



# Constraints In The Recent Developments Of ICT Based Instruction In Remote Rural Areas Of West Bengal At Secondary Level

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## Abstract

**Background:** The rapid advancements in Information and Communication Technology (ICT) have transformed various sectors, including education. ICT-based instruction holds the promise of enhancing teaching and learning experiences, fostering student engagement, and improving educational outcomes. However, while urban schools have made significant progress in integrating technology into their classrooms, rural schools continue to face unique challenges in adopting ICT-based instruction.

**Objectives:** This study explores the constraints that hinder the recent developments of ICT-based instruction in rural schools like infrastructure, digital divide, digital literacy and like.

**Methodology:** The research is qualitative in nature. The methodology will explore whether the available ICT content is suitable for the local context and whether language barriers hinder the effective use of digital resources. This approach help to understand how socio-cultural norms and beliefs impact the acceptance and implementation of ICT-based instruction in remote rural areas.

**Conclusion:** By highlighting the benefits of technology in education and dispelling any misconceptions, resistance to change can be overcome. Ultimately, empowering educators and students with the necessary tools, skills, and resources will unlock the potential of ICT-based instruction in remote rural areas. This transformation can lead to improved educational opportunities, better outcomes, and a more inclusive and equitable educational landscape for all learners, regardless of their geographical location. By collectively addressing the constraints and nurturing a supportive environment, we can ensure that no learner is left behind

in the digital age, and the promise of ICT in revolutionizing education becomes a reality for remote rural communities.

**Keywords:** Constraints, ICT Based Instruction, Rural, Secondary Level.

## 1. Introduction

Information and communication technology (ICT) as a concept has been defined in varied perspectives. De Watteville & Gilbert in Wonbah as cited in Sulaiman (2020) defined ICT as the acquisition, analysis, manipulation, storage and distribution of information, and the design and provision of equipment and software for these purposes. They further stated that ICT refers to the different infrastructures used in the processes, their applications, and the numerous services these infrastructures render. Chux-Nyeche (2014) defined ICT as the combination of computers, communication equipment such as telephone, video-conferencing and other technologies associated with automation in the processing and transmission of information. That is, the application of computers and telecommunication equipment for automatic processing of information. In recent years, Information and Communication Technology (ICT) has revolutionized the education landscape, transforming the traditional methods of instruction. ICT-based instruction refers to the integration of digital technologies, such as computers, smartphones, tablets, and the internet, into the teaching and learning process. The adoption of ICT in education has brought numerous benefits, including enhanced access to information, interactive learning experiences, and improved engagement among students. However, as with any technological advancement, there are also inherent challenges and constraints that need to be addressed to fully harness the potential of ICT-based instruction. This paper aims to explore the constraints faced in the recent developments of ICT-based instruction. Understanding these limitations is crucial to making informed decisions and implementing effective strategies for integrating technology in education. By acknowledging these constraints, educators, policymakers, and stakeholders can work together to create a more inclusive, efficient, and sustainable ICT-based instructional environment. The subsequent sections of this paper will delve into various constraints that arise from different perspectives. Through this exploration, researcher hope to shed light on the complexities surrounding ICT-based instruction and identify potential solutions to overcome these obstacles.

### 1.1. Conceptual Framework of the Study

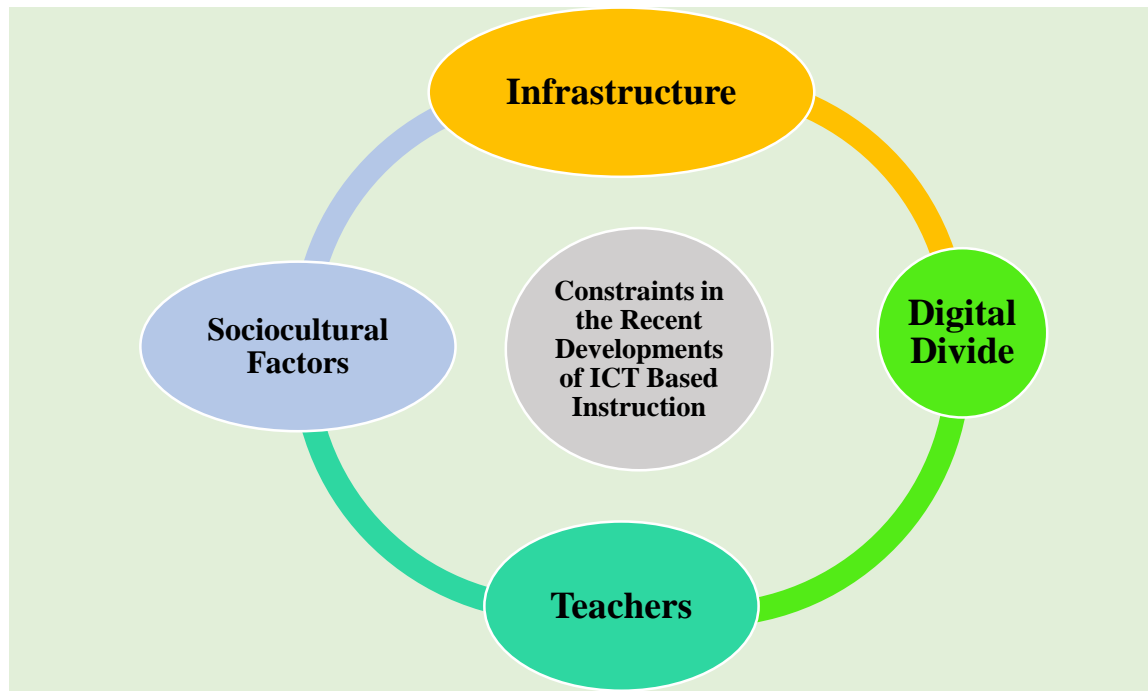


Figure 1.1: Showing the Conceptual Framework of the Study

Source: Made by Investigator

The conceptual framework of the study focuses on identifying and understanding the key constraints that hinder the recent developments of ICT-based instruction in rural schools. It aims to explore the various factors that contribute to the challenges faced by rural schools in effectively integrating and utilizing ICT for educational purposes. This component addresses the availability and quality of ICT infrastructure in rural schools. It includes factors such as the presence of reliable internet connectivity, access to digital devices (e.g., computers, tablets, and smartphones), availability of electricity, and the condition of ICT equipment. Constraints in this aspect may arise from inadequate funding, geographical remoteness, and limitations in technical support and maintenance. The conceptual framework uses these four interrelated components to identify the constraints in the recent developments of ICT-based instruction in rural schools. It recognizes that these components are not isolated but interconnected, and addressing constraints in one area may influence the effectiveness of ICT integration in the others.

### 1.2. Statement of the Problem

This study entitled as **"Constraints in the Recent Developments of ICT Based Instruction in Remote Rural Areas of West Bengal at Secondary Level."**

### **1.3.Objectives of the Study**

The research objectives of the study were delineated below:

1. To determine the constraints of ICT infrastructure in remote rural areas of West Bengal at the secondary level.
2. To explore the digital divide in remote areas of West Bengal at the secondary level.
3. To ascertain the challenges faced by teachers in utilizing ICT for instruction in remote areas of West Bengal at the secondary level.
4. To analyse the socio-cultural factors influencing the adoption of ICT in education.
5. To explore the role of government policies and support in promoting ICT-based instruction in remote rural areas.

### **2. The Review of Related Literature**

**Dutta, T., & Hazra, A. K. (2023).** Use of ICT in Rural Schools of West Bengal: Constraint and Consequences. The present study will deal with the use of ICT for academic and non-academic purposes with major constraints of ICT use in rural schools. The study was conducted with secondary and higher secondary schools with ICT facilities in Burdwan District (Undivided) of West Bengal. Students, ICT teachers, and institution heads were interviewed using open and closed-ended questions. The study found many opportunities for ICT access with existing resources if it is properly used and utilized. Limited ICT resources, Poor internet connectivity, and a lack of skilled teachers are a few bottlenecks hindering the smooth implementation of ICT in rural schools.

**Fidelis, F., & Onyango, D. O. (2021).** Availability of ICT facilities and teachers' competence in the use of ICT among public secondary schools in Ngara district, Tanzania. *East African Journal of Education and Social Sciences*, 2(2), 34-40. Qualitative data was analyzed based on themes while quantitative data was analyzed descriptively. The study revealed that the schools faced non availability of ICT facilities and internet connection. They also faced limited electricity supply and limited funds for maintenance of facilities. Furthermore, a significant number of teachers did not have competence in any of the aspects of computer. Very few could use internet while another few had some competence in hardware and programming. Therefore, it was recommended that the government and other education stakeholders should organize for seminars and workshop for capacity building so that teachers may gain knowledge and competence in the use of ICT facilities.

**Saidu, A., Clarkson, A. M., Adamu, S. H., Mohammed, M., & Jibo, I. (2017).** Application of ICT in agriculture: Opportunities and challenges in developing countries. *International Journal of Computer Science and Mathematical Theory*, 3(1), 8-18. Due to lack of growth and awareness about ICT among the rural people the process of development is very less, still it has a tremendous impact in the growth of rural area. The rural people need to know the importance of ICT for the faster improvement of rural sector this will also help ICT to work more efficiently. This paper mainly focused the different application of ICT in various sector to improve the condition of rural area and the challenges faced by ICT to develop rural areas.

**Pholotho, T., & Mtsweni, J. (2016, May).** Barriers to electronic access and delivery of educational information in resource constrained public schools: A case of Greater Tubatse Municipality. In 2016 IST-Africa Week Conference (pp. 1-9). IEEE. An exploratory case study approach was adopted to identify and understand the challenges faced by rural schools, including educational services and content considered by schools as relevant and useful. The results indicate that resource-constrained schools in the GTM are facing challenges of lack of access to electronic educational information and services, as the result teaching and learning becomes difficult.

**Ali, M. R. (2015).** ICT Using Situation in Rural and Urban Primary Schools of Bangladesh: A Comparative Study. *Prime University Journal*, 63. The findings indicate that 35% urban and 21% rural teachers use ICT in their classroom teaching-learning process but not in regular basis. Only 2% rural and 9% urban teachers always use ICT. But problem is that only 1% urban teachers use ICT in every day of the week. The most used ICT devices in both rural and urban primary schools of Bangladesh are laptop, projector, modem, pen drive, audio player and sound box.

### **2.1. Research Gap**

There is a dearth of research related to **"Constraints in the Recent Developments of ICT Based Instruction in Remote Rural Areas of West Bengal at Secondary Level."** Therefore researcher conducted investigation related to such statement of problem.

### **3. Methodology of Study**

By employing this qualitative research methodology, a comprehensive understanding of the extent of ICT infrastructure, such as internet connectivity, electricity supply, and availability of ICT devices, in remote rural regions. The specific difficulties encountered by teachers in remote rural areas when integrating ICT tools into their teaching practices. The methodology will explore whether the available ICT content is suitable for the local context and whether language barriers hinder the effective use of digital resources. This approach help to

understand how socio-cultural norms and beliefs impact the acceptance and implementation of ICT-based instruction in remote rural areas. Thus it involves gathering and analyzing academic papers, journal articles, books, reports, and other scholarly sources to identify key findings, trends, and gaps in the research.

#### 4. Analysis and Interpretation

The analysis and interpretation of the study were conducted based on the objectives of the study.

##### 4.1. Pertaining to Objective 1:

*O<sub>1</sub>: To determine the constraints of ICT infrastructure in remote rural areas of West Bengal at the secondary level.*

Information and Communication Technology (ICT) has become a critical catalyst for progress in various sectors, including education. In recent years, the integration of ICT in education has transformed traditional teaching and learning methods, offering new opportunities and possibilities for students and educators. However, despite the advancements made in urban areas, remote rural regions still face significant challenges in accessing and implementing ICT infrastructure. ICT (Information and Communication Technology) infrastructure in remote rural areas faces numerous challenges and constraints, making it difficult to establish and maintain robust connectivity and technology services. Some of the key constraints include:

**Limited or no internet connectivity:** Many remote rural areas lack reliable and high-speed internet connectivity. The absence of basic telecommunication infrastructure, such as fiber-optic cables or cellular towers, hinders access to the internet, which is crucial for various ICT services.

**Geographic barriers:** Remote rural areas often have challenging terrains, such as mountains, forests, or deserts, which make it expensive and logistically difficult to lay down the necessary infrastructure for connectivity.

**Power supply:** Access to a stable and reliable power supply can be a significant challenge in remote rural areas. Frequent power outages or the lack of electricity altogether can disrupt the functioning of ICT infrastructure.

**Lack of infrastructure investment:** Due to low population density and limited economic opportunities, private companies may be hesitant to invest in building ICT infrastructure in remote rural areas. This lack of investment slows down the development of technology services in these regions.

**Affordability:** Even if ICT services are available in remote rural areas, they may be prohibitively expensive for the local population, leading to low adoption rates.

**Limited digital literacy:** In many rural areas, there is a lack of digital literacy and awareness about the benefits of ICT services. This can impede the uptake of technology and limit the potential benefits.

**Maintenance and support challenges:** Maintaining and supporting ICT infrastructure in remote rural areas can be difficult and costly. The lack of local technical expertise and long travel distances to reach these areas can lead to delays in resolving technical issues.

**Policy and regulatory issues:** Sometimes, government policies and regulations may not prioritize ICT development in rural areas or may create bureaucratic hurdles that hinder private investments.

**Environmental factors:** Extreme weather conditions, such as heavy rains, storms, or floods, can damage ICT infrastructure and disrupt services in remote rural areas.

**Limited resources:** Local governments and communities in remote rural areas may lack the financial and human resources needed to initiate and sustain ICT infrastructure projects.

Overcoming these constraints requires a multi-faceted approach involving collaboration between governments, private sector entities, and NGOs. Investments in infrastructure, digital literacy programs, and supportive policies can play a significant role in improving ICT access and services in remote rural areas. Additionally, exploring alternative connectivity solutions such as satellite-based internet can help overcome geographical challenges.

#### **4.2. Pertaining to Objective 2:**

***O<sub>2</sub>: To explore the constraints of digital divide in remote areas of West Bengal at the secondary level.***

The digital divide refers to the gap between those who have access to and effectively use digital technologies (such as the internet and computers) and those who do not. In remote areas, the digital divide is often exacerbated by various constraints, which include:

**Language and cultural barriers:** Digital content is often primarily available in widely spoken languages and may not cater to the linguistic and cultural diversity of remote areas. This can alienate certain communities and restrict their access to relevant information and services.

**Educational disparities:** Remote areas may have limited access to quality education and training in digital skills, perpetuating the digital divide and hindering social and economic development.

**Lack of relevant content:** The absence of localized and region-specific digital content may discourage people in remote areas from using digital technologies regularly.

**Power outages and unreliable electricity supply:** Inadequate power infrastructure can disrupt digital services and limit people's ability to use digital technologies consistently.

**Limited access to devices:** Remote areas may face challenges in acquiring affordable and reliable devices such as smartphones, computers, and tablets, which are essential for accessing digital services.

**Lack of Localized Services:** Digital services often cater more to urban or metropolitan areas, leaving rural communities underserved in terms of e-commerce, e-health, and other essential online services.

**Inadequate Hardware:** Availability and affordability of computers, smartphones, and other digital devices may be limited in rural areas, hindering access to ICT.

**Government policies and priorities:** In some cases, government policies may not prioritize bridging the digital divide in remote areas, leading to limited investments and initiatives to improve digital access and literacy in these regions.

Addressing the digital divide in remote areas requires a comprehensive approach involving multiple stakeholders, including governments, private sector organizations, NGOs, and local communities. Some strategies include expanding ICT infrastructure, subsidizing internet costs, providing digital literacy training, creating localized and culturally relevant digital content, and supporting the development of affordable and durable devices. Collaborative efforts can help empower remote communities, bridge the digital divide, and unlock the potential benefits of digital technologies for these regions.

#### **4.3. Pertaining to Objective 3:**

***O<sub>3</sub>: To ascertain the constraints faced by teachers in utilizing ICT for instruction in remote areas of West Bengal at the secondary level.***

In today's rapidly evolving digital age, the integration of Information and Communication Technology (ICT) into education has become increasingly important. ICT offers a plethora of opportunities to enhance teaching and learning experiences, providing access to a vast array of educational resources and interactive tools. However, the effective utilization of ICT for instruction is not without its challenges, especially in remote areas. Remote regions often face unique constraints that hinder the seamless integration of technology in



classrooms. Teachers in remote areas often face several constraints when trying to utilize ICT (Information and Communication Technology) for instruction. These challenges can hinder the effective integration of technology into their teaching practices. Some of the key constraints include:

**Limited Infrastructure:** Remote areas may have inadequate or unreliable internet connectivity, which affects the use of online resources, educational platforms, and communication tools necessary for ICT-based instruction.

**Lack of ICT Equipment:** Many remote schools may lack access to computers, tablets, projectors, or other ICT devices required for effective technology integration in the classroom.

**Limited Training and Professional Development:** Inadequate access to training and professional development opportunities related to ICT integration can hinder teachers' ability to use technology effectively in their teaching.

**Lack of Localized Content:** Educational resources and digital content may not be tailored to the specific needs and contexts of remote areas, making it challenging for teachers to find relevant materials.

**Language and Cultural Barriers:** ICT resources and content may be predominantly available in widely spoken languages, overlooking local languages and cultural nuances.

**Time Constraints:** Teachers in remote areas often have heavy workloads and limited time to explore and experiment with ICT tools for instruction.

**Limited Technical Support:** The absence of technical support and maintenance services in remote areas can make it difficult to address technical issues with ICT devices and infrastructure.

**Cost:** The cost of acquiring and maintaining ICT equipment and software can be prohibitive for schools and teachers in remote areas, especially if financial resources are limited.

**Distance Learning Challenges:** In remote areas with limited infrastructure and resources, implementing effective distance learning programs using ICT can be challenging.

In conclusion, the integration of ICT in education has the potential to revolutionize teaching and learning experiences, even in remote areas. However, teachers in such regions encounter a range of constraints that hinder the effective utilization of technology for instruction. From limited infrastructure and access to digital resources to inadequate training and technical support, these challenges can impede the seamless integration of ICT in classrooms.

#### 4.4. Pertaining to Objective 4:

*O<sub>4</sub>: To analyse the constraints of socio-cultural factors influencing the adoption of ICT in education.*

The adoption of ICT (Information and Communication Technology) can be significantly influenced by socio-cultural factors, which encompass the social and cultural context in which individuals and communities operate. These factors can either facilitate or hinder the uptake of ICT in various settings. Some of the key constraints arising from socio-cultural factors include:

**Attitudes and Beliefs:** Cultural norms and attitudes towards technology can influence people's perception of ICT. If there is resistance or skepticism towards new technologies, it can slow down the adoption process.

**Language and Content Relevance:** The availability of ICT content in local languages and culturally relevant contexts can impact adoption rates. If the content is primarily available in foreign languages or does not align with local values, it may deter people from embracing ICT.

**Digital Literacy:** The level of digital literacy and skills within a community can be a significant constraint. If individuals lack the knowledge to use ICT effectively, they may feel intimidated or reluctant to adopt technology.

**Gender Norms:** In some cultures, traditional gender roles and expectations can influence access to and use of ICT. Women may face more significant barriers in adopting technology due to social norms.

**Privacy and Security Concerns:** In certain cultures, there may be strong concerns about data privacy and security, leading individuals to avoid using ICT to protect their personal information.

**Social Hierarchy:** Social hierarchies and power structures can influence the adoption of ICT. If certain groups are marginalized or excluded, they may have limited access to technology and opportunities for digital participation.

**Religious and Ethical Considerations:** Cultural and religious beliefs may influence the use of certain technologies, leading to resistance or restrictions on their adoption.

**Interpersonal Networks:** Social networks and word-of-mouth play a significant role in technology adoption. If influential members of a community are not embracing ICT, it may discourage others from doing so as well.

**Resource Constraints:** Socio-economic factors can also be a constraint, as ICT adoption may require financial resources that some individuals or communities cannot afford.

**Accessibility and Physical Infrastructure:** In certain cultural contexts, the lack of physical infrastructure or accessibility challenges may hinder the adoption of ICT, especially in remote or marginalized areas.

Overcoming these socio-cultural constraints requires tailored strategies that take into account the specific beliefs, values, and needs of the target population. Engaging with local communities, providing culturally relevant content and training, promoting gender-inclusive approaches, and fostering a supportive environment for technology adoption can help address these challenges. Additionally, collaboration between stakeholders, including governments, NGOs, and community leaders, is vital in promoting a positive socio-cultural shift towards the adoption of ICT for the betterment of individuals and society as a whole.

#### **4.5. Pertaining to Objective 5:**

***O<sub>5</sub>: To explore the role of government policies and support in promoting ICT-based instruction in remote rural areas.***

In today's digitally connected world, Information and Communication Technology (ICT) has emerged as a powerful tool in transforming education. ICT-based instruction offers new opportunities to enhance learning experiences, engage students, and bridge educational disparities. However, while technology adoption is becoming prevalent in urban areas, remote rural regions often face unique challenges in embracing ICT in education. Government policies and support play a crucial role in promoting ICT-based instruction in remote rural areas. They can significantly impact the accessibility, affordability, and effectiveness of technology integration in education. Here are some ways in which government policies and support can facilitate the adoption of ICT-based instruction in remote rural areas:

**Infrastructure Development:** Governments can invest in building and upgrading ICT infrastructure, including broadband internet connectivity and electricity supply in remote areas. This foundational support is essential for enabling schools and communities to access and use digital technologies effectively.

**Financial Assistance:** Providing financial incentives or subsidies for schools and teachers in remote areas to acquire ICT equipment, such as computers, tablets, projectors, and software, can help overcome financial barriers to technology adoption.

**Training and Professional Development:** The government can organize and fund training programs for teachers in remote areas to enhance their digital literacy and skills in using ICT for instruction. This support empowers teachers to integrate technology effectively into their teaching practices.

**Digital Content Development:** Governments can support the creation of localized and culturally relevant digital educational content that aligns with the curriculum and addresses the needs of students in remote areas.

**E-Content Distribution:** Establishing platforms or networks for the distribution of digital educational content can ensure that teachers and students in remote areas have access to quality resources and learning materials.

**Digital Inclusion Initiatives:** Governments can launch digital inclusion initiatives aimed at bridging the digital divide and ensuring that all students, regardless of their geographical location, have access to ICT-based education.

**E-Government Services:** Integrating e-government services into the education system can streamline administrative processes and improve access to educational resources and support for schools in remote areas.

**Collaboration with Private Sector:** Governments can collaborate with private sector entities to leverage their expertise and resources in ICT to support education initiatives in remote rural areas.

**Monitoring and Evaluation:** Implementing monitoring and evaluation mechanisms allows the government to assess the effectiveness of ICT-based instruction initiatives in remote areas, identify challenges, and make necessary adjustments to improve outcomes.

**Public Awareness Campaigns:** Launching public awareness campaigns to promote the benefits of ICT-based education and address any misconceptions or concerns can create a supportive environment for technology adoption.

In the end, government policies and support play a pivotal role in promoting ICT-based instruction in remote rural areas. By recognizing the unique challenges faced by schools and communities in these regions, governments can create a conducive environment for the effective integration of technology in education. Through strategic interventions and targeted initiatives, they can bridge the digital divide and unlock the full potential of ICT for teaching and learning. By putting in place favorable policies and providing targeted support, governments can foster an enabling environment that encourages the adoption of ICT-based instruction in remote rural areas. This, in turn, can improve the quality of education, enhance learning outcomes, and empower students with the skills needed to thrive in a digitally connected world.

## 5. Conclusion

In conclusion, while there have been significant advancements in ICT-based instruction, remote rural areas continue to face several constraints in adopting and benefiting from these technologies. The challenges in recent developments of ICT-based instruction in remote rural areas include limited infrastructure, inadequate access to digital devices and reliable internet connectivity, a lack of digital literacy and technical skills among teachers and students, and the scarcity of localized and culturally relevant educational content. Addressing these constraints requires a concerted effort from governments, educational institutions, NGOs, and other stakeholders. Policymakers must prioritize the development of ICT infrastructure in remote areas, ensuring that reliable and affordable internet connectivity reaches every corner of the country. Financial support should be provided to schools and teachers to acquire necessary digital devices and equipment. Furthermore, public awareness campaigns can play a crucial role in encouraging the acceptance and integration of ICT in remote rural communities. By highlighting the benefits of technology in education and dispelling any misconceptions, resistance to change can be overcome. Ultimately, empowering educators and students with the necessary tools, skills, and resources will unlock the potential of ICT-based instruction in remote rural areas. This transformation can lead to improved educational opportunities, better outcomes, and a more inclusive and equitable educational landscape for all learners, regardless of their geographical location. By collectively addressing the constraints and nurturing a supportive environment, we can ensure that no learner is left behind in the digital age, and the promise of ICT in revolutionizing education becomes a reality for remote rural communities.

## Reference

- Ali, M. R. (2015). ICT Using Situation in Rural and Urban Primary Schools of Bangladesh: A Comparative Study.
- Dahal, T. N. (2021). ICT resources availability in rural community schools in Nepal: An exploration and analysis. *Artech J. Art Social Sci.*, 3: 1-10. *Artech Journals*, 3(1), 1-10.
- Dutta, T., & Hazra, A. K. (2023). Use of ICT in Rural Schools of West Bengal: Constraint and Consequences.

- Fidelis, F., & Onyango, D. O. (2021). Availability of ICT facilities and teachers' competence in the use of ICT among public secondary schools in Ngara district, Tanzania. *East African Journal of Education and Social Sciences*, 2(2), 34-40.
- Joshi, D. R. (2017). Policies, practices and barriers of ICT utilization in school education in Nepal. *International Journal of Research in Social Sciences*, 7(2), 408-417.
- Kwapong, O. (2007). Problems of policy formulation and implementation: The case of ICT use in rural women's empowerment in Ghana. *International Journal of Education and Development using ICT*, 3(2), 68-88.
- Madida, M., Rugbeer, H., & Naidoo, G. M. (2019). Barriers to effective digital teaching in rural schools. *Gender and Behaviour*, 17(4), 14101-14115.
- Maiti, A., & Jana, S. K. (2021). ICT Use in Higher Education in Eastern States of India: An Analysis. In *Developing Countries and Technology Inclusion in the 21st Century Information Society* (pp. 230-245). IGI Global.
- Memon, A. B., & Tunio, M. N. (2023). Assessing the Potential of ICT Education at Secondary Schools in Pakistan: A Comparative Study. *Pakistan Journal of Educational Research and Evaluation (PJERE)*, 10(2), 16-33.
- Onwuagboke, B. B. C., Singh, T. K. R., & Onwuagboke, J. N. (2014). Availability, gender and teaching experience: Determinants of ICT utilization in teaching in rural secondary schools in south eastern Nigeria. *The International Journal of Science and Technoledge*, 2(5), 410.
- Pholotho, T., & Mtsweni, J. (2016, May). Barriers to electronic access and delivery of educational information in resource constrained public schools: A case of Greater Tubatse Municipality. In *2016 IST-Africa Week Conference* (pp. 1-9). IEEE.

- Saidu, A., Clarkson, A. M., Adamu, S. H., Mohammed, M., & Jibo, I. (2017). Application of ICT in agriculture: Opportunities and challenges in developing countries. *International Journal of Computer Science and Mathematical Theory*, 3(1), 8-18.
- Umar, I. N., & Jalil, N. A. (2012). ICT skills, practices and barriers of its use among secondary school students. *Procedia-Social and Behavioral Sciences*, 46, 5672-5676.
- Wu, D., Li, C. C., Zhou, W. T., Tsai, C. C., & Lu, C. (2019). Relationship between ICT supporting conditions and ICT application in Chinese urban and rural basic education. *Asia Pacific education review*, 20, 147-157.

