Effectiveness of ICT for Secondary Education System in Vyas Municipality Ward No-1 of Nepal

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Abstract

ICT education in Nepal encounters obstacles that impede its effective implementation and widespread adoption. Insufficient infrastructure, including reliable internet connectivity, electricity, and hardware, poses a significant challenge to providing comprehensive ICT education countrywide. Additionally, a considerable digital divide exists between urban and rural areas, leading to disparities in access to ICT tools and technology. The research aims to explore the effectiveness of ICT in enhancing Nepal's secondary education system, assessing its impact and benefits. It seeks to understand how ICT can improve various aspects of secondary education, ultimately enhancing the overall quality and efficiency of the educational process. Questionnaires and group discussion are the main tools of this research. Mixed method used in this research. The majority of participants considered ICT's effectiveness as "Sufficient", indicating a significant positive impact on the secondary education system. Additionally, 33% rated it as "Normal" suggesting an average impact. 8% perceived it as "Satisfactory", indicating a modestly positive perception. However, 21% rated it as "Insufficient" indicating room for improvement. This analysis reveals that while many participants view ICT positively, a considerable proportion sees scope for enhancement. Overall, this study provides insights into the perception of ICT's effectiveness in enhancing secondary education in Nepal, with most participants viewing it positively, through some believe improvements are needed.

Keywords: ict, smart classroom, education, traditional, learning

Introduction

ICT, short for Information and Communication Technology, encompasses technologies facilitating information access via telecommunication. Unlike Information Technology, ICT emphasizes communication technologies such as the internet, wireless networks, and cell

phones. Nowadays, there are increased opportunities to incorporate ICT into teacher training programs, enhancing the quality of education. Teachers hold a vital role in society, fostering creativity in students who can become future social workers, politicians, poets, and philosophers. With rapid technological advancements, educational institutions adapt their programs and classrooms to bridge the technology gap for effective teaching and learning in the future(Ratheeswari, 2018).

Telephone lines were installed, and a trunk service connected Kathmandu and Raxul in 1914. Radio Nepal commenced broadcasting in 1951, and the Radio Act was established in 1957. The use of FACIT electronic calculators officially started in 1962, and computers were employed for census data processing in the 1960s. In 1917, the government utilized an IBM 1401 computer for census data processing, and the National Computer Center was initiated in 1974. In 1982, the first foreign direct investment in software development was made. Private IT companies flourished in the 1990s after market deregulation. The internet was introduced in 1993, initially through RONAST and MOS, through the project was short-lived. In 1994, MOS established the first commercial e-mail service linked to Australia, allowing for regular message transfers(Sabitha Marican, 2019).

Information and Communication Technologies have presented both opportunities and challenges for various educational stakeholders, including teachers, students, curriculum designers, planners, and institutions. These technologies have connected schools to the outside world, extending the teaching and learning process beyond traditional classrooms. ICT tools have significantly influenced educational reform, shaping the roles of teachers and students, and transforming the content and form of education. However, the adoption of ICT in education also faces hurdles. In developing countries like Nepal, limited access to ICT tools creates a digital divide among teachers, students, and institutions. Additionally, challenges arise from low digital literacy, insufficient ICT facilities, unfavorable policies, lack of technical support, and resistance to change traditional educational roles and beliefs. Despite these challenges, it is crucial to embrace ICT in education. Overcoming these obstacle requires support from school administration, positive teacher atti-

tudes, continuous ICT training, appropriate tool usage, and a redesign of educational infrastructure and practices. Implementing these measures can transform challenges into opportunities, fostering and ICT-friendly pedagogy that meets the needs of contemporary information society in Nepal and beyond(Kandel, 2022).

In Nepal, ICT education faces several challenges that hinder its effective implementation and widespread adoption. Insufficient ICT infrastructure, such as reliable internet connectivity, electricity, and hardware, poses a significant obstacle to providing comprehensive ICT education across the country. There is a significant disparity in access to ICT tools and technology between urban and rural areas. Students in remote regions offend lack access to computers, the internet, and other essential ICT resources. Lack of Trained Teachers: There is a shortage of teacher who are adequately trained in ICT skills and integrating technology into the teaching process. This limits the quality and effectiveness of ICT education in schools. The educational curriculum often fails to keep pace with rapid technological advancements, resulting in outdated or insufficient ICT content in schools. Limited budget allocation for ICT education restricts investments in updating technology infrastructure, providing training, and developing relevant digital resources. Some educators and administrators may resist incorporating ICT into the education system due to traditional teaching methods, fear of technology, or lack of understanding of its potential benefits. A significant portion of digital content and resources is primarily available in English, which creates a barrier for students and teachers who are more comfortable with local languages. The absence of comprehensive and clear policies related to ICT in education hampers strategic planning, resource allocation, and effective implementation. Inadequate Monitoring and Evaluation: The lack of proper monitoring and evaluation mechanisms makes it challenging to access the impact of ICT initiatives and identify areas for improvement.

Addressing these challenges requires a multi-faced approach, including investment in ICT infrastructure, teacher training programs, curriculum updates, policy development, and creating content in local languages. Collaboration between the government, educational institutions, private sector, and international organizations in vital to overcome these

obstacles and realize the full potential of ICT education in Nepal(Rana, 2018).

The research question is "What is the effectiveness of ICT in education process of the secondary education system in Vyas Municipality Ward No-1?" This research question seeks to investigate and assess the impact and benefits of information and communication Technology on the secondary education system in Nepal.

The main objectives of this research, Assess the current status of ICT education process of secondary schools in Vyas Municipality Ward no-1 Nepal, including the availability of infrastructure, access to technology, and ICT-related policies and practices, Compare the effectiveness of ICT in strengthening the secondary education system in different regions of Nepal, considering variations in resources and infrastructure. Analyze the effect of ICT on student learning outcomes, academic performance, and engagement in the learning process. Identify challenges and barriers faced in implementing ICT in secondary education and explore strategies to overcome them.

Due to the impossibility of examining ICT education in all secondary schools in Nepal, this research has chosen a specific study area to ensure simplicity and clarity. The study area is limited to Ward No. 1 of Vyas Municipality, where only model secondary schools are selected. Among them, Nirmal Secondary School was selected since the other schools in the region are Normal Secondary school, lower secondary and primary schools. For the study, participants included the computer teacher and school principal from each selected school. The research focus on clear and concise objectives, including investigation physical conditions, educational conditions, lab conditions, students' interests, parental preferences, school requirements, computer availability, challenges faced in ICT education, future plans, and various obstacles.

The research on "Effectiveness of ICT in Strengthening the Process of Secondary Education System in Nepal" can have several significant contributions. The study can provide insights into the impact of ICT integration in Secondary education, helping policymakers to understand the benefits and challenges of incorporating technology into the education system. It can guide the formulation of evidence-based policies to

support ICT implementation in schools across Nepal. By examining the effectiveness of ICT in the secondary education process, the research can highlight areas where technology enhances learning outcomes, teaching methodologies, and overall educational experiences. This information can be used improve teaching practices and student engagement. This study can shed light on the existing ICT infrastructure in secondary schools in the selected area and identify areas that need improvement. This can help in directing resources and investments to strengthen the technological capabilities of schools. Understanding the challenges faced by teachers in integrating ICT can inform the design to targeted training programs to enhance their digital skills and proficiency. Effective teacher training can lead to more efficient and productive use of technology in the classroom. The research can assess how ICT impacts student academic performance and engagement levels. This information can help educators design more personalized and interactive experiences, potentially leading to better student outcomes. By studying the problems and challenges faced in implanting ICT in secondary education, the research can help identify barriers that hinder effective technology integration. Addressing these obstacles can pave way for a smoother adoption of technology in the education system. Based on the findings, the research can provide recommendations for future ICT- related initiatives in secondary education in Nepal. This can assist stakeholders in planning and implementing strategies that align with best practices and lessons learned. The research contributes to the existing knowledge base on the role of ICT in education. It adds to the literature and can serves as a reference for researchers, policymakers, and educators interested in similar areas of study. The insights gained from this study in a specific municipality and secondary schools can potentially be extrapolated to other regions and schools in Nepal. This can help in scaling up successful ICT practices and interventions nationwide. The study adds to the body of educational research in Nepal, specifically focusing on the integration of ICT in the secondary education system. It encourages further research and exploration in this field to deepen our understanding and improve educational practices. The research on the effectiveness of ICT in strengthening the process of secondary education in Nepal can have practical implications that extend beyond the specific study area and contribute to the enhancement of the

education system as a whole.

Review of Literature

In order to enhance the effectiveness of the research, several research papers were analyzed and their findings were summarized. This contribution significantly enriches the depth of the study. The related review paper are given.

The successful implementation of ICT in education hinges on an effective initial stage, ensuring teachers and students can make the most of it. This requires schools' top management to provide proper support and preparation for technology based teaching and learning. If the integration process is appropriately executed from the outset and continuous maintenance is ensure, ICT adoption in schools can yield substantial benefits for educator and learners alike. The practicality of using ICT in education underscores the importance of granting teachers time to learn and explore the technology, overcoming the "trial-and-error" phase until they become comfortable with its use for teaching and learning. To enhance the country is education system and elevate its global ranking, serious consideration must be given to the integration of ICT in classrooms. This entails changing teachers' beliefs about using technology in education, as their pivotal role in implementing new policies efficiently and successfully cannot be overlooked. With advancements in technology and communication devices, accessibility to ICT for students both at school and home become crucial. Moreover, teachers need to be literature and process sound ICT skills and knowledge to enhance their teaching methods and embrace the demands of 21st-century teaching skill, promoting effective learning in the process(Ghavifekr & Rosdy, 2015).

This research highlights real challenges faced in integrating ICT education and the current situation in educational institutes, including a lack of ICT-related personnel, insufficient implementation of government policies, limited knowledge about the benefits of ICT tools, and the significance of integrating them for communication. Moreover, there is a shortage of ICT tools and techniques for teaching and learning activities. Many teachers lack the necessary knowledge and skills to effectively use ICT in education, as they have not received adequate training teaching ICT at the secondary level. Consequently, the insufficient knowledge and

skills in using ICT tools and software restrict the utilization of ICT in teaching and learning activities. Moreover, institutions often lack proper staff training and quality ICT education training for teachers(Diyal & Pandey, 2022).

The research on the Effectiveness of ICT in Higher Education Model emphasizes that four key factors, namely Availability of ICT, Usage of IT, Knowledge from ICT, and Cost of ICT, significantly and positively impact the efficacy of ICT. among these factors, Cost of ICT exerts the greatest influence on ICT effectiveness in higher education, with usage availability, and knowledge following closely behind. The integration of ICT in education transmission and knowledge acquisition. This systematic approach makes the teaching and learning experience more convenient, allowing learners to develop essential skills to benefit from it further. It is crucial to recognize that positive change in learning outcomes are strongly linked to the innovative use of technology in education. Hence, the effective utilization of ICT in higher education can be a key factor in promoting progress, enhancing teaching methods, and transforming learning processes, benefiting teachers, administrators, and students alike(Chakraborty et al., 2018).

The research investigates the Government of Nepal's recognition of the importance of integrating ICT in education to meet the needs of contemporary society and assesses the actual implementation of such integration in rural primary schools. Initiatives such as the formulation of ICT in education policies, its inclusion in the curriculum, and collaboration with NGOs to provide computer labs and ICT training for teacher are significant steps toward modernizing teaching and learning approaches from traditional methods. However, the study reveals a disparity between policy intentions and the practical challenges faced in rural areas. For the transformation of education and the integration of Nepal society into global communication networks to go beyond mere rhetoric, well-researched and realistic implementation strategies must be developed. There are still formidable barriers, represented by high mountains ravines, that need to be navigated to achieve these goals(Rana, 2018).

Employing information and Communication Technology for instructing mathematics has the potential to improve the efficacy of the

teaching procedure and bolster students' grasp of fundamental principles. However, integrating this approach into education is not devoid of challenges, as a variety of obstacles cloud emerge. These hindrances has been identified and categorized in the research(Chong et al., 2005). The incorporation of ICT into the realm of mathematics education yields beneficial effects on both the processes of teaching and learning. Various hindrances to integration ICT into the instruction and comprehension of mathematics across different branches of the subject have been recognized. Moving forward, the study's scope will be expanded to encompass higher education levels, focusing on professional advancement(Das, 2019).

The initial motif, impacted assignments, showcased how students perceived ICT instruments as empowering them to effortlessly, swiftly, and dependably execute tasks, while also producing polished and appealing outcomes. The subsequent enhancement highlighted how these tools aided in the gradual refinement and alternation of written assignments, as well as the exploratory evolution concepts and designs. The third focal point, shift in experience, unveiled that a considerable number of students perceived the use of computers in an educational setting as inherently different from conventional classroom engagements, discerning differences in novelty, setting arrangement, and the dynamics of interaction between them and their educators(Pandey, 2022). The study explored the function of ICT within science education in schools situated in Sokoto state. It presented an outline of ICTs incorporation into education, the actual utilization of ICT within school science laboratories, and the significance of ICT within the educational framework. One of its pivotal advantages is fostering students' cognitive abilities by encouraging advanced thinking, enhancing problem-solving capabilities refining communication proficiencies, and cultivating a profound comprehension of the subject matter and instructional tools. Furthermore, the study delved into the consequences of applying ICT to science education. In essence, ICT in education is perceived as a discipline, a resource, and a crucial skill, all of which collectively offer substantial societal benefits(Abdullahi, 2013).

Through conducting individual in person interviews, the author successfully gathered and examined comprehensive data concerning the requirements, background viewpoints, and inclinations of social stud-

ies educators regarding the utilization of ICT in teaching and learning. Nonetheless, two constraints within this research exert and influence on these findings. Firstly, the 23 teachers who partook in this study may not offer a representative perspective encompassing all social studies instructors in Colorado, even though their number proved to be suitable for this investigation. Secondly, the teachers involved in the study might possess a preexisting interest in and potentially greater familiarly with integrating ICT within their classrooms compared to non-participating educators. This phenomenon of self-section cloud be linked to the generally favorable responses documented in this study(Hong, 2016).

The employed teaching approach has originated from the meticulous application of the scientific method and credible sources, while student participation was entirely optional. This approach has demonstrated its effectiveness as a supplementary tool to traditional classroom instruction. Additionally, it lessens the load of class discussions, referencing, quizzes, and similar activities, affording the instructor more focus on the core classroom seasons(Srinivasan, 2009).

The existing literature, however lacks investigations into the impact of ICT on improving the educational sector at Nepal's Secondary level. Hence, this research has been conducted with the specific purpose of offering substantial support to address these crucial gaps.

The Conceptual Framework

Various elements have been recognized to enhance the efficacy of ICT in secondary education.

Main Factors	**Scale and inquiries**
Accessibility of ICT	Presence of a fully equipped IT lab in the school. Access to fast internet connectivity for both IT land and personal devices throw Wi-Fi. Utilization of online multimedia and video conferencing during classroom lectures, facilitated by smart classrooms. Access to a advanced library within the IT labs.

Main Factors	**Scale and inquiries**
Usage of ICT	Implementation of the latest ICT innovations in schools. Adoption of multimedia devices instead of traditional chalk and board for teaching. Integration of Wi-Fi in schools, allowing access to information through smartphones, tablets. Utilization of video-conferencing to monitor classroom activities of both students and teachers. Application of ICT for recording attendance in schools.
Knowledge from ICT	In the secondary education system, ICT offers information to operate various devices. In the Secondary education system, ICT imparks knowledge that is beneficial at the professional level. ICT generates valuable information for students related to their studies. Important notifications about exams, form fill-ups, or upcoming events can be promptly delivered to individuals through smartphone applications.

Main Factors	Scale and inquiries
Cost of ICT	The IT lab facilities provided to students are included as a nominal part of the tuition fees. Students are required to acquire personal computers and mobile devices for any time access, both within and outside the school premises. Visually and hearing-impaired students are exempt for any additional charge or the need to purchase special devices. laptops, notebooks, smartphone, and tablets are available at affordable prices. Attractive offers are available for 4G data packs, ensuring affordable mobile internet access. IT lab have minimal operation and maintenance costs.
Effectiveness of ICT in Secondary Education System	With the aid of ICT, individuals can enhance their learning capabilities. ICT offers a vast online learning repository through digital libraries and the internet. Multimedia system assist students in improving their learning experience. Implementing video-conferencing enables monitoring of student-teacher interactions in the classroom, facilitating personalized feedback. ICT has the potential to improve educational efficiency at the local, regional, and national levels.

Hypothesis of The Study

- The presence of ICT significantly influences its effectiveness in the education sector.

- The utilization of ICT has a substantial impact on its effectiveness in the education sector.
- The knowledge derived from ICT plays a vital role in enhancing its effectiveness in the education sector.
- The cost of ICT has a significant impact on its effectiveness in the education sector.

Methodology

The research method makes the study goal-oriented. In this research work, to make the study highly effective, first of all, the problems of the study area have been collected. Research design has been prepared after selecting the collected problems. Although the design is ready, the methods of data collection have been prepared. The collected data has been analyzed. A report has been prepared and documentation has been done at the end. In this research used mixed method.

Area and Population

In this research to explore the significant role of ICT in secondary level education and investigate the measure taken to enhance the educational aspect within the school. To achieve this, various individuals associated with the school were selected for the study. These include the school's principal, the chairman of the school management committee, and four committee members. Additionally, ten students currently enrolled in secondary education, ten parents, two computer teachers, and one teacher each for English, mathematics, science, social studies, and Nepali subjects were chosen to participate in the research.

Instrument

Several tools were developed to facilitate this study. This conceptual framework considered various factors, and based on these factors, close questionnaires were designed to ensure easy observation and data collection. To enhance the research's reliability and validity, a group discussion was conducted among selected sample participants.

Data Collection Procedure

The data collection process for this study was conducted with an

objective approach. To assess the effectiveness of ICT in the teaching and learning process at the school, the researchers sought to gather information on several key aspects, including students' interest, teachers' positive and negative experiences with ICT, and various factors influencing the research. This sample for the study was collected using the following methods:

Group Discussion: A group discussion was organized to validate the study and gather the opinions of stakeholders from different schools. This discussion provided additional support to the research.

Direct Observation in School: The researchers conducted direct observations in school to collect data. They studied various physical materials used for educational activities, observed classroom dynamics, assessed the condition of ICT devices used in the school, and gathered opinions from various stakeholders. By utilizing these methods, the researchers ensured a comprehensive and unbiased data collection process to achieve the study's objectives effectively.

Data analysis Process

The data gathered in this study has been thoroughly examined. Using the collected data, a comparative analysis was performed to assess the positive advancements and impact of ICT on the educational aspect at the secondary level of the school. The study involved rating four aspects, namely sufficient, normal, satisfactory, and insufficient, to evaluate the direct and indirect influence of ICT on various subjects and other aspects of the school. By calculating the average ratings obtained, the researchers conducted a comprehensive result analysis.

Result analysis and Discussion

Table no-1 serves as the primary foundation for the result analysis. Once the data was collected, a subsequent table was created to facilitate the examination of the tabulated data.

Table: 1

SN	Factors	Sufficient	Normal	Satisfactory	Insufficient
1	Presence of a fully equipped IT lab in the school.	1	0	0	0
2	Access to fast internet connectivity for both IT land and personal devices throw Wi-Fi.	1	0	0	0
3	Utilization of online multimedia and video conferencing during classroom lectures, facilitated by smart classrooms.	0	1	0	0
4	Access to a advanced library within the IT labs.	1	0	0	0
5	Implementation of the latest ICT innovations in schools.	1	0	0	0
6	Adoption of multimedia devices instead of traditional chalk and board for teaching.	0	1	0	0
7	Integration of Wi-Fi in schools, allowing access to information through smartphones, tablets.	1	0	0	0
8	Utilization of video-conferencing to monitor classroom activities of both students and teachers.	0	0	1	0
9	Application of ICT for recording attendance in schools.	0	0	0	1
10	In the secondary education system, ICT offers information to operate various devices.	0	1	0	0

SN	Factors	Suffi-cient	Nor-mal	Satis-facto-ry	Insuf-ficient
11	In the Secondary education system, ICT imparks knowledge that is beneficial at the professional level.	0	1	0	0
12	ICT generates valuable information for students related to their studies.	0	1	0	0
13	Important notifications about exams, form fill-ups, or upcoming events can be promptly delivered to individuals through smartphone applications.	0	0	0	1
14	The IT lab facilities provided to students are included as a nominal part of the tuition fees.	1			
15	Students are required to acquire personal computers and mobile devices for any time access, both within and outside the school premises.	0	0	0	1
16	Visually and hearing-impaired students are exempt for any additional charge or the need to purchase special devices.	1	0	0	0
17	laptops, notebooks, smartphone, and tablets are available at affordable prices.	0	1	0	0
18	Attractive offers are available for 4G data packs, ensuring affordable mobile internet access.	1	0	0	0

SN	Factors	Suffi-cient	Nor-mal	Satis-facto-ry	Insuf-ficient
19	IT lab have minimal operation and maintenance costs.	0	0	0	1
20	With the aid of ICT, individuals can enhance their learning capabilities.	0	1	0	0
21	ICT offers a vast online learning repository through digital libraries and the internet.	0	0	0	1
22	Multimedia system assist students in improving their learning experience.	0	1	0	0
23	Implementing video-conferencing enables monitoring of student-teacher interactions in the classroom, facilitating personalized feedback.	0	0	1	0
24	ICT has the potential to improve educational efficiency at the local, regional, and national levels.	1	0	0	0

The result analysis of the given data on the effectiveness of ICT in strengthening the process of the secondary education system in Vyas Municipality ward no. 1 is as follows:

Table: 2

Sufficient	Normal	Satisfactory	Insufficient
38%	33%	8%	21%

The percentages represent the distribution of responses from the participants who rated the impact of ICT on the secondary education system. 38% of the participants found that the effectiveness of ICT in

strengthening the process of secondary education was sufficient. 33% rated it as normal, 8% considered it satisfactory, and 21% perceived it as insufficient. This comparative analysis represented by pie chart diagram.

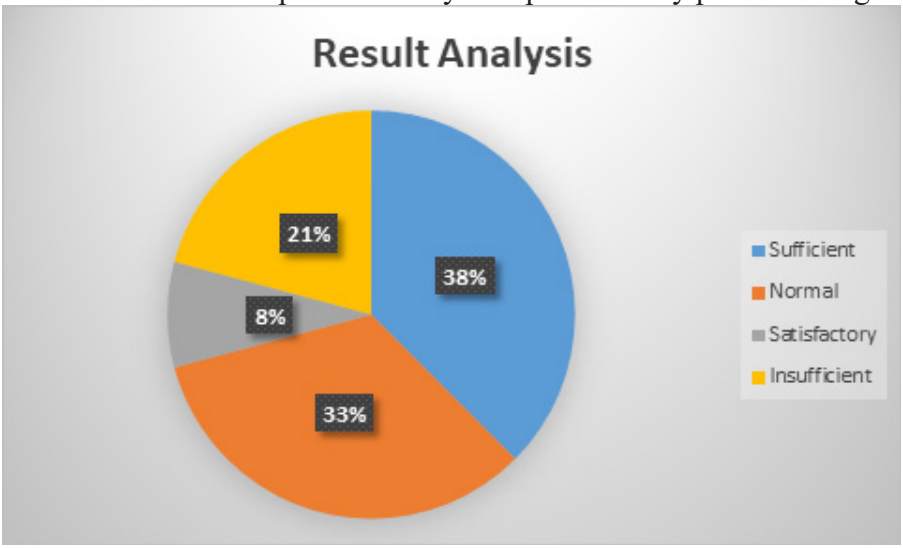

Figure no 1

The highest percentage of participants rated the effectiveness of ICT as "Sufficient" indicating that they believe ICT has a significant positive impact on the secondary education system. Following closely, 33% of the participants rated it as "Normal" suggesting that they consider ICT to have an average impact on the secondary education process. A similar percentage (8%) rated it as "Satisfactory" which may indicate a more modest but still positive perception of ICT's impact. Lastly, 21% of the participants rated ICT's effectiveness as "Insufficient" suggesting that they see room for improvement or believe that ICT's impact on the secondary education system not meeting expectations. This result indicate that a significant portion of the participants viewed ICT as having a sufficient or normal impact on the secondary education system. However, there is also a considerable proportion that felt the impact was unsatisfactory or insufficient. This analysis provides insights into the overall perception of ICTs effectiveness in enhancing the secondary education process in Nepal. The majority of participants see ICT as having a positive impact on the secondary education system, either "Sufficient" or

Normal". However, there is a notable proportion that perceives impact as "Insufficient", highlight potential area for improvement or further development.

The research revealed that ICT plays a significant role in enhancing the school's educational standards. The results indicated that educational activities centered around ICT as the primary foundation were effective. Despite focusing solely on the teaching activities at the secondary level, the findings suggest that these results may also be representative of educational conditions in other levels. Throughout the investigation, it became evident that ICT has led to improvements in various aspects of the school. Different departments within the school have experienced enhancement in their activities due to the integration of ICT.

Conclusion

The study focused on the effectiveness of ICT in improving education at a model school selected by the government of Nepal in ward no. 1 of Vyas Municipality. Various aspects of the chosen model school were observed to gain insights. The major challenges identified were the lack of progress in schools without access to ICT, students' disinterest in educational activities, and teachers' lack of enthusiasm in the teaching process. To address these issues, the researchers raised questions to understand the reality of strengthening the educational situation in the absence of ICT access. To explore this question, a study was conducted on various aspects of the secondary school selected the government in ward no. 1 Vyas Municipality. The study revealed the use of ICT devices in different departments and educational activities at the school. All subject teachers were found to be capable of using smart boards and possessed the necessary ICT knowledge. The School showed a high level of ICT integration, which significantly contributed to its educational efficiency, surpassing other schools. Among 24 factors considered for the study, 38% were rated as sufficient, 33% as normal, 8% as satisfactory, and 21% as insufficient. It was noted that the school should focus on implementing additional programs to improve the satisfactory level and address the issues marked as insufficient.

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