personal factors like personal belief, experience, interest in using ICT, support from family, social factors like support from peers, support from authorities, social, curricular factors like curricular objectives, assessment system, teaching, etc. affect ICT integration in education.

A similar study conducted in Nepal by Dhital (2018) reported that lack of ICT qualified teachers, lack of electricity, lack of computers and financial problems are the major challenges in government schools in Nepal. In their study, Rana et al. (2018) found that rural schools have lack of ICT infrastructures, well-trained ICT teachers, lack of peoples' awareness in the use of ICT. They also argued that ICT policy focuses on urban areas and financial problems in the schools; poor access to the internet is the main challenge in implementing ICT in rural primary schools. Moreover, in a similar study in the Nepalese context, Khadka (2021) reported that there are no appropriate classrooms for ICT implementation, lack of knowledge in surfing the internet, frequent power cuts, lack of internet access, internet instability, high price of internet, and inadequate administrative support are the major obstacles in the integration of ICT in Nepali ESL classroom.

However, a study conducted in Nepal by Laudari and Maher (2019) reported that lack of ICT infrastructure, low internet speed, no technical support, lack of time for preparing lessons and digital content, security of infrastructure, not enough training on technology use, no clear policy guidelines on technology use are the major challenges for integration in education

Strategies for Mitigating ICT Implementation Challenges

Studies have suggested various ways of mitigating ICT implementation challenges for fruitful teaching and learning. For example, Bingimlas (2009) in his study in the Australian context, reported that ICT resources, including software and hardware, effective professional development, sufficient time, and technical support need to be provided for teachers for excellent integration of ICT in teaching and learning opportunities. A similar type of study in the Netherlands by Drent and Meelissen (2008) identified that the help of school and the development of cooperative communities of teachers, the stimulation of reflective behaviour of teachers towards their own activities, and teacher entrepreneurship can enhance innovative use of ICT in education.

A study in the African context by Ramorola (2013) suggested that the Department of Education need to develop a clear ICT policy for the integration of technology in education. He stressed that teachers need to plan for using ICT in classroom teaching, the government need to provide training and support to teachers, provide enough resources and sufficient ICT-qualified teachers, provide access to the internet, allocate enough time for ICT integration, appoint a technician for maintenance and technical problems, for mitigating ICT challenges at the school level.

Rana and Rana (2020) reported that old generation teachers who have poor ICT skills need professional training so that they can transform the traditional way of teaching to the

modern system of teacher education in universities of Nepal. Teachers in government schools need to be provided with ICT training, practical ICT policies need not be prepared and implemented, ICT literacy needs to be enhanced by creating awareness, electricity needs to be sufficiently provided, and ICT needs to be included in the curriculum as a part of mitigating ICT challenges in governments in Nepal (Dhital, 2018). Khadka (2021) suggested developing competence and confidence in teachers in integrating ICT in the Nepalese ESL classroom.

In a similar study in the Nepalese context by Laudari and Maher (2019) suggested that the government need to develop a clear ICT policy, schools need to have economic and technical support, teachers need to be provided training on ICT use, and teacher education stakeholders need to embed ICT seamlessly in all subjects to mitigate the ICT challenges in teaching and learning.

Methods

Data provides the foundation for a research study (Yin, 2015). This study followed a qualitative approach (Merriam & Grenier, 2019), and we adopted a phenomenological interpretive research design (Cohen, 2002). We adopted the phenomenological design to explore teachers' lived experiences of challenges and mitigating ways of ICT implementation in rural community schools. In this study, a phenomenological design allowed the participants to share their lived experiences of challenges they encounter while integrating ICT in their classroom (Groenewald, 2004). The research site was five rural community schools in Ghiring Rural Municipality in Tanahun. This research was primarily based on interviews with the purposefully selected 20 teacher participants who were struggling to implement ICT in classroom teaching. Therefore, we conducted face-to-face, online and phone call semi-structured interviews with the participants to elicit data. First, we made phone calls to the head teacher to get permission. Then, we contacted the teachers on their cell phones and took verbal consent from them and visited the school to build rapport. We explained the purpose of our research before taking the interview. Then, we took interviews in face-to-face mode and on phone calls, too. Interviews were audio recorded, maintaining the ethical considerations. In this study, data were thematically analysed to understand the participants' lived experiences by employing an inductive coding (Braun & Clarke, 2022).

Results

This section deals with two organizing themes viz. (a) ICT integration in rural community schools, and (b) mitigating ways, along with their local themes.

Barriers of ICT Integration in Rural Community Schools

The task of implementing Information and Communication Technology into teaching and learning, especially in remote rural community schools, is a complex process and thus, practitioners might encounter numerous difficulties. The barriers that the teacher encountered while implementing ICT are discussed in the following sections:

Accessibility and ICT Use

The results reveal that remote rural community schools face the problem of inconsistent electricity supply and internet access, which discourages teachers from ICT

integration. All the participants accepted that they had electricity in their school; however, most of the participants indicated that there was no regular electricity supply, which caused disturbances in the ICT integration. For instance, Ganesh from Kalyan School explained:

Since our school is located in a remote, hilly and rural area, there are always disturbances in electricity in rain, storms and lightning. Therefore, there is no regular electricity supply in the school. Hence, these issues hinder ICT-integrated teaching. Simultaneously, the internet gets disconnected, which is a frustrating experience in ICT-implemented teaching.

This indicates that as the school did not have an alternative source of electricity and a backup system, there was a lack of adequate electricity supply and a problem with the internet facility for running classes with the ICT spirit. His voice is echoed in Saran from Kanti school when he said, “Electricity got disturbed in rain, storms and lightening.” His opinion asserted that “we got frustrated in ICT use when there had been frequent power cuts.”

In contrast, Tara Singh from Chandani School appreciated the school for having an alternative source of energy, a solar system, which allowed him to use ICT with no such obstacles. However, he criticized for slow speed of the internet. He further argued that although the school had internet access it was not accessible in each and every classroom.

These examples echoed the voice of the research participants who argued that although they had electricity and internet access, the electricity kept going off, which cut off internet connection and ultimately disturbed the smooth delivery and flow of teaching.

Majority of participants indicated that they had fewer resources for ICT implementation and the infrastructure was also poor which deterred the ICT use among teachers. They reported having poor access to the ICT resources. For instance, “there are no computers, smart boards, projectors in the classroom” (Hiran). Similarly, “smart boards and projectors are not used since they are not fixed. We have 15 sets of computers and 7 computers which are damaged and are out of use. [Working] computers have been used for official purposes such as printing, typing and keeping records” (Til Prasad). Likewise, they [Computers and projectors] are not available to each and every classroom ... There is no “internet and ICT availability in the classroom ... The computer lab is used for computer classes only” (Ganesh, Kalyan School).

These participants’ statements reveal the fact that the schools did not have sufficient ICT resources to encourage technology use in the classroom. These remarks indicate that remote rural community schools are facing financial obstacles in managing ICT resources. The most surprising fact was that no school had sufficient ICT tools, resources and well-equipped infrastructure to encourage ICT use.

Moreover, the participants emphasized that most of the students did not have access to consistent internet as well as ICT tools like mobile phones and computers. Half of the teachers reported that they did not have a personal computer at home.

Training and ICT Integration

The participants claimed that training in relation to ICT use influenced the integration of ICT in the classroom. However, most of the participants complained that they did not receive

sufficient training on ICT use. They expressed their frustration that their school did not organize ICT-based training, nor did the local government pay attention to it. This is reflected in Toran's statement from Ram Shah School when he said, "I have not undergone any such training, and the school has also not provided any ICT-based training to the teachers, making them poor in ICT integration." His comment raised a question about the school's responsibility for providing sufficient training to enhance ICT implementation in schools. He further added that the management is so frustrating that it did not pay attention to such an issue, which discouraged them from ICT-integrated teaching.

Eleven teachers reported that they had not taken any training related to ICT use. In this context, Pashmita stated, "I do not know ICT tools and their use. I have not taken any training regarding it. Therefore, I could not dare to use ICT." In a similar vein, Devi said, "I haven't had any chance to take training. I wish I could get training that would help me transform my teaching." Though nine teachers reported having attended training on technology implementation, they were not confident enough to use it for pedagogical purposes. Thus, it is clear from the comments that the teachers avoid using ICT due to their limited knowledge of ICT, and there are not enough training opportunities for teachers in implementing technologies in teaching.

Administrative Issue, Technical Support and Staff Encouragement

In this study, participants reported that the lack of administrative and technical support deterred them from ICT use. Participants at Ram Shah blamed the administration for ignoring the importance of ICT implementation and not managing technical support on time. In this regard, Toran said that "I think administration doesn't understand the value of ICT and therefore it is careless on this. [Other teachers] might certainly support for ICT use, but unfortunately, most of them don't have ICT literacy, either." He further criticized that "there is no technician to support in technical problems, too." Similarly, Rajesh from Karan school supported the statement as they didn't have a technician at school, and it took a relatively long time to get damaged computers repaired. The result reveals that the lack of technicians at schools for fixing technical problems discourages teachers from using ICT.

Regarding the encouragement from their peers, most of the participants appreciated their colleagues for encouraging them to use ICT. Unfortunately, fewer teachers can effectively use ICT in the classroom. Bibisha's expressions, from Kanti School reflects how the encouragement of colleagues also doesn't work, when she states that "other teachers are also like me, they don't have sufficient knowledge on ICT." She outlined the actual situation of teachers regarding ICT literacy in remote rural community schools and their encouragements. She further added that "the concerned authorities do not have the willingness and commitment to enhance technology in education." What was clearly reflected in participants' expressions was that the lack of technical support prevented teachers from implementing ICT in their teaching.

Teachers' Practice of Mitigating ICT Challenges

Nine teachers reported that they attended training related to ICT use in the classroom, which extensively helped them to mitigate the challenges. They revealed that the knowledge

and skills they learned in training enhanced ICT use. Among all, Tara Singh stated, “I have taken professional training from school ... taken ICT training from an institute too.” Ganesh from Kalyan School claimed that “the teachers need to be provided training on ICT use, which helps them in ICT use so that they fix computers easily without delay.” He further added that he had been using ICT in teaching even though the school did not have sufficient resources. This clearly indicates that ICT training enhances the use of technology in teaching.

The teachers from Chandani School appreciated the school for having a backup system for electricity supply, which helped them use consistent internet in teaching, even though the internet speed is low. It clearly indicates that managing a backup system could be another alternative mitigating ways for resolving ICT challenges. In this regard, Bam Bahadur from Chandani School accepted, “We have had an inverter in our school for three or four months. Since then, we haven’t had an electricity problem in the school.”

In the interviews, the teachers regarded technical support and administrative support as mitigating ways of ICT challenges. For them, support with technical skills and knowledge enhanced their confidence in the ICT use and helped smooth classroom delivery. They further added that the concerned authorities, like SMC, local government, and provincial government, need to manage the budget for managing ICT resources to boost ICT use in education. This remark is reflected in Ramesh’s statement when he said that “we can do less individually to mitigate these challenges as a whole. The local government, provincial and federal governments have to go hand in hand to resolve [ICT] problems.”

Regarding the measure of internet problems, the data revealed that using mobile data is expensive. The participants voiced that in the interruption of electricity, together with the internet, they used mobile data for searching pedagogical content. However, Sargam stated that “the school needs to hire a technician for the technical support, smooth functioning of ICT tools, and consistent classroom teaching”. He further added that the schools need to be provided sufficient physical infrastructure and maintain a tech-friendly classroom and school.

Discussion

This study investigated rural community teachers’ experiences of facing challenges in ICT implementation as well as their ways of mitigating these challenges in five rural community schools of Nepal. In light of the results, we noted that successful ICT integration remains inconsistent, with most teachers utilizing technology only to a limited extent due to systemic barriers that reflect the wider global problem of the digital divide (Abdullahi & Aliyu, 2025; Das, 2023). The results reveal that technological deficit among teachers and lack of ICT competence are the barriers to ICT integration in classroom teaching (Sanmartin Orbe & Ushiña Paucar, 2025). The results imply that most of the teachers have not been using ICT in teaching in the classroom, and other teachers have been using it to some extent due to several obstacles. Teachers were found to have poor technological knowledge and skills. Similar to a prior study (Rana & Rana, 2020), the findings revealed that inadequate electricity supply, inconsistent internet, insufficient ICT resources and infrastructures, insufficient training, inadequate technical support, and lack of administrative support were major obstacles for the successful integration of ICT in rural community schools. All the participants agreed that their school do not have sufficient ICT resources. They also noted that most of the students and the

teachers did not have access to personal computers for planning and accessing pedagogical content. Most of the participants indicated that there were frequent power cuts which hindered the smooth classroom delivery. Lack of regular electricity supply and internet discouraged teachers from using ICT in their classroom pedagogy.

Likewise, the participants complained about the negligence of the school administration in managing training on the use of ICT. Some of the teachers criticized the administration for providing insufficient support and encouragement for integrating ICT in the classroom. Furthermore, some of the teachers seem frustrated with inadequate technical support and less encouragement from their fellow teachers. Moreover, it is worth noting, also reported in (Mathevula & Uwizeyimana, 2014), the interviews reflected that some of the teachers have insufficient technical knowledge and are less confident on its implementation.

Regarding the practice of mitigating ways, the teachers' as well as administrative initiatives are seen as contributing factors. The teachers have sought for different measures like; use of mobile data in the lack of internet access, organizing ICT based training to those teachers having less or no ICT literacy and skills, managing alternative source of energy for running consistent electricity, financial support from local as well as provincial government, staff support and encouragement in the use of ICT for mitigating ICT challenges. They accepted the fact that their individual effort is not enough for regular use of ICT, rather they wished for administrative as well as governmental support for resolving ICT-related challenges.

Conclusion

ICT plays a crucial role in bringing transformation to the traditional way of teaching. However, the teachers encounter several challenges while integrating ICT into their real teaching in the classroom. Teachers encounter challenges in handling an ICT-integrated classroom. The lack of sufficient ICT resources, inadequate ICT-based training for teachers, inconsistent electricity supply, poor access to the internet, lack of alternative source of electricity, lack of administrative support and lack of ICT skills are found to be the major challenges for effective implementation of ICT in rural community schools in Nepal. The majority of teachers in rural community schools had not attained ICT-based training. The reported information about the ICT challenges could justify that rural community teachers, as well as schools, are still struggling to minimize the digital divide in education. Teachers' self-reported information led to the speculation of their inability to use ICT in classroom teaching in the same current situation. The findings also clearly revealed that teachers were trying hard to minimize those challenges related to ICT integration.

Likewise, several challenges need to be addressed if the concerned sectors and authorities aim to enhance ICT implementation in rural community schools. The schools have to search for financial resources, and stakeholders need to provide administrative and technical support to mitigate the challenges that emerged along with the effort to integrate ICT in teaching and learning, particularly in rural community schools. The results also triggered the policy-making and implementation aspects to be changed to seek a solution to the challenges seen. The majority of teachers who have not had the opportunity to learn ICT skills need to be

provided with training for proper implementation of ICT in the language classroom, and ultimately to transform the traditional way of teaching to the recent ICT-integrated teaching.

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