

INTEGRATION OF ICT IN SCHOOLS OF KATHMANDU: A CASE  
STUDY OF PUBLIC SCHOOL

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## DECLARATION

I hereby declare that this dissertation is my original work and has not been submitted for candidature for other degrees.

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## DEDICATION

This dissertation is dedicated

to my mother with love.

To Karkhana for the great trajectory in my career path.

To my mentors Mr. Babu Raja Dyola, Mr. Shyam Pant,

and my dear friends.

-S

## AN ABSTRACT

*Sonam Tamang* for the degree of *Masters in Sustainable Development (MSD)*,  
presented on 22 September 2022.

Title: *Integration of ICT in Schools of Kathmandu: A Case Study of Public School*

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ICT integration is one of the major topics discussed in the field of education. Along with its various opportunities and possibilities, ICT adaptation requires a variety of strategic management, implementation processes, and contextual understandings to integrate effectively and efficiently. Similarly, for ICT and innovations to be implemented smoothly at school, stakeholders' decisions and perceptions play a vital role. The motivation factor for leaders, teachers, and students to adopt innovation is influenced by various social and economic factors. Additionally, the leader, and teachers' prior experiences and perceptions from their level towards the use of computers and awareness play a vital role in the integration of ICT at public schools. Leaders' efforts and perception of ICT perception highly important; to create the desired change in a desire for ICT at schools. Similarly, the perception of teachers toward innovation, and support for them to use are significant to support the successful integration of ICT in public schools. Even though tools had prioritized ICT laboratories to enhance access to ICT tools, the internet, and emerging technologies still, struggle to get adopted at schools. Lack of management practices to manage the existing computer lab, and equipment, struggle, and often over-overlooked by stakeholders. The notion of ICT has more aspects

involved in the social context. It may appear as simply adding resources to a school premise but it is influenced by many social factors for its effective implementation of new innovations at schools.

Keywords: Innovation, ICT, adaptation, ICT lab, computer lab, strategic management.

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## LIST OF ABBREVIATIONS

CB	:	Capacity Building
DOE	:	Department of Education
ESP	:	Education Sector Plan
ICT	:	Information Communication and Technology
IT	:	Information Technology
NIT	:	National Information Technology
OLPC	:	One Laptop Per Child
SMC	:	School Management Committee
SSDP	:	School Sectoral Development Plan
SSRP	:	School Sector Reform Program





## CHAPTER I

### INTRODUCTION

The accessibility of digital tools has improved opportunities in a variety of ways and affected many facets of life. Information Communication Tools (ICT) are being used more and more in a multitude of sectors, including business, healthcare, tourism, and education, among others. Because it helps us live our daily lives and offers solutions to both personal and institutional difficulties, it has evolved into a way of life.

In my academic and professional career, I have observed the use of various digital tools in direct and inadvertent ways. The majority of our daily activities today entail using digital tools and technology, which has revolutionized how the world uses and applies these tools and technologies. In both our personal and professional life, mass media outlets including TV, radio, social media, newspapers, and our two primary forms of communication have undergone a significant evolution.

The schools and stakeholders have shown interest in integrating the new tools for making learning better. Looking back at the pandemic (Covid-19), most of the schools had shifted towards remote learning, this may have created several impacts among students, teachers, administrative and ultimately to the school itself. New challenges and opportunities had emerged in this discourse. Similarly, in the present context, digital tools are widely available and employed in many aspects of our lives at present. Even in the education sector, in the teaching-learning process integrating digital tools to make classes effective are emerging at a different pace in different context. In order to improve student learning and complement the curriculum, teachers are using the internet and online resources. Recalling the response to the

pandemic by the education sector many students were able to continue their studies even during the pandemic because of digital technology and technical advances. Remote learning was adapted by most universities and schools during the pandemic globally. Arguably, advantages of the technology are supporting us in the day-to-day and in our learning.

In the past years, I got the opportunity to visit various schools in Kathmandu valley and other places as a part of my career. I had experienced and observed that the schools in the valley cover a wide range of schools, from elite institutions to mediocre schools. However, the purpose of all remains the same - to educate children and improve the standards of quality of education. If I have to recall my past experience, when I was a student, having access to a computer was a scarce thing, we were allowed only once a week to visit the computer lab. These days computers are almost available in any school because of cost, access, and their vitality in the day-to-day operation and in students learning. Adding on, Teo et al., (2019) pointed out that, ICT's role in improving Nepal's educational system and standards is becoming increasingly acknowledged widely. Seeing these changes and transformations at schools, I thought a lot had changed in the past decade by seeing computer labs for students, and most of the operational tasks were recorded and done by computers. In fact, the School Sector Reform Program (SSRP) of Nepal emphasized ICT by the introduction of ICT-based education at the basic and primary levels (Teo et al., 2019).

A great shift in the teaching-learning process was experienced by learners and teachers due to the pandemic. Even most of our master lectures were done in an online modality where the internet, laptops, online resources and familiarity with online tools played a vital role. There was some limit to the remote learning, as some of the workshops were done physically by the teachers for us. In the beginning, it was

interesting for me and my few friends, but when it got elongated for more than four months, I started to think more about remote learning in a critical way. The school, where I worked, had also shifted towards an online teaching-learning modality where most of the students had access to the major amenities for remote learning.

Integrating ICT at school plays a vital role in the teaching and learning process. In my experience, I've noticed that the usage of PowerPoints, interactive video resources, internet access, and other technological tools have helped to improve learning - reflecting in our remote learning. The culture of using and integrating ICT had been evolving in education sectors; as a student, I've experienced this in my academic discourse and professional career. During the pandemic, digital mediums were highly used for the teaching-learning process - being the best alternative for learning to happen. From the national level, integrating ICT had been prioritized by the government before the pandemic. Nepal Government has also prioritized the integration of ICT in education sectors from policy levels. The implementation of the Information and Communication Technology in Education Master Plan (2013-2017) has encouraged schools to adapt new tools and innovation in schools across the nation. It has also emphasized incorporating computer-based management systems for schools in rural and urban areas in schools (Dhital, 2018).

ICT has a significant impact on society and affects every aspect of human endeavor, including education. However, in the education sector, since there are many elements influencing the integration process, the extent of ICT implementation in the educational sector varies from school to school. The important role of ICT in improving education is identified where nations have invested heavily in networking classrooms and increasing the number of computers in schools (Mofarreh, 2016), to support the teaching-learning process. In schools, the use of digital tools can foster

critical thinking, collaboration, communication, and creativity which are essential for meaningful learning. Thus, emphasizing the requirement of the present education system – ICT usages and implementation seem essential at various levels. This is because when ICT or new innovation are integrated, it passes through the sociocultural setting of the school, environment, perception of the school staff members, capability implement can reciprocally have an impact on the usage (Salomon, 1993). Thus, empirical studies are necessary while implementing new innovations at schools in Nepal if we aspire to see new innovations integrated into schools of our nation.

ICT has the ability to open up a new teaching and learning opportunities in schools, which could have an impact on raising educational standards. As a learner, I've seen firsthand how resources used in the classroom are adapting to new scientific and technological advancements and changing through time. Digital tools and the internet are now more widely available than they were ten years ago. Therefore, it is essential to inquire how schools are employing ICT in the present context.

### **Purpose of the Study**

Given the prevalence of digital tools and technology progress in the present, it is expected that schools will or may adopt new technological developments. Also, it is up to the schools to decide how to incorporate these tools into their curriculum and potential school systems. In the literature, we can find several aspects that express about efficiency and efficacy of digital tools and technology, but there are a number of factors regarding how ICTs are seen or perceived by individuals or the environment in which it ought to be integrated.

During the pandemic most of the schools in the valley shifted towards remote learning, this may have created several impacts on students, teachers, administration

and ultimately to schools in various ways but the challenges and opportunities differ from context to context. These obstacles might be personal, technological, organizational, or institutional level. Thus, the study's purpose is to examine how ICT integration in public schools currently stands in relation to implementation, challenges, readiness and effectiveness at school. Hence, the study has aimed to explore how public schools are integrating ICT at public schools.

### **Problem Statement**

In today's context, with the increase of digital tools and technology, it is likely for schools to adapt the emerging technological changes. Similarly, it depends upon the schools how they want to integrate these tools in their class and in a possible school system. The efficiency and effectiveness of digital tools and technology can be found in the literature; however, there lies various realities on the perception and practice in the school premise for its implementation of ICT in the school. Similarly, most of the studies done in the past are related to opportunity and challenges, effective use and challenges, teachers' training and ICT, etc., and in policies ICT is considered to be a means to an end by focusing on the access of the resources at school through various programs - focusing on the accessibility more. But in there are social contexts, perceptions, attitudes toward new innovation, etc., which has an impact on the integration of ICT.

To expand the purpose of my study, literature had given me some avenue to conduct my study. In literature, ICT's aspects from the stand point of its opportunities and challenges, policies about the ICT by the Ministry of Information and Technology, which are abundant in research done by others. However, empirical studies of a particular school are less studied - which could give new perspectives for the integration process from the ground level. Thus, the study has aimed to explore

how public schools are using ICT which will help to understand on a deeper level about the integration process and other aspects.

### **Research Question**

- How public schools are integrating Information Communication and Technology in Secondary Schools?

### **Delimitation of Study**

The study does not incorporate the encounters and perspectives of all the public schools of Nepal. It does not consolidate the context of all public schools and teachers of schools as the schools which were taken as the cases were selected where one school had recently implemented an ICT lab and another school had initially planned for establishing ICT. Similarly, interactions with school teachers and school leaders were done occasionally while and some participants of the school management committee were also interviewed in the natural discourse of research, who play a significant role in the transformation of school and progress. Also, a few students were also equally considered for the study to understand their perspectives and experiences. Additionally, the research exclusively has used the observations and experiences via interviews provided by the public-school teachers by keeping a proper record. Lastly, in the discussion part the attributes of the diffusion of innovation, theory, were more emphasized in the discussion chapter.

Thus, the findings, analysis and discussion are dependent on the primary data collection of the schools I've selected as a case.

## CHAPTER II

### LITERATURE REVIEW

This chapter explains the theoretical and literature aspects of my research. Different theories and concepts on ICT and their intersection with education are discussed in this chapter. The diffusion of innovation theory and other thematic reviews are discussed in this chapter.

ICT has become an essential part of the educational field and is used in the education field in a more effective and efficient manner (Benini, 2014), with the use of electronic devices including computers-based programs, networking, telephone, videos, and multimedia and internet. It has supported and given new avenues for the teaching-learning process in the past decades. ICT consists of various arrays of features that allow new ways for learners and teachers to create open independent and accessible educational prospects. Furthermore, teachers with technological training and the use of technology, computers, web-based learning, e-learning, and the internet can improve the quality of teaching (Yusuf, 2007 as cited in Dhital, 2018). At schools, the integration of ICT doesn't work for itself, it is dependable on various factors such as teachers, administration, environment, etc. Thus, it demands certain attention on how the adaptation and integration are done at various levels.

#### **Integration of ICT at School**

ICT integration in education refers to learning processes that involve the proper utilization of technology in schools to the use of new innovations, tools and technology in school for the learning process (Warwick & Kershner, 2008). Williams (2003) expresses that integration of ICT refers to the use of resources like the internet, CD ROMs, or other software for different purposes at school, and its advantages for

the teaching-learning process, administration and students. The notion of integration is the use of ICT tools and its effectiveness in the day-to-day activities of the schools. Looking at the larger impact and gain in society using technology, and the impact on the economy nations are developing education reforms focusing on ICT integration in education (Jhuree, 2005). Integration ICT requires several aspects from managing the resources to its management. One of the major things which needs to be understood while integrating ICT is “strategic planning” (Cheever et al. 1986 as cited in Jhuree, 2005) which involves “identifying the necessary resources to achieve goals, planning the acquisition, deployment and disposition of the resources” (p. 470). Having a strategic plan can allow the better implementing of ICT tools for the school and manage the resources in an efficient manner. For instance, communication through ICT tools such as the internet has given a virtual space for fast interaction with one another. Similarly, an engaging platform for the learners with support to the teachers in the teaching-learning process are some of the advantages and opportunities of ICT integration at school (Jhuree, 2005).

While implementing ICT teachers are one of the major key stakeholders at schools, as they can utilize the resources in various ways to accommodate the subject they are teaching. However, in the study conducted by Rana and Rana (2020), it suggested that “ICT training was a fundamental need of, particularly teachers who were mainly responsible for changing the traditional teaching strategies to modern learning ways” (p. 43). Similarly, integration refers to not only the capable teachers who can use the digital resources it must be guided by the policy and plans. As Jhuree (2005) expressed that “national policies in ICT Education and a priority list need to be formulated accordingly” (p. 476). The integration of ICT at school differs among various nations as social, economic and technological disparities exist at various



levels which need to be considered by stakeholders and government while implementing ICT at schools.

### **ICT and Education**

ICT helps learners to explore and discover topics, solve problems, and overcome new challenges. While engaging students in the application of ICT, makes knowledge acquisition more accessible and concepts in learning areas are understood. In addition, the efficiency and efficacy of ICT integration and implementation are determined by a country's expenditure and national policies. However, even within these countries the expenditure and policies were different from one another, resulting in different progress in ICT (Aristovnik, 2012). Understanding the relationship between the use of ICT and the educational performance had challenges; the environment in which the technologies are introduced or adapted makes it difficult to isolate their effect on the environment, resulting in complexities in an understanding of ICT's role in education (Youssef & Dahmani, 2008 as cited in Aristovnik, 2012). In order to use ICT technical access is one of the preconditions but looking at the technical access for teachers, students or administration cannot determine the improvement in the education sector. The difficulties associated with the adoption and use of ICT are influenced by the accessibility and availability of the technology, which varies in different contexts. The government's prioritization of technology also affects how ICT is integrated into the educational system. Similarly, ICT must be used effectively in regard to method, goal, and application for it to be effective while implementing at schools (Salam, et al., 2018). Focusing on the technical aspects of ICT, such as access to technical devices, it has narrowed ICT integration towards technological access and uses. In Nepal, the ICT policies are also developed where its use and implementation are emphasized as “ICT in education, research and

development” where various aspects such as integration, access and collaboration of public and private organizations are focused (Ministry of Information and Communication, 2015 p. 21).

Aristovnik (2012) argues that “in order to be successful, a country should improve its education system by implementing effective and robust ICT policies” (p. 145). The experience from developing countries had demonstrated that improving ICT infrastructure does not always result in improved ICT integration. Thus, to comprehend the influence of ICT, we must go beyond the technological level to the information and social system levels (Aristovnik, 2012).

The adaptations are necessary for the development and even create inclusiveness in the range of new tools and technology. In developing nations, the Ministry of Education sometimes finds itself in “situations where there is pressure to acquire and adopt new technologies because of the claims of what these technologies could do to aid and leapfrog their development” (Hooker, 2008, p. 3). It is necessary to have a school culture that focuses on the adaptation of an ICT, which are guided by the education policymakers; teachers' efforts and skills, schools shared vision among the stakeholders to use ICT as an integral part of the school are the essential factors for the integration of ICT (Salam, et al., 2018). Recently in Nepal, the Education Sector Plan (2021- 2030) has been published and one of the expected outcomes of the education sector plan is to “implement information and communication technologies for the quality of education” (Ministry of Education, Science and Technology, p. 22). It is vital that the implementation and decisions are made under research-based approaches. Similarly, access, to skilled teachers, one laptop per child, internet in public schools, etc., are prioritized in the plans and policies of Nepal. However, decisions for implementing ICT education are done without a comprehensive study or

rigorous evaluation to explore the potential of ICT, “the potential and reach of ICT,” (Hooker, 2008, p. 3) on which the implementation would succeed. In developing nations, ICT-based educational reform is implemented at a relatively slow rate due to a lack of substantial budget, concrete policy and inadequately skilled teachers to adapt the technology efficiently (Salam, et al., 2018)

### **Plans and Policies**

The first National Information Technology (NIT) policy was announced in 2000, which aimed at positioning Information and Technology (IT) as a tool for development and growth, and it was revised in 2010. Before this general idea of ICT was adhered to by nations such as radio programs for some subjects in schools. In schools, under the matching grant schemes (2007-2010), the Department of Education (DOE) provided 2 computers and one printer to 3038 schools, and internet connectivity to 85 secondary schools conducting distance education programs (Dhital, 2018). In order to increase access to ICT tools government had come up with several plans and strategies as School Sector Development Plan, SSDP (2016–2023) emphasized the accessibility of computers and printers, for lower and secondary schools allowing schools to there are a number of lower and secondary schools to benefit from this ICT Support program (Ministry of Education, 2016). Such a plan by the government shows that the perspective of increasing access is prioritized by the government of Nepal.

According to the Ministry of Information and Communication (2015), emphasis has been placed on the necessary steps for advancement in the promotion of ICT in Nepal's educational system. ICT had been given priority in order to bring about change and advancement with an emphasis on teaching, learning, pedagogy, and administrative tasks. The use of Information and Communication Technologies

(ICT) in education has been considered one of the strategies to achieve the broader goals of education for betterment in the quality of education. Furthermore, in the recent Education Sector Plan (ESP) 2021- 2030, the emphasis on the integration of ICT for the quality of education has been focused on. The pressing need for leadership, management, and development in the infrastructure, allocation of human resources to the community schools, etc., are prioritized in the plan (Government of Nepal, 2021).

Education Sector Development Plan (2021-2030) states that “all public schools will have access to information and communication, and a well-developed teaching and learning process will be implemented to make the most of it” (Government of Nepal, p. 71). Further, the emphasis on access and the implementation of the ICT tools are given; some priorities by focusing on the skilled human resources and training programs for ICT are given for the quality of education. Nepal has previously established and implemented various programs, in accordance with the policy, that place a strong emphasis on ICT in education. The implementation of the Information and Communication Technology in Education Master Plan 2013-2017 has increased access to computers and the internet in schools, which allows for the scaling-up of the use of ICT in school education (Ministry of Education, 2013). This followed programs focusing on training and access to ICT tools and technologies in various arrays of education. One Laptop per Child (OLPC) as a pilot project in selected 26 schools in six districts which was a lab module project in some schools with internet connectivity (Government of Nepal, 2013).

In 2007, the government launched the One Laptop Per Child (OLPC) program, which aimed to use ICT in classroom education. OLPC was a pilot initiative that was launched in 26 primary schools across six districts in Nepal in conjunction with the

Open Learning Organization (OLE), a non-profit organization. This strategy of promoting ICT was unable to scale up and did not meet the needs of the school's users (Dhital, 2018).

Nepal's ICT policy places a strong emphasis on technical resources and trained human resources. The equipment according to the master plan is understood as a specific laboratory with computers at schools. Also, it had aimed that an adequate number of computers and multimedia projectors in each resource center and training center. Similarly, the places where electricity is not available, it states that “those schools will be equipped with televisions and DVD players and power backup to operate them. Such schools can opt for a solar panel for power supply. The notion of collaboration is regarded for development in the education sector, together with the provision of expansion and access to the internet for all institutions in the master plan of ICT (Government of Nepal, 2015).

The 13<sup>th</sup> Plan 2014 maintained the significant effort by making provision for using ICT literacy (Education for All), increasing access to quality education in rural areas, and expanding the use of ICT in school education, making educational service effective, timely, and result-oriented (National Policy Commission, 2014). Later, School Sector Reform Plan (SSRP) (2009-2015) was implemented and expands ICT-associated teaching/learning strategies (Ministry of Education, 2009), giving direction towards implementation and introduction to the ICT tools in schools. This gave a shift in public schools towards having access to technical tools in the past.

Ministry of Finance (2015) showed that the total ICT budget just comprises \$ 45,661 which is just 0.55% was the total budget of Nepal. Despite the priorities given towards ICT for implementation, the budget set by the nation appears to be limited for

implementation. The budget allocated by our government is comparatively less than with respect to the developed nations (Dhital, 2018).

### **School Sector Development Plan**

In Nepal, the School Sector Development Plan has emphasized ICT integration in the schools. The use of ICT has been focused not only on the subject matters but also on educational governance and management. Including ICT in classes has been recognized as one of the factors in the infrastructure of development in the planning. Furthermore, developing the offline training course for the teacher, specifically focusing on Science, Math, and English has been prioritized. The implementation of the Information and Communication Technology in Education Master Plan 2013-2017 has encouraged schools to adapt to the classes where computers and the internet are used to support classes and even in the management of schooling (Government of Nepal, 2013). Similarly, ICT integration into the educational practice has had a rapid development in the past 20 years, obliging the schools to re-think and renovate their pedagogical approaches and to avail and exploit new technological resources (Benini, 2014), and its high importance for our nation to re-think how to use ICT as a catalyst for quality of education.

ICT in the classroom would have significant educational and pedagogical benefits for both teachers and students. In today's world, policy is critical to development and progress. Similarly, it plays a significant influence in any nation's education system, resulting in significant development. As a result, a huge number of educational initiatives and research projects have focused on ICT integration in schools.

The School Sector Development Plan (SSDP) has focused on the learning environment and built the capacity to implement the ICT according to the context.

The recent national educational plan is School Sector Development Plan, SSDP 2016–2023. The ICT objectives of the School Sector Development Plan 2016–2023, had focused on ensuring adequate capacity to include them in the curriculum by concentrating on suitable development access to learning materials and supporting capability and skill development programs and guidelines. Further, for the betterment of creating an environment that is ICT-enabled for learning (including the institutional and professional capability of managers and implementers) and is based on need and context, the effective use of ICT can improve classroom delivery (Ministry of Education, 2016 p. 69).

Along with the tools and technology there are other tangible and intangible factors that play equally vital roles- ICT roles cannot be disregarded. Not all the mediums and tools can increase the students' learning- how it is introduced in class accelerates the learning- there lie various dimensions and pedagogical aspects in the teaching-learning process. Teacher training with well-designed programs which enables and builds adaptive individuals in the teaching-learning process for ICT plays an important role in the improvement of education. Policies need to address several factors which have an effect on effectiveness and also the “cost-effectiveness of different approaches to ICT use in teacher training so training strategies” (Ratheeswari, 2018).

### **Thematic Review**

In this section, I have explored some concepts of leadership, skilled human resources for ICT integration, ICT impacts over authentic learnings and integration and curriculum. Some different dimensions of ICT are explored in this section to explore other aspects which have an interrelationship with ICT. The major purpose of

this section is to explore how ICT has been part of various aspects of education.

Hence, the related themes are discussed in this chapter.

### **Leadership and ICT**

Leadership plays a vital role to build the capacity of individuals and groups who can build the capability of individuals for adapting ICT tools and even build capacity. Capacity Building (CB) refers to allowing access to equipment for individuals which allows them to take steps towards new changes which support the teaching-learning approach the challenge of learning to use the technologies to improve their teaching and learning undertakings, and appropriate use of ICT (Mwawasi, 2014). Leadership can vary in an institution and organization in accordance with the nature of leaders and the institution itself. For instance, despite the school leaders who are mostly Principals, Kirkman (2000) observed that departmental leadership had more significance in the teacher's application of the ICT-implementation of new technologies at school.

Additionally, the utilization of ICT is reliant on the two factors from a leadership standpoint. When teachers have access to computers, for example, it is also possible for instructors to participate in the literacy process via ICT. It's necessary to have access to and knowledge of the accessible resources before using the pedagogy of teaching and learning (Mwawasi, 2014). The aspects of leadership play a crucial part to motivate the teachers, students and other users at school to adapt. According to Carlson (2002), teachers are the key to whether technology is used appropriately and effectively or not. But it is arguable that leadership has an effect on the appropriate use of the ICT since, "transformational leadership occurs when one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality" (Geijsel et al., 2003, p. 230). In reference to



transformational leadership, the role of leaders and practitioners of ICT and innovation has an effect on one another. Indeed, the practitioner needs some guidance towards accepting the new innovation or technology which can boost the morale and confidence of individuals. Leaders play a crucial role in this process of adaptation. Creating a milestone for the new learners to achieve goals related to acceptance or achievements in the adaptation of new technology is dependent on the leadership approach – who directs or transfers the skills, and knowledge or provides training (Afshari et al., 2012). Consequently, Crawford (2005) expresses that transformational leadership “this form of leadership is necessary to drive principals to the higher levels of concern and motivation needed for educational improvement” (p. 8), which remains significant when principals are taken as a leader along with other stakeholders. Adding on, one of the most important variables affecting and supporting the integration of instructional technology in schools has been identified as leadership (Yee, 2000).

### **Skilled Human Resource and Technology**

Skills are important for teachers to develop their professional skills. For this technological development are necessary to adapt. It is necessary to shift the emphasis of ICT use in education away from the acquisition of fundamental skills and toward the development of pedagogical competence using readily available digital technology, such as handheld devices, CD and DVD digital media, as well as the use of social media sites to support teaching and learning that transcends time and space (Mwawasi, 2014). In today’s context, even the use of social media, and online communication channels are becoming and growing as soft skills. In organizations and institutes, individuals or groups must proficient in the skills and languages of constantly changing technology in order to sustain the competitive advantage of new

technologies. Similarly, having an environment to use technology can encourage individuals to increase their productivity. New technology is developed to increase productivity, and as a result, technology is progressively displacing manual labor and being integrated into most parts of employment (Fuchs, 2010).

Hermans, et al., (2008) have identified three main stages for ICT to be highly valued and regarded by teachers; integration, enhancement and complementary. The notion of integration is inclined towards increasing the effectiveness of the ICT use for a subject matter, with the right skills, that encourages students to solve complex problems and support students' achievements (Karami et al., 2013).

Chien, Wu and Hsu (2014) study showed that the barriers to ICT integration in the classroom are confidence, competence and attitudes of teachers reduce the percentage of ICT integration. On the other hand, they also expressed that the expectation of the students over ICT was growing among young students. In order to meet the expectation of ICT at school it also creates a growing demand for the teachers' readiness towards the adaptation over the innovations. Along with the accessibility of the resources at school "teachers' readiness and skills in using ICT are playing an essential role in the use of ICT in education" (Karami et al., 2013, p. 177).

### **Authentic Learning**

Authentic learning refers to learning that typically focuses on real-world problems. Introducing new real problems, to professionals, through virtual communities in a given learning environment has become possible with technological advancement. Similarly, real-world relevance in authentic learning can be achieved via information and technology (Lombardi, 2007). For example, when students are learning about some social problems, students should have opportunities to learn about the more relevant problems which exist in other communities or some other part

of the world. Furthermore, community members, individuals, or organizations working to solve the problems can be connected via the internet and other communication mediums in authentic learning practices. For making authentic learning better digital tools can provide various support. When relevant information and evidence are given to students, providing relevant experience in the classroom setting and connecting to the real-world complexity gives students to find more relevance to what they are learning and solving learning (Herrington, 2003).

The web-based learning can increase the option/ access to information, facts, contemporary problems, and cross-checking facts- this expands learners “multiple sources and perspectives” (Lombardi, 2007), supporting students’ learning. Even in various subjects, for example, the contents of history used to be dependent on textbooks and dependent on the knowledge/skills of teachers to dispose of them. Many units are often limited to what courses and textbooks have to offer only. However, with the help of the internet and a large number of learners can connect with professionals in a short period of time, for which different online tools can be used (Lombardi, 2007). This can increase the possibilities of students learning. The geographical constraints are very thin through the web-based application and online tools. Such learning experiences are essential and incorporate the ICT which supports for learning of students. Recently, during a pandemic, ICT has been in classes the ICT can help certain units in many ways, universities and schools have adapted to the online modes.

The use of ICT in education can increase students’ motivation, promote deep and collaborative understanding, facilitate lifelong learning, and offer easy access to information and shared resources. Furthermore, when students are technology-rich or

when they have access to a variety of communication, visualization, and simulation technologies their performance may increase.

### **Use of ICT in Curriculum**

The School Sector Development Plan, SSDP 2016–2023 has set the objectives to enable progress in learning through ICT integration. Focusing on capacity development and appropriate development access to learning materials for incorporating these in the curriculum are focused in the plan. Major SSDP's strategies emphasized the importance of ICT infrastructure, pedagogical teaching-learning resources, and ICT prerequisites as enabling elements in government schools. ICT learning centers with improved teaching and learning methods and their availability were given priority. Adding to ICT integration in government curricula through the development of professional development guidelines and programs, educational materials in an equitable manner are given light (Ministry of Education, 2016)

The objectives of the SSDP 2016–2023 emphasized in several aspects of the integration at school but there are certain challenges that need to be overcome such as inadequate funding, lack of secondary infrastructure, lack of qualified personnel and lack of policy formulation and implementation (Ministry of Education, 2016) which are the bottle neck for ICT implementation at schools. For instance, one of the objectives explicitly shares about establishing an ICT environment by including ICT prerequisites as enabling conditions in government schools and the provision of ICT infrastructure and teaching-learning materials for pedagogy. However, Transcend Vision Nepal (2016) argues that ICTs are not used in an effective manner for acquiring new knowledge due to the inadequacy of the curriculum. Similarly, lack of infrastructure, the digital divide and qualified teachers who can adhere to the vision of ICT's set by the government are some of the reason which affects the implementation

process- which later affects the integration of ICT in the curriculum too. Teachers need sufficient support, in terms of using the tools and technology along with the access which later they can integrate into the subjects and explore the pedagogical role of ICT in teaching-learning process.

## **Theoretical Review**

### **Diffusion of Innovation**

Innovation takes time to be accepted by the larger public with time, it is transferred from various mediums and communicated in a social context- diffusion of innovation (Rogers, 2003). The behavioral change of the mass (majority) is dependent on the opinion of the early adopters of the technology; however, “only adopters of successful innovations generate this curve over time” (Sahin, 2006 p. 17) which are widely used such as cell phones, computers and internet in today’s context. The innovations and their disposition can include behavioral changes and perception. The integration does not occur in a vacuum i.e., it happens in a social context. For instance, introduction to new tools and technology has more than only having access; when ICTs enter the sociocultural setting of the school, they may trigger changes in the activities, curriculum, and interpersonal relationships in the learning environment, and are reciprocally affected by the very changes they cause (Salomon, 1993). The adaptation can precede at different ration even if the awareness of the new innovation is understood by an individual or organization as the rate of adoption is partially influenced by perceived attributes, namely; relative advantage, compatibility, trialability, complexity, and observability (Rogers, 2001 as cited in Sahin, 2006).

Rogers’s theory of “diffusion of innovation” is one of the most widely used adoption models and the adoption process of new innovations has been studied for more than 30 years (Sherry & Gibson, 2002 as cited in Sahin, 2006 p. 14). In his

theory, he has mentioned the major elements of diffusion; innovation, communication channels, time, and social system. Indeed, these major element plays a vital role in the process of diffusion of innovation. Roger (2003) states that “an innovation is an idea, practice, or project that is perceived as new by an individual or other unit of adoption” (p. 12). Innovation need not be adopted all at once; people, communities, or organizations may still view inventions as new innovations even though they have been developed or put into practice for a very long time (Sahin,2006) and in the long run, they may accept or decline the innovation. For instance, mobile phones, computers, the internet, and other communication tools were accessible to the majority of people only after the early adopters had used them before - who could afford them, had the opportunity for trial, and observed the result of the innovations. Rogers (2003) stated that “individuals’ perceptions of these characteristics predict the rate of adoption of innovations” (p. 219). The perceived characteristic of innovation by individuals can differ from context to context and there seems to be less empirical research carried out that deals with the effects of the perceived characteristics of innovations on the rate of adoption (Sahin, 2006). Similarly, Roger (2003) expresses that there are five major attributes of innovation, which lead toward a decrease in uncertainty, (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability.

### ***Relative Advantage.***

Rogers (2003) defined relative advantage as “the degree to which an innovation is perceived as being better than the idea it supersedes” (p. 229). The early adaptors adapt the new innovation when they want to decrease the possible challenge in the near future, which is a “preventive innovation” that has a lower rate of adaptation (Rogers, 2003, p. 233). Similarly, the “cost and the social status motivation

aspect” also plays an important role (Sahin, 2006). Some of the new innovations could be cost-effective to adapt at individual and institutional levels despite the potential of the innovations to solve the problem for them. The innovation is understood as “preventive innovation” (Roger, 2003 p.233) which are adopted to decrease or stop possible problems. One of the factors that encourage adaptors to adopt innovations is their perception of the benefit in problem-solving, especially when that innovation is superior to or earlier than earlier innovations in that area. Similarly, for the early adaptors, social status and cost are the motivation factors while it remains less important for the late majority (Sahin, 2006).

### ***Compatibility***

Rogers (2003) stated that “compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (p. 15). When new innovations are introduced, the notion of compatibility, which involves skills to use them also comes into account. As mentioned before in the previous paragraph, the relative advantage gives an adaptor an idea of advantages. However, if new innovations cannot be used by potential users despite their awareness of innovation, the rate of adaptation will decrease. (Sahin, 2006) expressed that “if an innovation is compatible with an individual’s needs, then uncertainty will decrease and the rate of adoption of the innovation will increase” (p.18). Thus, innovation compatibility also plays an important role.

### ***Complexity***

Rogers (2003) defined complexity as “the degree to which an innovation is perceived as relatively difficult to understand and use” (p. 15). The perceived value by the adaptors towards the innovation is vital for the adaptation of innovation to happen. When innovation is complex to use or arduous to understand, the relative

advantages will also decrease. Similarly, when new innovations are introduced to a new environment, the users' perception of the innovation remains vital. Higher the degree of complexity to adapt lower the rate of adaptation and vice versa (Sahin, 2006).

### ***Trialability***

According to Rogers (2003), "trialability is the degree to which an innovation may be experimented with on a limited basis" (p. 16). The uncertainty of adaptation can be reduced by using, experiencing, or even vicariously experiencing innovation. For instance, the late majority of adopters would rely on the knowledge imparted by the early adopters. The more the innovation is tried and used, it has a high chance to get adopted and even creating possible adaptors.

### ***Observability***

According to Rogers (2003), "trialability is the degree to which an innovation may be experimented with on a limited basis" (p. 16). It depends on the innovation for its advantages or effect to be observed, while some innovations are complex to explain. Some innovations' impacts and advantages are easily observed by others. These observations can happen from peer to peer while an adaptor is using. Roger and Williams (1983) expressed the innovation, giving an example of technology as "A technology is a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving the desired outcome" (p. 232). Further, he elaborates giving an example of a computer's hardware and software from the point of observability. He expresses that, "the software component of a technological innovation is not so apparent to observation, so innovations in which the software aspect is dominant possess less observability, and usually have relatively slower rates of adoption" (Roger 1983, p. 232).



Along with attributes of the innovations, uncertainty of integrating new technology can occur, and obstacles while integrating innovation can occur via the social system or from an individual's practice. Rogers (2003) stated that "individuals' perceptions of these characteristics predict the rate of adoption of innovations" (p. 219). The perceived characteristic of innovation by individuals can differ from context to context and there seems to be less empirical research carried out that deals with the effects of the perceived characteristics of innovations on the rate of adoption (Sahin, 2006).

There could be societal pressure, understanding of the new innovation, and awareness that could influence how each person perceives the new innovation. This suggests that it may have both favorable and negative views of the new innovation and its application. In the case of educational institutions, peer review or evaluation of the new technical tools plays a vital role.

In brief, the diffusion of innovation is a process that transmits innovation of discovery or production to its user or adaptor at a certain time. However, it takes place in society as a collective activity with certain uncertainty in diffusion (Rogers, 2003). Academics have made vivid references to Rogers' theory in their research to comprehend diverse organizations' adoption of new technologies at a deeper level. Thus, in my study, this theory has been selected for further discussion over finding.

### **Research Gap**

The majority of research has focused on providing schools with access to resources and their impact on the curriculum, teaching-learning process, and leadership. For instance, Warwick and Kershner (2008) argues that the significance and advantages of ICT should be known by teachers in order to conduct meaningful lesson with the use of ICT. They argue towards making classes meaningful using the

ICT tools and its usage while the innovation adaptation ratio can differ from case to case. The adaptation can precede at different ration even if the awareness of the new innovation is understood by an individual or organization as “the rate of adoption is partially influenced by perceived attributes, namely, relative advantage, compatibility, trialability, complexity, and observability as innovation characteristics” (Rogers, 2001). Similarly, the findings in research conducted by other researchers concentrated on the advantages and disadvantages of ICT in education. However, qualitative and case studies that investigate the many realities of particular schools are not investigated in order to comprehend the social context in which the new innovations are employed- in Nepal. Therefore, there is still a significant gap in ICT’s integration research from qualitative research to explore the depth of challenges and opportunities to understand the ground reality. Additionally, more research needs to be done on how to identify the interconnected components embedded while using the new invention of ICT at school. As previously expressed, a number of studies have been done on ICT integration from the standpoint of policy level and difficulties encountered during the implementation process. In literatures, there are still spaces where innovation’s integration process and context need to be studied. Because multiple realities exist at the ground level for the implementation of ICT depending on the number of students and teachers, the physical location, and their collaboration with other organizations, etc. Thus, these aspects have encouraged me to explore more.

## CHAPTER III

### RESEARCH METHODOLOGY

This chapter summarizes the selection of paradigm and study methods used for data collecting and analysis. The research paradigm, research method, research design, research instruments and techniques, data collection procedure, quality standards, and ethical considerations are all covered in this chapter.

#### **Research Paradigm**

In my research, the interpretivist paradigm has been used for the study. This enables a greater understanding of the background and assists in the interpretation of the participants' shared experiences. Kivunja and Kuyini (2017) expresses that “every effort is made to try to understand the viewpoint of the subject being observed, rather than the viewpoint of the observer.” In this line during the research process the data were collected through observation and interaction with the participants- looking at the situations from their point of view. Similarly, interpretivists in the research process, it is essential to comprehend the context of any type of research in order to properly interpret the information obtained (Willis, 2007). In this paradigm, the three are not rigidness towards finding the answer but allows researchers to understand and explore the subject’s experiences in deeper level. In social context, there are different aspects, views and perspectives and realities, He further states that “different people and different groups have different perceptions of the world” (p.194). Thus, the interpretation and the data are collected form subject or individual’s point of view. Willis (2007) asserts that “interpretivists tend to favors qualitative methods such as case studies and ethnography” (p.90). In this approach it, the subjects’ perception and their way of viewing the world are significant. The perception towards certain

phenomenon would be different and vary from person to person's eye. McQueen (2002) states interpretivists view the world through a "series of individual eyes" and choose participants who "have their own interpretations of reality to encompass the worldview" (p.16). Thus, for my study I've used the interpretivism paradigm and case study methodology to understand and explore various perspectives.

### **Research Approach**

The qualitative research approach, a case study, was selected for the study. Case studies are tailor-made for exploring new processes or behaviors or ones that are little understood (Hartley, 1994), enabling researchers to answer how and find more reasons for the social context. To respond to specific questions that are qualitative and experience-based in a social and institutional framework, in-depth research is required. One strategy in research is a case study. This approach is selected because some circumstances in a social setting are difficult to understand and build meaning out of the case study approach for the study was chosen for qualitative findings, with an appropriate approach the depth of the situation or context is understood (Sykes, 1990). Furthermore, case studies are preferred in qualitative research (Yin, 2002), which doesn't consist well-defined framework, however, conducting dependable and defensible design is necessary. Case study approach was my research strategy to explore how ICT integration are happening in public schools of Kathmandu valley. The use of case study allows for in-depth understanding of socially constructed organizations- and in my study experience from the school teachers, leader and other stake holders. To expand the rationale for my case study, as a choice of for research I had tried to explore some of the case study methodology and methods. As a novice researcher, I found the case study to be demanding and ambiguous at first. To gain clarification on the methodologies and approach, discussion among peers and mostly

with my immediate supervisor were done. In literature, several aspects from the Robert Yin, Sharan Merriam and Robert Stake were found which give me direction towards exploring more and delved further into the literature. Case study as a research strategy has been explored in depth by three writers in particular, Merriam (1998), Yin (1981, 1984, 1994, 1999, 2003a, 2003b, 2005), and Stake (1978/2000, 1994, 1995, 2005, 2008 as cited in Brown, 2008). As my study was focused in the field of education, I had focused on the Merriam the beginning. Merriam (1998) expresses that “single most defining characteristic of case study research lies in delimiting the object of study: the case” (p. 27). The case is a unit, entity, or phenomenon with defined boundaries that the researcher can demarcate or “fence in” (p. 27), and therefore, can also determine what will not be studied giving researcher focused on the specific boundary for the study. The case is “a thing, a single entity, a unit around which there are boundaries” (p. 27), which defines the unit as a focused bounded scope of the study.

While reviewing Robert Stake’s (1978/2000) as cited in Noor (2008) perspectives on the case study, he states that “case studies will often be the preferred method of research because they may be epistemologically in harmony with the reader’s experience and thus to that person a natural basis for generalization” (p. 20). Similarly, “most contemporary qualitative researchers hold that knowledge is constructed rather than discovered” (Stake, 1995, p. 99) focusing on the construction of knowledge from the experiences and interpretation. For a particular case or the unit, he states that a case is “a specific, a complex, functioning thing,” more specifically “an integrated system” which “has a boundary and working parts” and purposive (in social sciences and human services) (Stake, 1995, p. 2). Indeed, a single unit or a case are an integrates system, since a unit or a system are integrated with

more than one system. For instance, in my study, despite the schools were considered as a one-unit other factors such as individuals from the local community, communities' perspective over the school and support were also interlinked. Similarly, while reviewing Stake's approach, methods, to unfold the multiple realities of social context for data gathering and interpretation are explicitly expressed. While, Merriam (1998), expresses that the study does not claim any specific data collection methods, but "focuses on holistic description and explanation" (p. 29). Emphasizing the reason for choosing, method as case study and my tools observation and interview, the rationales are inclined towards the aspect of interpretation of data. "Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter" (Noor, 2008, p. 35). The interpretation comes with the data collection process which mostly involves the observation, interview and document reviews which supports the data analysis part of the research. It's the process of giving meaning to "first impressions as well as to final compilations" (Stake, 1995 p. 71). The description of the case is not simply detailing of the area of the study, he further had expressed that "not only commonplace description, but 'thick description'" (Stake, 1995 p. 102). These considerations were done as far as possible to acquire data for my study. I have selected a "collective case" as my research method which to understand a particular phenomenon (Stake, 2000) and in my case study, emphasizing on the integration of ICT in two public schools. The cases are selected to understand the "shared phenomenon of the interest", which can be further discovered (Luck et.al., p. 106) and interpreted to understand more about the context giving more perspective from the findings of these two case units. Similarly, knowledge created out of the research was interlinked with the epistemological alignments in research endurance and findings and analysis sections.

## **Case Selection**

The study took place in two public schools in Lalitpur district of Kathmandu valley. I selected the public schools that have considered using ICT tools for daily and administrative tasks a priority. Similarly, some public schools of my locality were also considered at the preliminary stage of case selection. Additionally, the public schools in Lalitpur were considered after pre visits and communicating about the schools to my immediate supervisor. These schools were listed with some suggestions given my peers. At the beginning, in initial phase, several schools were listed which had computer labs and supporting school students with lab facilities. During selecting schools, I talked with some school leaders at the beginning, expressing purpose of the study. In this process, I wanted to find at least three schools with well-managed ICT laboratories and other facilities, one with labs but needing assistance from the school to effectively integrate ICT, and one without an ICT lab or with the fewest current technologies. Due to my delimitations of the study, I was only able to choose two schools. I was able to identify two that had recently established ICT labs and current access to a number of computers and technology, but another did not. I had to disregard several schools due to various reasons, such as some school had ICT labs and computers which were supported by Nonprofit organizations. While selecting the case I tried to select the schools where the teachers and leader were actively engaged for the progress of the school, who wanted to self-sustain and progress by themselves in term of ICT integration and other aspects of progress of the schools.

### *Case I*

Laxmidev Secondary School is one of the oldest Lalitpur's public schools, a secondary school which was founded in 2046 B.S. It is located in the North East, 300 meters away from the Patan Durbar school. During my prior visit, I got to know that

they had recently established and ICT lab for the students and assigned one teacher to take classes inside the ICT lab.

Before selecting this school, I had gone to other public schools which had computer lab but there were no dedicated teacher or class assigned to use it. In this case(school), the school has a proper set of routine that showed the days and when the school students were having their computer class and who was taking lead for it. And a assigned teacher for the computer was present at school. The school had assigned one teacher for the computer classes- for grade 6, 7 and 8. Similarly, for primary school students also smart television was allocated in another block of the school. Same like the ICT lab, the school a specific classroom for the smart TV which was used for the video tutor and other informative video sharing was also present.

At present with more than 300 students and 35 staff members the school had proper infrastructure, in terms of classrooms and other secondary amenities for students and teachers. By observing the number of computers, location, dedicated teacher for the computer classes I took the school as a case unit for the study where my key stakeholders were students, teacher, students and school management committee. Thus, the school was selected for my study.

### *Case II*

Bhav Public School is also one of the public schools at Lalitpur established in 2018 B.S which is approximately 200 meters away from ring road of Lalitpur. The school had recently started to build new building for the school which can accommodate 300 more students. Currently they have around 200 students at the school. The school holds a good credibility in local community since it considered as a landmark of the town too. At initial phase of the conversation with Mr.Keshav, I got to know that school had prioritized for ICT lab but they lacked space. They have kept



ICT lab as a priority in the new building which was being build at the moment.

Despite the school had no ICT lab, at the moment, the school had few computers which were used by most of the teachers. The school was active on the social media for sharing the progress of the schools, when I search about the school online.

Compared to the previous case, this school was at initial stage for integrating ICT lab and introducing ICT tools at the school. So, to explore the process of the school, stakeholders perceptions and other factors having effect while integrating ICT I had selected this school my another case. Thus, I selected this public school as my second case which was a public school, as similar to the first case, but had different dynamic and context.

### **Research Participants**

While scheduling my field visit, I took permission from the school leaders. Similarly, I shared my purpose of the visit in the staff room with most of the teachers so that during conversation and interaction I could proceed with the interview and engage with them. The interviews conducted in the research were conducted voluntarily- for this teacher's routine was followed. The data and information gathered were written down in notes and afterward put into word documents. Similarly, the photographs and recordings were taken with the permission of the school's teachers and other staff members. In addition, interview with the teachers, school head, and two students to develop and obtain information regarding the study subject by asking open-ended questions. I had created an outline framework for observation, and reference questions to ask participants who would respond to my research questions. In the following paragraph, I have presented a short introduction to the research participants who were the major participants for my research study.

Research Participant's Profile

The research participants' and their sharing were important for my study as they have shared their challenges, opportunities, perceptions and other aspects. During the field visit these participants had given me more information about their respective schools and integrated with me often during my visit. The participants are introduced as in the discourse of the study they were the key persons who helped me to understand more about the school, school's culture and mostly how they are using and perceiving the ICT at school. Despite observation was the major tool for the study, the process of y study had natural and social interactions which made be understand their perspectives, sharing and stores in deeper manner. The major participants are introduced below:

Ms. Sunita is a teacher who works in a Bhav school. She has been in the school for more than four years as a teacher. She aspires to work as a teacher in the future. She has served as an inspiration to other teacher who is enthusiastic and enjoys working with her students. She was one of my interviewees and also, I had interview with her while at staff room. She gave me some of her thoughts about her views towards available ICT tools at the school. Similarly, she had been using internet and support from other teachers to understand and adapt new tools and technologies.

Mr. Keshav is a teacher at Bhav school who prefers to teach social studies at the school. He handles the resources of the schools and supports the administrative tasks at schools. He is a committed individual who is a Teach for Nepal alumni and is currently pursuing his master's degree at Kathmandu University. He is in charge of the school's resource management, provides help to the teachers, and most importantly, enjoys his time at school. He was one of my key people at the school while managing schedules with teachers and observation at school premise. If I had to observe classes or used other space for my study, he was the key person at the school.

Ms. Laxmi is a teacher at Bhav school who also handles some of the operational task at school. She prefers to teach mathematic for the school. She currently pursuing her master's degree at Kathmandu University and aspires to become an educator in the long run. She is a teaching fellow at the school and also faciliatory of ICT training program at school. She supported me by giving her post training review in an interview. She was taken as one of my participants because she had some views and prospects to train her team and guide others to use ICT tools. In fact, she was one of the teachers who took the remote learning forward during pandemic.

Mr. Rajeev is a teacher and prefers to teach mathematic. Similarly works at Laxmidev Secondary School's leader and had taken role of coordinator to. At Kathmandu University, he is pursuing his Master's degree. He works closely with School Management Committee who is managing challenges and major agendas of school with stakeholders. He was one of my key people at the school while managing my schedules, class, visit time, at school premise. Also, he was one of my participants as I had interviewed him about his thoughts for ICT lab establishment at the at school.

Ms. Anu is a new teacher at Laxmidev Secondary School who works for the government schools. She returned to school after maternity leave and is excited to teach science and computer at the school. Her primary subject is science, although she is also capable of teaching computer science. She had taken lead on teaching an optional subject last year- computer subjects- who allowed me to observe her class and supported during focused group discussion.

Ms. Khushbu is a teacher at Bhav school, she prefers to teach primary graders and enjoys being at school. For the past 5 years she has been a teacher at Bhav and want to pursue Masters in education soon. She had supported me to introduce team teachers and other staff members of the schools. Also, she supported other teachers to

use computer, internet and mostly printing process at school. So, she was one of my participants who gave me insights about her perception and other information about the school.

Ms. Sanu is a has been teaching for the past 2 years at Bhav school. She is one of the youngest teachers who is currently doing her bachelor degree and pursuing her teaching career. Being grade teacher of grade 2 she has to teach major subjects. She supported in my study by letting me observe her classes and during other discussions. The principals of Bhav and Laxmidev Secondary schools are Mr. Bhanu and Mr. Laxman, respectively. Both of the leaders had been at their school for more than a decade. Both school leaders have been members of the SMC and have played a vital role in collaborating with different organizations for betterment of school. They were the first interviewees and also the major key personnel for my visit at school and conduct the study.

Mr. Surya is one of the school management committee and past student of the Bhav school. He has been in the management committee formally from the past 3 years and has been supporting the school in many ways. He had collected fund for the school's infrastructures and sponsored one student at the school too.

Mr. Santosh is board member of the school management committee and he has been supporting Bhav school for its development. Recently he had emphasized in the physical infrastructure development of the school. He is local community member who also actively works for community welfare program. Similarly, he has supported two students at the school for grade 4 and 5.

Mr. Ajay is one of the SMC members of school of Laxmidev school, is an active member. He is well recognized among the teachers and local community for his active participation in community welfare. He was in constantly engaged with the

school's progress from several years. His mostly tries to support the school by innating collaboration with other organization for betterment of the school and improve quality of education.

Ms. Shanti had been teaching in Laxmidev school from the past 6 years. She teachers mathematic at the school. She also looks after extra programs of the school such as arranging field trips and in school programs. She is local member of the community and has completed her masters. She had supported me to know more about the school history and the changes which had happened in the past.

Ms. Parvati and Ms. Surakshya are students of Grade 6 whole lives near by the school. They both have studied in the school from grade 1 and had been participating in schools' programs and activities. They are fond of computer classes and other era curricular activities. They were the first two participants as a student whom I had observed and had interested in Laxmidev Secondary school.

Mr. Anup is a student of Bhav school who lives near by the school. He was often seen in the school before and after on the ground with his friend. He was one of the recognized students of the school for his dedication on study and his active participation in extracurricular activities. After several conversations and getting familiar with him I had selected him as my research participant at Bhav school.

**Table 1**

*Participants Details*

Research Participant	Laxmidev Secondary School	Bhav School	Total Number
Teachers	2	3	5
Students	2	1	3
SMC members	1	2	3
Principal	1	1	2
School Coordinator	1	1	2
Total	7	8	15

## **Data Collection Tools and Techniques**

### **Observation**

I used observation as a technique to gather firsthand knowledge from naturally occurring social settings in order to grasp the deeper exploration of the study. Additionally, I used field observation as a method to learn firsthand details about the participants' daily activities at their schools and in their surrounds. Silverman (2020) describes “first – hand” as the researcher must participate themselves to rather observe people from distance. Thus, I have applied field observation in my study that was helpful to understand the more about the public school from the perspective of ICT integration.

As mentioned before observation was the most important instrument for the study during the field visit. Researchers must watch what is happening at a research site while participating in it in order to take thorough field notes about the environment, the participants, and the interactions that take place (Cowie, 2009) thus, my major area of observation were; schools, teachers, available resource, interactions of leaders with school teachers and students. Observation allowed me to examine the real time events, context and participants activities at school. Several times, in addition to observation, an interview and a concentrated group discussion were used. Similar to this, all of the information gathered by observation, including non-observational information, was recorded in order. Following the observation, these data were examined by grouping them into similar groups. For instance, in the theme "leadership's perception on ICT," various aspects of leadership were combined to create a meaningful process.

## **Interview**

Interview was part of the data collection process which helped me to explore more about the research study. Despite observation was the major tool for the data collection, the interviews were conducted in a natural setting which helped to generate reliable information and conversation. I was motivated to conduct interviews with my study's participants, teachers and leaders, in the school as part of a case study for qualitative research. I created an open-ended questionnaire relevant to my research questions in order to move forward with the in-depth interview. I asked several probing questions during the interviews as needed to make them more interactive and in-depth about the research questions. Similarly, some of the participants were not in reach physically so few phone interviews were also done for further inquiry.

## **Field Note**

Field notes were also used to keep notes of each visits. After each visit and during the field visit at school, I kept proper notes of the events, conversations and other major elements which were essential for the research questions were documented properly. I used my note book for the data collection and later major things were again documented in the word file on computer. I took some of the images and also tried to give description as per the sharing of participants on the field notes.

## **Data Analysis and Interpretation**

In line with the research, data were organized and categorized based on their nature, observed actions and sharing, contents, and ideas expressed by the participants. Making meaning of data, conducting various analyses, going in-depth to understand the data, presenting the data, and providing an interpretation of the data are all steps in the data analysis and interpretation process (Creswell, 2011). The data

interpretation was done after the data were collected, considering themes about the context, theory, and the data itself. While coming to the analysis part several pieces of information were similar and they were connected to the relevant theme to create meaning it. While doing so, the relevance of data and information with one another was also carefully done. Such as the collected data were categorized systematically to understand more about the recorded data.

The data were collected on each filed visit and kept it on the record, on diary and later recorded on word files. Each data collected had date, stakeholders name and several aspects of the observations. While doing observation the data were collected with timings too, this allowed me to understand when these data was collected – even helped me to understand at different time different experiences and contexts were present. For instance, challenges encounter by the teachers from technological aspects were categorized in one section so it could be added in the theme of the finding sections. Also, Similarly, pseudo names were given to protect the identity of the participants. The data were analyzed by the interpretation of the themes linking it with the literature reviews were done. Finding of the other studies and literate were used to corelate the finding of my study.

### **Quality Standards**

The investigation was carried out following the guidelines for scientific research design- case study. To support the findings, discussion, and analysis chapters, several trips to the school were made. I was able to uncover and assemble information and insights through making numerous observations.

Data were carefully connected to one another after being acquired from the schools based on shared experiences, interactions that were observed at school. It was done since bringing these data into the finding and discussion section was collected



from more than one visit, observation and conversation with the participants. This is crucial for qualitative studies since they seek to cover contextual circumstances that are pertinent to the phenomena being studied (Baxter & Jack 2008). Further, the quality standard is essential for evaluating the quality of a study, it presents trustworthiness and authenticity which I adopted in my research as far as my knowledge.

### **Trustworthy**

The focus of the study was on two public schools. The data collected from two fields were constantly recorded each day during and after the end of each visit. After each day's observation, interviews and conversations a proper record of their sharing was done. This is taken into an account, as in most cases there is the tendency of accumulating scattered information on the topic which is widespread in the real context (Yin, 2003) which need record keeping for further analysis before moving to the discussions and conclusions of the study. Furthermore, to make alignment of the findings' interpretation was co-related with the theoretical aspects, diffusion of innovation, and also other similar studies findings.

### **Credibility**

At the time of the research, several information and data were collected. It was done to acquire needful of data for the further analysis. While collecting data, sufficient time was allocated for each visit to the school. Pre-visits at the schools were done, and afterward rapport building was done – expressing my research purpose. This was done to be familiar with the setting and context to enhance more richness of the study. Furthermore, the observed data, conversations, and interviews were co-related and analyzed rigorously for the meaning-making process along with an in-depth literature review. For this, the literature review of past similar research,

relevant to my research, was referred for the meaning-making process. Similarly, during analyzing, and reporting qualitative research, it is necessary to find the interconnectedness of the problem with the “epistemology, ontology, paradigms, methods, research questions, and so forth” (Rose & Johnson, 2020 p. 434). This had been taken into consideration.

During research consideration of “a consensus that qualitative inquirers need to demonstrate that their studies are credible” (Creswell & Miller, 2000, p. 124), and this requires extra interpersonal skills – social, trustworthiness, sensible in the situation, etc. Another major aspect to establish trust among the participants, proper communication with the participants (teachers) and the stakeholders was done-informing the process and objectives of the study. This encouraged teachers to provide more quality data and even support the purpose of the study.

### **Ethical Consideration**

According to Wet (2010), “ethics in research is extensive, complicated, and warrants deep and thoughtful discussion” (p. 303). During the data collection process, the visits were pre-informed to the personnel, also, while having formal interviews, the discussion and interview were scheduled with the participants as per need. As its create an establishment and rapport for further clarification while recording the data for further use (Baxter & Jack 2008). Similarly, during the interview process the interviews were conducted as similar as regular conversation with questions and answers – as rapport was built among the participants through several visits at school. This helped me to build a comfort zone with the environment and for participants to share views.

Furthermore, after the data were collected, the findings, were analyzed and moved forwards for the meaning-making process. In this process, various literature

available were reviewed. The arguments discussed in the data analysis section were connected to the theoretical aspects of the meaning-making process, and in this process, ethical guidelines set by the Kathmandu University was also followed.

Maintaining the individual's privacy and confidentiality is an essential consideration for the research. It was communicated among the participants that their identity won't be disclosed. Researchers were given space for confidentiality while and these considerations were thought during the research. In this study, the participants' ethical approval was incorporated in the research procedure, and the respondents' informed agreement was obtained. Oral consent while taking pictures and use in the study was taken from the participants. Any injury to the responder was avoided while conducting the field study. The research was conducted while keeping in mind the key ethical standards. To maintain participant and school confidentiality and to foster nonjudgmental perspectives toward schools and individuals, participant and school names were used as pseudonyms.

Furthermore, my study was guided by the ethical guidelines for research from Kathmandu University and adhere to ethical principles to protect the dignity and rights of research participants.

## CHAPTER IV

### ACCESS OF RESOURCES AND READINESS

In this chapter, I have emphasized the ICT tools (computers, printers, internet, and another medium of communication) which were available at the schools and how they have been used by the teachers, leaders and students. I have presented the status of the schools of their available resources, its usage and the readiness of the school stakeholders. I have accumulated the data which focuses on specific details such as the numbers of computers, and printers, availability of resources, their conditions, and some sharing done by the school teachers and leaders.

To begin with, during my first visit to Laxmidev Secondary School, I was captivated by the staffroom's proper timetables, notice boards, and routine prints in all of the classrooms. My assumption had given a different image of the public school but I was more of surprised with the systematic and organized visual representations of major operations at school. These notices, instructions, and printouts were visible to students, teachers, and parents which were helpful for me as a researcher too- which were prepared by the school leaders and teachers together at the beginning of the year. From the notice board, main gate and each classroom had a printed schedule of the routine and major events of the month. Similarly, there was a well-equipped lab in the school that encouraged me to further inquire into the research question. Thus, this chapter highlights various dimensions of ICT use in schools: available resources and their usage, and how the teachers and leaders are adapting to the change and their readiness toward the technology available.

### Resource Seeking by Stakeholders

Both the schools had applied for a grant, to support the schools having computers in school had pushed instructors, administrators, and students to use them on a variety of levels. School management team and Principals had played active part to seek resources for ICT in various levels. Mr. Rajeev and Mr. Keshav of Laxmidev and Bhav shool respectively had shared about how they look forward for the resources. Mr. Rajeev shares in line to the resource seeking by Laxmidev school:

*"The government granted us a grant for the ICT lab after we applied last year, and thanks to the work of my team, we were awarded almost 6 lakhs. We have bought computers for the lab setup and are anticipating the teachers' use of them. In truth, we had previously asked for commuter and laptop donations and support from people and organizations. The solutions weren't very successful in establishing an ICT lab compared to the grant we have received."*

The school had applied for the grant for the establishment of the ICT lab at school. We can infer that the school coordinator had prioritized the ICT tools at the school. By his personal and professional career, he had understood and observed the importance of the computer at school and in students learning. The school had sought for several alternatives to integrate ICT; however, this was one of the vital step and support for a public school.

Recalling my first visit, at Bhav on 31,01,2022, the school's premise was filled with several construction martials for the school. I could see the walls and the new buildings were being built at the time. The construction was going on, and I came to understanding that it was supported by international non-governmental organization shared by Mr. Kehsav when I was introduced to the school and other

staff members. The school leaders, including school management committee and leaders have agreed to allocate one classroom for the ICT lab shared Mr. Keshav when I expressed my research purpose. So, while resource seeking, by the public school it seems to be ambiguous to understand how schools are approaching for the resources from the government or any other sources. Mr. Keshav shares in line to the resource seeking by Bhav school:

*“We have applied this year because we think the government will help us and it’s important to improve the access to computers for students. The issue we are currently dealing with, though, is the fact that the actual infrastructure for the classroom and even for ICT lab we must allocate a certain room. It’s crucial that, even if given financial support for the ICT lab, we need to manage the available space because the school requires physical development too.”*

He expressed that there are other major requirements which schools has to overcome and one is infrastructure for the school. Despite he shows a keen interest in creating an ICT lab, computers and internet there were several other needs for the school which they had to prioritize.

In the both of the participants sharing positive attitude towards the ICT tools and technology was felt. Both of the school’s stake holders wanted to bring the use of computer at their schools through introducing computers to students and teachers. However, the several things were different from one another. As in the case of Laxmidev school, there was no challenge for the room to establish an ICT lab since the school had adequate classes and infrastructure- recalling the fact that the school had better infrastructure than Bhav school. On the other hand, as expressed by Mr.

Keshav despite having positive attitude toward establishing ICT lab the school had challenge to implement the idea.

### **Available Resources and Readiness**

The School Sectoral Development Plan (SSDP) (2016-2023) had focused on implementation the teaching-learning process, and its effectiveness and governance as major objectives (Dhital, 2018). In line with the mandate of the aforementioned plans both schools were found to have integrated ICT tools in classrooms and in their daily operations. Both schools had secondary computers, internet, and printers which were used by the teachers more often which was were my first observation checklist of the schools to further inquire. At Bhav school, I observed teachers during my visit managing the document file on the computers where resources for their grades, mostly handouts and flashcards and word puzzles, were printed. This procedure was frequently observed in Bhav and Laxmidev schools in the morning before the first session during my visits. I used to reach before the school started at 9:00 am in the morning. Morning used to be one mostly use by the teachers for conversation with one another and use of printers and preparing for the class. It was evident in most of my visits at least one teacher used to use be around the administrative computers and printing necessary items for the school and class. At least three teachers used to stand around the one computer, discussing their daily chores at home while simultaneously printing out materials for the students.

At Bhav school during 9:30- 10: 00 am I observed teachers in mostly using the computers and printers for the students. This was more of a routine for the teachers to printout the resources before beginning of the day. While listening to their conversations, the teachers used to share the things which they had read in social media to one another and share with each other. Teachers who had completed their

major tasks for the day used internet via personal phone for getting updated with the school's conversation; school had a small online conversation group for daily updates and announcements. At my time of visit, April, 2022, it was the time of local election, a lot of sharing about the election's perspective with reference to what they think and have read or watched online contents were discussed. Almost all the teachers had access to internet provided by the both of the schools. Later, I came to realize that teachers had a small group, Facebook messenger, where all the teachers and leaders were participants discussing about the school's issues and agenda. This observed in both of the school- having a small group for the school's meetings and other passing of information with one another. This was a common practice of online discussion in both of the school.

While starting a conversation and rephrasing my purpose of the study, participants often used to repeat a phrase, "challenges of budget", this was common words shared by the school leaders and even the teachers with whom I had interacted while introducing my research topic.

In developed nations, such ICT systems are used enormously, mainly for collecting enrollment data, student attendance, secondary information on teachers, and secondary information on schools. In other words, ICT mainly helps administrators get a better idea of the size of the educational system, student dropout and repetition, and the number of students per teacher (Carnoy, 2004). Similarly, the attendance collection, printouts and searching online resources were the coming activity observed in both of the schools. Among these schools, Laxmi Secondary School had created an ICT lab at the school during January, 2022 and it was ready to give services for the school students and teachers.



I was eager to learn more about the ICT lab so I approached my key person at Laxmi Secondary School, Mr. Rajeev, who shared about the ICT and some of his views towards it. At the back of my head, I was eager to meet the teacher who was taking class over there too. Mr. Rajeev was highly excited too when he expressed that they had set up an ICT lab for their school. He expressed that it was recently completed, as mentioned before around January, 2022. Furthermore, he expressed that it was an achievement for the school as this was the first computer lab which was set up for the Laxmidev Secondary School. He helped me to visit the ICT lab too, and introduced me to Ms. Anu who was the computer teacher at Bhav school. I observed the ICT room could accommodate around 20 students at a time, which was in the fourth floor of the school. It was clean and tidy with computers placed in proper tables. Internet, digital boards were well set at the room which was astonishing to see at a public school.

On my next visit, 02, 23, 2022, my purpose was to meet Ms. Anu to understand and gather more information about her role and her perception towards the ICT lab and other resource. First thing, is that computer is an optional subject so specific computer teacher was not present at the school. Technically the school was short on teacher to take responsibility of the optional subject and ICT lab which was available at school. It was due to the willingness and readiness of Ms. Anu, being a science teacher at Laxmi Secondary School, she was taking computer class too. She shares:

*“Having access to the ICT lab was new to me and my colleague at the school. I learned how to use computers during our Bachelors and in our professional careers. This has given me a new opportunity to learn Nepali and English typing and get familiar with other secondary uses required in schools*

*(printing, sending mails, learning to make PowerPoints, etc.). In my school days, the computer was scarce, I also graduated from a public school, and seeing a computer lab in a public school has given me a new avenue to learn and teach by the use of technology. I learn with the students too, as in our leisure time, as me and my colleague are using the ICT lab to learn secondary typing to develop a few skills!”*

Her sharing shows having access to the computer can create new avenues for the teachers to adapt to technology and she certainly had willingness to adapt. The question which emerged from this instance was that if the computers were not available would the teachers try to develop skills on their own or not? Even if they would try or want to, it would be certainly challenging for teachers without access to the computers in their workplace. Mwawasi (2014) expresses that the notion of capacity building, in ICT integration and adaptation would be missed; building capacity involves giving people access to tools that enable them to make adjustments that support the teaching-learning method, overcoming the obstacle of learning to use technologies to better their teaching and learning endeavors, and making proper use of such tools. Participant Ms. Anu shared with high enthusiasm after her class, and she shared,

*“giving students some exercise that requires computer lab has made me feel motivated towards teaching computer subject, and of if we had no computer lab, I wouldn’t be willing to teach computer.”*

Her willingness to take extra role, taking computer classes for grade 6, 7 and 8 and even learn new skills was correlated to new lab which was vividly observed in her expression and enthusiasm. On my next visit, on 25, 02, 2022, had chance to have conversation at teaching room. We were on the same table while other teachers were

also arriving. We started our conversation with formal greeting and sharing. She also asked about my study and what motivated me to pursue Masters and my research topic. I tried to be concise as much as possible. Afterwards she shared:

*“I was motivated by the fact that we had new ICT lab, I was looking forward for new ICT lab at our school. I’m a science teacher but I felt I can take classes of computer as well so when the management team asked me for taking class, I was ready for it!”*

Ms. Anu shared her dedication towards her school and students. The school was short in teachers for optional subject, computer but she took the opportunity and started delivering classes in the lab for computer. On the same day, I had to understand the view of Mr. Mr. Rajeev, school coordinator and School Management Committee member, he expresses his views on ICT for the school on:

*“This is the first time an ICT lab has been set in Laxmi Secondary School and most of the teachers and students were looking forward to it. We managed the computers which can accommodate our students and I hope this will bring growth in students and teachers. We had limited budget and we had tried to make most out of it”.*

In the above sharing, I found that the school had tried to bring facilities that can uplift the school’s standards for students’ learning and school teachers. Mr. Rajeev expresses his vision to upgrade the school and establishing the ICT lab was in their planning for several years. School’s improvement in infrastructure was one of the priorities set by the management committee. Mr. Rajeev and Principal of the school had been focusing for the establishment of the ICT lab since few years.

Finally, after the procedure they received grant from the government. He was sharing with excitement and enthusiasm about the newly established ICT lab at

school. While discussing about the ICT lab a lot of positive energy towards the ICT lab from his side could be felt, this was indeed one of the new infrastructures added in the school. He shared that they had applied for the grant from the government which made the idea of having ICT lab at school into reality. Similarly, the library of the school was shifted into the other block of the school and a designated space with proper chairs, table and other amenities were well set for the computer lab. The school had focused on grade 6, 7 and 8 to have at least 2 classes in the lab for students to use the computers and learn basic computing at school.

He shared about the changes he and his team had brought in the school such as increase in numbers in the past 3 years, management of drinking water and sanitation, sports and other indoor games for the students. Before the ICT lab, the school had limited resources, computers, which were often shared among the leader and other staff members- he adds. Indeed, in their school, the computer which was allocated for the principal and school was often used by the teachers and for administrative purposes – during observation. They had received the grant from the government by applying to the President Educational Reform Program 2077/78 he shared. While walking through another building, during the conversation, I came across another class where a smart television of 32 inches was also installed. It was guiding students to learn vocabulary from the internet resources. A teacher was guiding the student, a glimpse of the vocabulary content was playing on the screen. Students were eagerly watching towards the smart television. He expressed that it was dedicated to only primary school teachers and students while he wanted grade 6, 7 and 8 to use the ICT lab more in coming days. Finding computers, smart TV, and the internet dedicated to the students and teachers had encouraged more to explore more.

I requested for another observation in the ICT lab during my next visit which was scheduled on 02, 27, 2022. At 1:40 pm 27, 02, 2022 I got chance to explore how the students were using the available resources through the class observation. At Laxmidev Secondary School, I observed that there were 14 computers having LCD monitors and 1 digital board in the ICT lab, this was supported by the Nepal government. Miss Anu who was handling the computer class welcomed me into her class, it was grade 6 computer ICT lab time. All students were excited to work on the computer. This was new to the teachers and school students as shared before. With big smile and high energy, she gave instruction and asked students to get ready for typing about themselves or school. Immediately after that she started the requested students to get ready for the Microsoft words, and her learning objectives to use for describing their school. The computers worked well during my first visit at ICT lab when students were using. In between she used to guide her students if they had challenges. Most of the students were following the instruction and helping each other. Those who were familiar with the finding files saving them and had completed the work started to help others. Few students who were struggling preferred to ask to teacher and friends. Later, she demonstrated how to use several fonts and enlarge the text. The students looked with an amazement which would be a simple sharing for a computer aware person - seemed like some sort of miracle to the students. I was reminded of my first computer experience in school, and I could already sense their eagerness to return to the class and put what they had learned into practice next time.

### **Priority Versus ICT Integration**

In Bhav school the student numbers had increased in the past 2 years. The school gave physical infrastructure a higher priority than other requirements share Mr. Keshav of Bhav school. Although there was no ICT lab at Bhav Secondary school,

there were still the essentials such computers for administrative and operational purposes. I was keen to understand if the school had prioritized integrating the ICT in near future or not? Having a conversation with one of the School Management Committee (SMC) Mr. Keshav shares:

*“We have applied for a government grant to establish an ICT lab at our school too, but for now we are focusing to manage funds for the school’s building. The school needs more classrooms for the next year as our class student numbers are higher. Regarding the ICT, we are using the available computer and laptops which were supported to school during the Co-vid 19 for our online classes”.*

The school had struggled to retain the students in the past but the school had applied for the ICT lab grant, they had increased the student’s number at school in the past year with various promotional activities around local areas. They had used social media for promoting the school’s credibility among the local community and larger audience.

During my field observation, seeing the laptops at Bhav school, which were kept in the stationery and resource room where only few teachers were allowed to enter. Permission was required for teachers to use them in classes. I observed Mr. Keshav used to check charge of the laptop, check if its connected to the internet or not and then give it to the grade teachers for classes. I asked to him wouldn’t it be great if they had a small computer lab? He shares:

*“At present we are in need of physical structure, a proper building, as you can see the student’s number and the classroom available ratio! Yes, as I’ve mentioned we have kept it as priority but there are other small yet important*

*factor school needs to overcome – pointing hands showing me drinking water and sanitation area.”*

The above sharing expresses that the schools have other priorities which are also significant for the school’s progress. There are other prioritized factors which are considered to be immediate need while ICT integration was secondary need for the school at the moment. Despite leaders have positive perception towards the new innovations to be integrated at school. Including the principal of both school which I had visited and the supporting leaders and teachers they expressed positive notes on the ICT integration at schools. For the innovation to be adapted attitude plays a crucial role, the support by the teachers indicates towards successfully implement the technologies for the education (Hew & Brush, 2007).

### **Remote Learning and Covid-19**

Mr. Bhanu expressed his previous years challenge due to the pandemic and how they had to overcome to continue the school through remote learning modality. He expresses:

*“I had lost hope for during the lock down for my school to continue remote learning which other schools had started, and I was worried if we could retain our students or not in the future with.”*

He continues his sharing with long pause:

*“I trusted the strategies offered by our teachers, it was time to listen to our trusted members; who are younger and familiar with the internets and remote learning and all. I listen to them and worked together in collaboration with Laxmidev school teachers to continue our classes during classes.”*

The school was in much of need of laptops and resources for overcoming the challenge. To understand more on this account, I persisted to know more about the

remote learning from teachers who took online classes during lockdown, as Ms.

Laxmi shares:

*“We had look for donation of laptops from our networks, we received 6 working laptop and we had one desktop computer. To make it efficient we had to work in strategic ways to start remote learning for the students. In this process we had collaborated with Laxmidev school teachers too. Indeed, it was challenging for us during that time since there were lot of variables to control while implementing the online classes”*

In the discourse of the remote learning, school leaders including Ms. Laxmi Mr, Rajeev and Mr.Keshav, of two schools, had applied two major strategies. One identifying the competent teacher who could learn and deliver the online class. Second, supporting the student who had no access, any means of communication, for the online classes from both schools. For this school teachers had held a meeting and had done phone call to the student’s parents to understand the availability of the digital tools at home. This made the teachers to picture the scenario of the student’s home environment if they could have access to the online class or not. For the student who had no access to any of the digital tools (android phones or computers) they divided into groups and provided time to visit schools and take classes. Similarly, from the school side teacher were selected who were willing to take learn about the online classes at the beginning, later all teachers slowly learned by trial and error process. The teachers who could deliver the online classes were a steady process but slowly emerged in these schools. After they identified the teachers, at beginning, laptops were given to the teachers with secondary demonstrations on running the class. Similarly, for the students who had no access to any forms of communication, school had set up a learning station the group of students. This means a group of



students would come to school and take the online classes from the school using one laptop by several students. The strategies were shared by Ms. Laxmi recalling the challenging time when she had to groom the teachers for online class by learning herself first. The priority in at that time for the school was to make sure that classes are running for the students. School leaders and the teachers all agreed that the necessity of the computers and internet as an integral part in today's context- latter it was available for all the teaching staff members.

### **ICT in the Teaching-learning Process**

The integration of ICT in the teaching-learning process has significance in the school system and students learning. During the period of data collection, I got some opportunities to observe the planning process of teachers in both of the schools. One of the significant findings in both of the schools was that during the first kick-off time, in the morning, most of the ICT tools, computers, online preparation, and printers were highly used. Of course, for the rest of the time teachers had to teach.

#### **Primary School Teachers: Shared Responsibility**

In both schools, comparatively teachers of primary level were using the available ICT resources more than secondary school teachers. They used the resources for lesson planning and review, printouts, videos, and even some technique etc. The frequency of usage for classroom materials preparation by the primary school teachers was higher in comparison with the secondary school teachers. However, some teachers were dependent while using the available ICT resources. For instance, they would take support from the coordinators or other teaching members for troubleshooting computers, printers, and internet connections. Mostly during the morning, at 9:30 am it was prime time to use the available computers and printers at

both schools. Similarly, at Bhav school with the permission from Ms. Khusbhu, I asked to were the necessary things to prepare it for the class beforehand? I got the information that of the lesson plans which consisted of images which had to be replicated(worksheets) by number of student and some of the lesson had link provided for the YouTube videos which they had to show to the students. So, the primary schools were preparing classes and using ICT tool. Ms. Khushbu, often preferred to help other teachers in this process shares:

*“I like my primary team a lot, they are like a family to me. Similarly, during work I take it as our job to help each other. I’ve been familiar with the contents and lessons for more than a year and for new teachers I prefer to support them. Of course, it’s not a big thing but I want to encourage them to use resources properly. I’ve made lot of mistakes but I want new teachers to not to do so. Mostly, because the printer was donated to us, and we had lot of challenges when the old one broke.”*

She shared it with lot of compassion and smile. I could feel the importance of a computer and printer for their job and the challenges when it got dismantled.

Similarly, the process of sharing resources and knowledge sharing among the primary teachers were significant due to use in daily basis. It showed a positive attitude towards the available resource. Teachers' attitudes toward ICT can influence adoption and integration of ICT (Lawrence & Tar, 2018), which implies that if teachers have a negative attitude toward technology, even the best ICT facilities may not persuade them to use it in their instruction. Bring the positive attitude towards the stakeholders, primary or secondary teachers, teaching or non- teaching staff play a significant role in the adaptation and readiness for technology acceptance.

### **Chapter Summary**

ICT integration differs depending on the need, the number of students, and the resources available. This was a fresh topic of discussion for teachers and leaders while I had conversation with the teachers. Individuals have various perceptions of how to use the available resource depending on their jobs and responsibilities. Despite the schools' inadequate resources, the majority of the students expressed their desire to integrate for their own benefit. Similarly, having access to computers, laptops, printers, and the internet aided the schools' operations and daily functions.

## CHAPTER V

### STAKEHOLDERS PERSPECTIVE ON INTEGRATION OF ICT

In this chapter I've tried to bring the perspectives of the stakeholder on ICT at the school. As a part of my study the key stakeholders were, school leaders' such as principal, school management committee members, school coordinators, teachers and students. During the field visit I came across various sharing and instances where the stakeholders had shared about their views about the school and directly, indirectly about the perceptions of theirs toward the ICT. Leaders impact on the integration process, students views for new ICT labs, teacher's perception towards the ICT etc. I came across some personal stories, challenges, and adaptations, from the leader's point of view. I had a discussion after some SMC meetings to understand their prospect to manage the existing digital tools. Also, in one of our discussions, the school principal and school teachers at Laxmidev Secondary School shared some personal challenges and experiences which had led them to emphasize ICT integration at school. Thus, this chapter has focused on the aspects of leadership and integration of ICT in respective schools.

#### **School Principal's Perception on ICT**

During the field visit depending on the situation several contacts and conversation occurred during the data collection process, allowing me to learn about their perspectives on improving the school as well as their attitudes regarding ICT integration. Having conversations to explore how they had perceived ICT from their point of view was necessary to explore more about the research question.

While having a conversation in 20,02, 2022 with Mr. Bhanu of Bhav School, the principal, at his office it was observed that preferred using the daily registers for

taking notes and important details for his daily work at school. After further inquiry, the desktop and a printer of the school were transferred to the teaching department team- to be used by the teachers. I tried to explore his views towards sharing resources of ICT, (computers and other secondary tools) for his school – he shares:

*“Computers, in my opinion, are necessary for everyone. The majority of the time, in school, for the teaching-learning process. ICT plays a significant part in many elements of education, including the teaching-learning process, as I've observed in my past experiences. Collaborative School Network supported and encouraged me and my team to take online education during the pandemic. I was unsure whether or not my school could afford the resources at the moment. Similarly, the student's families are not financially stable and cannot afford the distance learning requirements. However, by using strategic preparation and communication with parents and students, we were able to conduct online programs. Later, I recognized that teacher training appears to be necessary if we wish to integrate ICT in the classroom—something with which we all need to become familiar. So, it's fine with me if my teachers use the computer, which I hardly use at the moment.”*

He described the lockdown of Covid-19 as one of the most difficult periods, as well as a time for sifting toward technological adaptation. He spoke on behalf of public schools in his area, stating that distance learning required the use of digital tools, but that both the school and the students/parents had limitations. There were also challenges that were beyond the school's reach, such as internet connection and computers at students' homes. To address this issue, Bhav school leaders devised a method to identify students who had access to at least a cellphone capable of distance

learning, as well as a group of pupils who would come to school and use the laptop for online classes.

The leaders of Bhav schools worked together to make distance learning possible. They had arranged a laptop learning area for pupils at the school, controlled the laptops, and added internet at the school expressly for distant learning, and distance learning spaces for students at school. From managing the resources to the logistic planning of distance learning was facilitated during the time of the pandemic. This later provided a new opportunity for school teachers to become acquainted with and use online materials during physical classes. For example, laptops that were used during distance learning were used during the physical classes and the daily operations of the schools. Ms. Laxmi of same school shared that distance learning was new and challenging at the beginning for school teachers while at present they were comfortable using them. In fact, she shared to facilitate a session that would further support the teachers. This demonstrated that the school's leadership's decision and attitude toward ICT integration are critical to the school's adaptation to the ICT.

A similar influence from the leadership aspect was observed in the Laxmidevi Secondary school. During one of my visits, Mr. Laxman, shared his own experience and explained why ICT was important to him in one of our focus groups. He shared:

*"I've seen other administrative employees present printed letters to government agencies for official work, whereas I used to prefer handwritten letters." It was fine for me for a period of time. Holding handwritten notes while others brought printed documents made me feel uneasy over time. I had to learn, and I can't deny that I haven't learned to adapt to technology in a timely manner. As time went on, I began to feel a little guilty about myself for not updating! This motivated me to study secondary Microsoft Office for*

*school administration and operations. And now I know how to type in both languages."*

His sharing of his past experience was had motivate him to teach his children's at least typing skills and other secondary functioning of computers. In a group meeting also, he vividly expressed to his teachers, "we must try to adapt and use these computers and internet for our students and for ourselves. I had persisted and I feel everyone should persist to using the computers." Even for the administrative works he preferred to use mails and had started using printouts shares Mr. Rajeev who closely works with the principal. In one instance, in 03, 13, 2022 the academic year was coming near. Teachers were busy with the course and other errands at schools. I could sense the change in environment of the teacher's room due to final exam preparations.

Ms. Anu who use to teach both science and computer had started to emphases on the science, her designated subject by the Nepal government to the school. This had left the computer lab visit less frequent to the students. Later, I came to understanding with Mr. Rajeev's sharing that in such cases school principal had agreed to take classes. I found that when a computer teacher was unable to take the computer class, the principal, Laxmidev, took the responsibility. With this information I wanted to visit the lab and observe how he was encouraging the students for computer classes. While observing his class in a computer lab, in the afternoon, 03,13, 2022, I observed that he was emphasizing the use of Microsoft word. Students were given a task to write about their school, introduction to their locality, themselves, etc. In one of the conversations, he stated that for me, if they understand and get familiar with the secondary typing I will be more than satisfied." The

implementation of technological tools in school was one aspect and leaders' perception of its usage can affect the implementation.

### **Teachers Perceptions on ICT**

Ms. Sanu of Laxmidev School was one of the grade teachers of grade 2 in Bhav School. She was one of the newest members in the school. I could observe that she was using laptop often her class for showing videos from the internet. I asked for permission on 06, 02, 2022 in the morning. Since I had arrived at the school in the morning, I could attend one of her class in grade 2. She took her class using the laptop and Bluetooth speaker showing one of the moral videos to the student. I tried to know more about her perception on the ICT tools. So later after her class I interacted with her. I had already built rapport with her in the past several weeks so it was easier for her to share too. She shared:

*“I’ve been using the laptop more frequently this year for the class. The laptops, speakers and internet are part of my classes these days. At the beginning I didn’t use the laptops but when I saw other teachers’ primary teachers using it I was also curious and learned from them. We don’t have the lab at the moment but these portable speakers and laptops has made it easier for engaging the students for learning”*

Ms. Sanu had 21 students and she tries to show some of the contents using the laptops for the students. She knows that the number of students is high so she prefers to use a Bluetooth speaker while showing class. Having access to the tool and her attitude towards implementing ICT tools in her classes was visible.

Similarly, Ms. Khushi who is grade teaching team of Ms. Sanu also had expressed some of her thought during the visit. On 08,03,2022 morning, when most of the



teachers are engaged in printing and collecting the worksheets, I tried to ask some prompt questions to her. She shares:

*“Few years back, I was used to be sacred at the beginning with printer, the new one which was donated to us by an organization, but we need the resources so I don’t think too much and use it. I help other teachers too when they need help. And after the lock down, I was more comfortable using the laptops and online classes. At school, for printing I find it easy and debug the minor problems (laughs...) Using laptops for classes and other programs in classes and school function are common for me and some other teachers. I feel I’m comfortable using the available resources.”*

The above sharing by Ms. Khushi shows how she has started to become familiar with the available resources at their school. Indeed, when the technologies are offered to the teachers it can provide various avenues for teachers to apply and integrate in the teaching learning process. Similarly, it can benefit students and teachers by allowing them to go beyond the curriculum by accessing the internet, technology-based courses, and other online resources, it can also have a good effect on students' learning processes (Ghavifekr & Rosdy, 2015).

During the visit at the in Laxmi Secondary School, I arrived at the afternoon, 12:20 pm on 03,04,2022 and it was lunch time at the school. I was offered the lunch at the school along with the teachers and we started some normal conversation. I was paying attention to the conversations, which were mostly about the local elections and teachers were sharing their views to one another. I noticed that Ms. Shanti was quietly listening to the math problem solving videos and taking note. I tried to get close to her but didn’t wanted to disturb her. She was using her personal android phone and preparing for the classes. I noticed that she was making a few notes about the video

she was watching on a piece of paper. The bell rang, the classes started again at 1:00 pm, and Ms. Shanti and the other teachers started to move about for their classes.

Later at after her classes, in her free time I approached her by asking how did class go and asked her how has internet helped her, she shared:

*“Yes, grade 5 and 6 are good class and I enjoy teaching them. And to answer your question, yes internet has helped me in many ways. I sometime use videos, not to show in the class but the teach the subject matters in different ways. Students gets intimidated with the math subjects but I try my best to make it easier and fun for them to understand. YouTube video has helped me to do so!”*

Ms. Shanti prefers to use internet for making classes easier and fun for the students. The use of the internet by teachers to make classes engaging and fun indicates that when access is given, for internet, they can use it for their subject matters and integrate later in the class. To ensure that subject instructors have easy access to ICT tools whenever needed, sufficient tools and access are required for ICT integration in schools are important for searching relevant resources through internet and computers. Similarly, the aspects of pedagogical teachers require insight into the pedagogical role of ICT, in order to use it meaningfully in their instructional process (Hennessy et al., 2005 as cited in Ghavifekr & Rosdy 2015).

### **School Management Committee Perception on ICT**

Mr. Surya is one of the school’s management committee member at Bhav Basic School. During the school’s 60<sup>th</sup> anniversary of the school I had opportunity to meet him- one of the management committee. The school had a full fledge program of celebration with music, dance, award ceremony, speech from the principal and other leaders etc., in 04,03,2022. During the event, I recall that he was helping the school’s

event in small errands such as managing the crowds, helping in food distributions.

Later when the program was over, I took some of his time and introduced myself and shared about my study to him. My objective was to understand how he, as a management committee, had perceived ICT's aspect for the school. He shares:

*“I remember our school was one of the recognized schools in the town, with time our school is not recognized by the community at present. Everyone knows about the word ‘school chowk’ which is land mark in our town, in fact it was named after our school since 2018. Our school was relocated in here around 300 meters away from its actual location which was considered as a ‘school chowk’. Regarding the progress in ICT, we have thought about it but at the moment, as far as my knowledge school’s new building had been the major priority. Once it is completed, we intend to create one ICT lab for the students for sure. With other teachers and school leaders we are looking for the grant and fund for ICT lab at our school too.”*

In his sharing and his involvement with the school I observed that he was one of the dedicated members for school's progress. Not only in during the school management committee meetings, he used to support in school's programs too. In fact, in the 60<sup>th</sup> year celebration of the school I had interacted with him. Through his sharing it was reflected that he was well aware and attached to the school being local community of the area. Later through Ms. Laxmi I came to realize that he was also one of the students of the school and had been constantly supporting the school. Furthermore, I had conversation with the Ms. Santosh who is the board member of the school management committee at Bhav School. In a preliminary conversation with him about the progress of the school, he had emphasized more on the physical infrastructure of

the school- new building for the school. While having further conversation with him he shares:

*“We had 5 years plan and establishing a new building was one of them. It was hard at the beginning, how to begin but constant discussion with teachers and principals we saw some prospects. Adding new teachers, managing budget, drinking water and sanitation are the major things we’ve accomplished and yes finally the building is also almost done. Talking about the ICT lab we had very few ideas at the initial phase for the school since the we had emphasized or eon making a hall for the school for different programmers. With time and discussions with principals and teachers some we realized that we should have ICT lab at school”*

*“My major role for ICT was to communicate with the Municipality for the budget and update to other SMC member and teachers whom I trust.”*

The narrative explored that the SMC members plays a vital role in the integration of ICT and other. For the perpetual development of the school SMC member’s decision and contribution plays a vital role. From his sharing, he relied on the teachers for the ICT integration process while was actively supporting to the school through coordination with municipalities. Indeed, the budget for the purchase, installation and other aspects requires financial support from the government- which he was managing. He was suggesting for the idea of ICT lab by the teacher at school who were the major users at the school if ICT lab are established.

Similarly, I had reached out for the SMC member of Laxmidev school for the understanding more views from the leader’s perspective. Since, ICT lab was already established at the school I wanted to now view from management committee about their planning and ideas which were relatable to my study. With the help of Mr.

Rajeev, I approached to one of the SMC head. Since, he was often out of the valley for other purpose I had to initiate for a phone interview. Mr. Ajay on shares:

*“Yes, I know about the ICT lab, which was established in the school. I was informed by the teachers and other members of the school. I’m glad it has been established, after all it for the children’s learning”*

I enquired as to his future plans or some thoughts for ICT by posing the question, "What are your other thoughts regarding ICT integration?" On 09,19,2022 shares he shares:

*“Well, I don’t have much ideas on this. As far as my knowledge I’ve been told that this academic year our ICT lab are already set up for the students and it can accommodate our students. So, I have not put much thoughts for ICT.”*

The participant, SMC member was interviewed after several months of the ICT lab establishment at the Laxmidev school. From his sharing, we can infer that he has been receiving updates from the school team about the ICT and other progress at the school. It was quite surprising that he was not well aware of the fact that the ICT lab’s major equipment’s, computers were almost out of order. However, he mentioned that he had once visited the ICT lab several months back after the ICT lab was created but it seem to that he has not observe red the present condition of ICT lab.

The innovations and the application of ICT doesn’t happen in a vacuum it need space to function and give services. The perception of the SMC members was more inclined towards establishment of a space where computers would be set and students would use them. A general understanding of Information, Communication, and Technology (ICT) in education was present in Mr. Surya as he had idea bout incorporating in coming day at school when they will have enough space. Similarly,

Mr. Santosh expressed about adding some computers and smart T.V for the school student who would learn digitally.

### **Students Perception on ICT**

In both schools I had witnessed positive attitude towards the ICT, secondary ally students used to refer it to computers and internet. I had some opportunity to be in their classes and have conversation with them during their free period and some classes.

On 03, 25, 2022 at Laxmidev Secondary School, in grade 6, I got opportunity to interact with them with permission of school coordinator. I had observed grade 6 using the computers in the ICT lab with their teacher's guidance. One of the class was off due to absence of teacher so I was provided chance to have conversation with some of them.

Grade 6 Ms. Parvati on 03, 25, 2022 shares:

*"I get excited when we are allowed to go to the computer lab, it's one of my favorite subjects. We don't have computers at home so it's exciting each day. We are were learning typing and understanding about hardware and software but sadly we are not going to lab these days. This is due to problems in computers are not in good condition."*

In her sharing, she was excited to learn new skills through ICT lab, using computers in her computer classes. I recall my class observation at 02, 27, 2022 when all the students were engaged with computers and practicing typing in Nepali and English. In short period, less than 6 months, the ICT lab computers were out of services. When Parvati was sharing, others were also sharing the problems in ICT lab in disappointing way.

Grade 6 Ms. Suryakhya shares:

*“Most of our computers are in no use. Some computers are not starting, while some computers’ key boards and mouse are broken. Our teachers are also helpless when we share this problem during class. Last time, we had to take two computer’s central processing units, to the vendor. I supported Mr. Rajendra, our school coordinator for carrying. It was very tedious since we had one scooter and I had to carry hold one CPU by my arms. I don’t know if its repaired or not but I wish to use our computers soon.”*

Her sharing depicts the challenge and possible constrains while implementing ICT at school. Despite the ICT lab was well created by the school using the grant, the school had missed to think about the management procedure for the exiting computers and other resources. This tells us that only introducing the ICT resources will not create efficient usage of the computers in schools. It requires some dedicated personals to manage and maintain them.

Similarly, Anup, student of grade 7 at Bhav School On 03, 27, 2022 also shares his view while having conversation in the ground. I had seen him often playing badminton with his friends at the ground during free time. He was familiar with me, seeing me in staff room and sometime helping in school activities. I had tried to innate conversation with his interest and vessel down to the ICT’s periphery questions. Such as: how would you feel if you had ICT lab at school? He shares:

*“Yes, it would be great. Computers are important in today’s world and learning about them would be great! Hope could play some games (smiles). I don’t know if we would have a computer lab but sometimes our teachers show videos to us from laptop in our class – I enjoy when we have such classes.”*

Participants had some expectation if school to have ICT. However, some of the teachers were using the laptops to show some contents to for the student. We can

infer that the participant had awareness about the ICT tool but lack of access was to ICT tool at school was hindering the possibilities of technological adaptation by individuals.

### **Chapter Summary**

The perception of the stakeholders shows that different stakeholders holds different perceptions towards the ICT integration process. Most of the stakeholder's perception towards the ICT indicated towards access to the tools, physical space, internets and other equipment's associated with the ICT. Similarly, participant who were in However, the notion of management involved to sustain the ICT integration process was less found among the stakeholders.



## CHAPTER VI

### CHALLENGES IN INTEGRATING ICT

This section includes a challenge and adaptation of ICT in both of the schools. The data were collected in response to the research questions through observation and interview. The major challenges observed and share by the stakeholders are expressed in this chapter while adapting the ICT tools. I have tried to explore some challenges experienced at individual and institutional level to understand more why certain challenges occurs.

#### **Operational and Personal Attributes towards ICT**

Teachers of Bhav school used printers for secondary operations such as printing the routine, lessons, and handouts for students and teachers. The frequency of the use was higher in the morning time- kick-off for the day. During this time teachers use to communicate the major resources that they require for the day with each other and utilized the time and resources efficiently. In one of the interactions with the Ms. Jyoti of Bhav school expressed that:

*“It was challenging for her and the school when a printer was out of order last year. This current printer was supported by the Rotary Club and we tend to be careful while using it”.*

It's obvious that machines lags and some errors might occur while we use them. When the printer got lag or jammed, they had to request coordinators or teachers who were familiar to solve the problem. For an individual who is familiar with the secondary function and maintenance of a computer and printer, this would be a very simple task. However, in a school where the resource is scarce, individuals (mostly

teachers) are used to stepping down to solve such problems. For instance, having a conversation with Ms. Sunita she expresses:

*“I want to solve such problems by myself but this is the property of all of us, and we have only one computer and printer at the moment which is given to us. I get worried if it gets dismantled when I’m using it, so, I make sure I inform the leaders of my school to avoid any further challenges.”*

A different set of cultures was established in schools while using computers and printers among the teachers. As expressed before the primary school teacher were using the available resources more frequently and this had to do more with their classes than other administrative work. Similarly, teachers were looking for permission while using and managing minor problems to avoid inconvenience.

Access to technology and usage provided some ownership of these tools, however, encouraging teachers to use them with a free will needs more motivation for handling the minor problems.

### **Institutional Integration of ICT**

Almost all the teachers and school leaders had smart phone in both schools. Both the school had installed internet for the school, thus all of the teachers had access to the internet. During, my field visits I preferred to stay at teachers’ room in both of the school and I observed that most of the teachers used to use internet via their personal smart phones. While being part of teacher’s conversation, teachers used to share about the things that they had seen or read on the online, social media and even share among them. From the individual’s perspective, the teachers had adapted the innovation, smart phones, from their personal level. However, from the institutional level the schools were adapting in different rate of adaptation. Shain (2006) states in line innovation diffusion’s attributes that “personal and optional

innovations usually are adopted faster than the innovations involving an organizational or collective innovation-decision” (p. 17). When the new innovation is exposed to the teachers, and demand for adaptation on the are placed, more likely to adapt will occur. When the value of the new innovation is seen by the teachers towards the new technology, they will use it (Casmir, 2001). Indeed, these are the positive attribute towards the application of innovation but for the efficient use or integration requires a systematic approach from institutional level. Correspondingly, I want to share some of the difficulties encountered by the recently formed ICT lab at Laxmidev School while using the available resource of ICT lab. In a brief, there were 14 computers that were in good operating condition – on my early visit at school. The government supported for the school with 6 lakh rupees for the establishment of the ICT lab. As previously noted, students and teachers used these computers for computer classes to practice typing and study other subjects. However, with later after several usage of the ICT lab computers, the installed computers started to show some hardware and software challenges. Ms. Sabina who was dedicated person of the ICT lab at school shares in our conversation

*“For maintenance I don’t know who are the concerned person or team since this is my first-time managing ICT lab. Simple problems can be handled by me if the computer is not function during class – as far as my knowledge, but I must say I’m not specialized person in maintain the computers. This has been a difficult for me to run classes since most of the computer are not working properly.”*

Ms. Sabina was one of the teachers who was taking two roles at the Laxmidev school. At the very beginning when I had conversation with her, she was highly motivated towards taking classes at ICT lab, and even learning with the students, however; I

could sense that the challenges of the computers' hardware and software challenges had slightly demotivated her. This was an obvious feeling since; she already had her major role of teaching science too and the academic year was also coming near. The management of the resources was extra task added in her job.

How the new innovation or technology will efficiently work also depend on the function system which manages the usage and possible challenges regarding the ICT tools. This allows successful adaptation of the technology by the stake holders at schools. School as an institution needs to prepare a system which looks after the possible challenge and how the innovation will take part in the school's operational activities, teaching learning process and other aspects.

### **Adaptation and Capacity Building**

Information and communication technologies have changed and given new perspectives; for role of institution for adaptation, teaching and teaching and learnings inside classroom, use of software packages and online resources etc. The changed Rapid technological development has given new possibilities to test different software and programs. PowerPoint, MS Word and Excel, use of Internet for educational videos and operational task are commonly used at schools. And for use of such programs through computers and laptops in a given circumstances requires infrastructure, maintaining ICT equipment and dedicate personals (Baskin & Williams, 2006). Similarly, the notion of capacity also appears to be significant along with other requirements of ICT integration process. Baskin and Williams (2006) note that "skilled personnel educators, support staff, and other leaders skilled in the selection and effective use of appropriate ICT resources remain an essential condition" (p. 3654).

I approached Ms. Sanu as she preferred to take help from Ms. Laxmi and Mr. Keshav, carrying laptop in her hand before her afternoon class. During my visit on 03,08,2022, I observed in the morning, she was preparing for her class. She took the laptop and stated to take help on managing the videos from the internet- later I realized was trying to download for her students. She worked collaboratively with Ms. Khushi that day, and later that afternoon in the teacher's room managing her upcoming class. I spoke with Ms. Sanu to learn what kind of support she occasionally needs from administrative and other teachers. She shares:

*“I mostly take help from Ms. Khushbu as I’m new at school and also new with the computers and printing process. I think her support has helped me to complete my task and also sometimes encouraged to get familiar using the computers and printings. I’m confident to use laptop for showing videos by managing Bluetooth speakers, managing the internet connectivity for some classes. However, I think I need to get more familiar with other aspects too.”*

She expresses her way of learning and adapting to the technologies available at the school. Similarly, she expressed that she needs some support which builds her capability to use the resources in an efficient way. During the meetings of the school teacher I had witnessed that, record keeping, creating logistic planning, routines and other online activities were done by the school leaders and few selective teachers. With my observation, for Ms. Sanu, the scope of learning about the ICT’s application had been limited to the class activities. Despite ICT in Education Master Plan 2013 emphasizes the integration of ICT in teacher education, school teaching and in-service teacher training programmed (Ministry of Education, 2013), the scope of effective implementation from capability increasement of the teachers are less prioritized. Similarly, Rana & Rana (2020) expresses that “rapid growth and development of

digital technology and internet facilities have been a secondary need of individuals” (p. 37), which should be part of an individual’s growth and capability of an individual should be increased.

Ministries of Education worldwide expect ICT to be used to enhance the quality of education (Leask & Younie, 2013) however, for public schools in Nepal, insufficient support to the teachers for supporting them to build personal and professional development through ICT are overlooked. Nepal’s Education Sector Plan, 2021-2030 has recognized access of ICT to students at school as one of the challenges and has aimed by to increase quality of education by 2030- including ICT access to schools (Ministry of Education, 2022). It expresses that progress in schools happening through various changes and one has been incrementing in the internet access in public school. Similarly, the model school proposed by the government to achieve the goal of quality education also includes establishment of ICT lab and other factors. However, the aim of the government seems to be ambitious but requires reach based strategies for applying or integration ICT at various levels since the schools lacks human resources at school. In fact, in my study both of the school’s lack of human resource was one of the challenges faced at the moment. Almost half of the teachers were hired by the school management committee who were teaching various subject at various levels. It is doubtful whether education quality will be at the desired level by 2030 in public schools, which lack human resources, teachers, and attention to capability development.

### **Empowering Teachers**

Training appears to be one of the key elements for empowering individuals at organizations. During the discussions with school leaders, I came across their views on improving the skills of the teachers at school. In Bhav school, one training at the

end of academic year was conducted and Ms. Laxmi had taken responsibility. While having an interview with Ms. Laxmi, she shared:

*“This is the first training after the pandemic, and I think we all must come to the same page while using the resources available. It’s simple for us to print out the worksheets but my team members are still struggling with secondary use. There are few teachers who are comfortable using cell phones and the internet but I find some friction in the use of available computers and laptops by teachers. We have new teachers whom we need to groom for our teaching practice and use of ICT tools for creating worksheets and other resources”.*

Every three days, there were four hours of instruction. Ms. Laxmi focused on the usage of the online resources, and designs, for elementary school teachers to develop interactive worksheets. Similarly, she had tried to groom new teachers to use the computer and available laptops for the teachers’ planning for the week. The requirements to deliver beneficial experiences for teachers and their students must be recognized by the teaching team if technology integration is to be successful in these courses (Schmidt, 1995). During such discourse, different ideas can be shared among teachers to teachers which will allow the innovation to become more effective. Since, the teachers at Bhav school had teachers with different experiences in teaching, career, and engagement with a new innovation at different levels, the training supported show how the available resources can be adapted in the coming days. Roger (2003), had expressed about trialability, “trialability is the degree to which an innovation may be experimented with on a limited basis” (p. 16). Indeed, when resources are tried, applied discussed, and thought about how to use them in the coming days the chances of adaptation can also increase.

I recall, at Laxmidev school, Mr. Rajeev had expressed the need of the training for the teachers. Due to an assembly program held by teachers and students on March 8, 2022, I arrived a little earlier than normal timing, at 8:30 am meeting that was scheduled with him at the school. I witnessed that school had arranged program where teachers and the students were arranging, mics, speakers, laptops and other equipment's to make assembly effective. Mr. Rajeev was also engaged and supporting the program. The program had several dances, speeches and some singing done by the students. The technical part was supported by the teachers which made the program successful. Later, I had chance to have conversation with Mr. Rajeev he shares I tried to ask about the how familiar are other teachers with all the arrangements and management of these technical he shares:

*"I hope you saw our program. Our students are quite shy but I hope they did well. Regarding other teachers' familiarity, few teachers are very familiar with the set up and management for the assembly but sometimes they need assessment for using track songs form the internet. However, I believe that they will learn eventually. I remember there were more than 4 teachers who grasped the online teaching method quickly during the lock down so I think this won't be hard to them in future- for other programs too."*

The above sharing reflects that, the school leaders are aware that teachers needs support while implementing ICT at school programs or in teaching learning process. Inarguably, if the specific trainings are providing to the teachers, they would be more familiar while using the available tools and technology. Rogers (1995) defines innovation as an idea, practice or object (ICT) that is perceived as new by the adopter- in this case teachers. Adding on, the characteristics of an innovation as seen by an individual within a social system are believed to have an impact on the rate of



adoption-when adopters are exposed to the new innovation or instruments. In the previous sharing Mr. Rajeev was rigorously working along with the teachers to use the Bluetooth speakers, laptops, mics and internet to integrate the available resources in the school's program, and interestingly few teachers and students were engaged with the process and understanding how things worked and experience how it can be integrated too.

### **Can ICT Become a Peer Learning Process?**

Several aspects of peer learning were visible among the teachers in Bhav school. For instance, among primary school teachers, collaborations between the teachers were comparatively higher. I could observe teachers working together for the next class by printing, downloading, and managing other resources for the upcoming classes. Having a conversation with the teacher during free time, lunch time, I came to the know that the grade teaching approach was taken in the school. Observing, teachers working with each other managing the resources was part of the grade teaching. In this discourse the team teachers used to look into the lessons and prepare for the class. Similarly, when there were need of printings and managing worksheets teachers used to work together. For instance, Ms. Khushbu shares her experience while teaching new teachers, her grade teaching partner, about the printing process at their school:

*“At first, I was also scared, but now I don't worry about making a mistake while using computers and printing resources. I am aware from previous experience that these printers occasionally need maintenance, but I think we should use them to improve our class. I enjoy printing flash cards since they are useful in my teaching. My grade-level teaching partner has learned how to*

*copy an image, save it, and print it. I enjoy assisting teachers who need assistance printing materials.”*

This had helped the teachers to learn from each other too. Before the class timing, teachers used to manage the laptop to show the videos to the students by testing if the speakers would work or not. If any technical challenges were found, they would try to solve them by themselves or take help from other teachers.

I obtained permission from the primary grade teacher to watch a few classes during the data collection procedure. Ms. Sanu graciously allowed me to observe her class. Before entering the classroom, I noticed that she attempted to manage the resources for her students. Her grade teaching partner also supported and helped her to prepare the resources; resources such as a speaker, laptop, and downloaded videos. In the class, the number of students was 20 and the students were highly excited. The speaker showed some problems while the video(story) was played, but students were engaged during the class. Some difficulties arose, such as charging the laptop throughout the class, managing the students to become more orderly, and keeping the laptop in anti-light, but the teacher handled them admirably. Ms. Sanu was able to handle issues with the connectivity of gadgets, laptops, and Bluetooth speakers. It demonstrated her self-assurance when using the equipment in class. She also informed the management team about the laptop's charge (battery) issue later in the staff room. She admitted that she was initially uncomfortable with laptops and other devices, but that she is becoming more comfortable with them as we work together.

### **Chapter Summary**

While managing or integrating the resources, schools have their own limitations. Even if more resources are provided, it seems vital to manage them in a systematic manner by allocating key personnel or having a function plan to address

the obstacles for ICT-related issues. Peers and leaders have a crucial role in accelerating the speed of adaption when new innovation is implemented at school. Similar to this, ICT should be used to improve teachers' capacity for both personal and professional growth.

## CHAPTER VII

### SUMMARY, DISCUSSION, CONCLUSION AND IMPLICATION

In this chapter, I've briefly described the major findings and summary in the discourse of the study. From the initial phase towards the conclusion parts, several learning and change in assumptions and realities are expressed. Thus, in this chapter, I've discussed the study's implications and major learnings from the study before moving on to my concluding parts. The discussions are based on my personal experiences at two public schools and my connection with the theoretical aspects.

#### **Summary of the Study**

As I mentioned in the introduction part there are various ranges of schools in Kathmandu valley, however, it was much easier for our students, on the school I was working on, for as access to technology, laptops, and the internet, were available for all the children. In contrast, my university friends who were working in government school, had several issues. One was access to the laptop and internet for teachers and school. She expressed that access to ICT has been a major problem for public schools and students who were enrolled in the public school of the country were negatively affected by the pandemic despite several schools trying to manage some technological integrations. Her sharing made me rethink access to digital tools, integration of ICT at public schools in response to the pandemic and technologically changing world, skilled teachers, administration, operational role, etc.

In my Master's, I developed perseverance to explore more about the ICT and its implication in education. When I was asked to provide my a research topic of my interest, I was sure that this topic would be an area of my keen interest. Since the

thinking and sharing of this particular topic during classes and with some mentors was gaining some shape.

In this context, I took two schools as part of my case study- research. In the discourse of my research, after the exploration of my research agenda, I had to vessel I remember that I was highly stuck with the word “optimum utilization of ICT,” at the beginning, which was narrowed down with discussion with my supervisor. It gave me more ideas on how to view a researcher in a social context. With discussion and some reading, I was clearer about observing how integration is happening at public schools. After the research topic was finalized, I was confident about what I wanted from this research. Hence, I had developed a research question:

- How public schools are integrating Information Communication and Technology for secondary schools?

Similarly, after the completion of generating the research question, I arrived at the choosing the methodology to complete the study. Based on my research question, I had to explore the experience, events, perspectives, perceptions and practices, leadership approaches, etc. I used a Qualitative research approach, case study, and observation as my major tool. Adding on, according to the need some interviews were also carried out with the participants. I need to explore the participant's experiences and perceptions of the ICT which would help me to generate multiple realities and explore the subjectivity.

I adapted the diffusion of innovation with my research findings. Moreover, I selected leaders, teachers, and students as my key participants so that I could explore more about the study.

I developed different themes out of the narratives under the research questions: To explore how secondary-level schools are using Information

Communication Technology and had developed the major themes: (1) Access to Resources and Readiness (2) Stakeholders Perception on Integration of ICT (3) Challenges and Adaptation of ICT with their sub theme.

### **Discussion**

The narratives and findings from the participants and the school environment reflected that integration of ICT requires various factors to be considered in public schools. The qualitative findings of this study provided in-depth information about challenges, limitations in the management of the available resource, and other factors.

When we talk about the integration of ICT, it's not simply having access to the digital tools or building an ICT lab for the students at school. It demands various aspects to be considered such as its management, leadership approach, and skilled human resources for its sustainable use and application. Among other factors, leadership was one of the vital factors observed in the study. Integration refers to the integration to the access of ICT in education, which contributes in the improvement in education sector and “equity, management, efficiency, pedagogy, quality, research and innovation” (Neeru, 2009 as cited in Mbodila, et al., 2013). Ghavifekr and Rosdy (2015) states that, “the integration of ICT in education to the use of computer-based communication that incorporates into daily classroom instructional process,” focusing on the teaching learning process. To address the aspects of the integration, including usage, implementation and other aspects such as access, leaders’ perspectives, factors influencing on the ICT to personal (stakeholders) adaptation of ICT are discussed in the following section.

### **Access and Challenges in Implementation**

The expansion of the ICT in school got some acceleration by the new reforms made by Secondly School Sector Reform Plan (SSRP) 2009-2015 by expanding the

teaching associated strategies for the schools (Joshi, 2017), and also Department of Education (DOE) provided a huge amount of money to buy necessary ICT tools and their effective use in secondary level (Joshi, 2017). As the finding of my study showed that the computers and printers provided by the government to the principals were used by the teachers of both schools. But the use and their access is vary. For instance, in Bhav school a computer was given access to the teachers by the principal for daily operation. However, it not sufficient if we calculate the ratio of the teacher and the available ICT tools in school. Similar picture was shown in the ICT lab of Laxmidev school. Though, there are about 14 computers in a lab, but their operations and maintenance are not maintained well. It's because no one knows how to maintain them. It clearly showed that our shows that our schools are equipped with ICT tools but because of improper guidance and lack of skills they are in least use. Because of this those ICT tools are out of order. The teachers had access to the computers, but there was no established procedure for who should use the resources or what personnel should be available in the event of probable repair needs.

### **Leadership Practice and Implementation Process**

In reference to my findings, the decision to install, integrate, or apply the ICT technical tools at a school depends on how the leadership team or a leader has prioritized that technology and how they plan to do so. As in both of the schools the decision were made by the principal or coordinators to introduce or manage the available resources. The idea of integration depends on how each person interprets and has experience with it. Similarly, what kind of leadership is in practice, at school, also plays a significant role in the implementation of ICT. In both of the schools, shared instructional leadership was observed at schools. Which means, in finding I found that the leaders were supporting the teachers in both the school by instructional

guidelines- understanding the teacher's strengths in some cases and empowering them. For instance, there were several instances where school leaders were supporting the primary teachers on how to use the computers for printing out the worksheets, Nepali typing, creating interactive worksheets, etc. Mr. Rajeev and Mr. Laxman of Laxmidev school were observed guiding the teacher for typing in Nepali and English at their own level. Also, the principal of both schools recognized the vitality of computers and strong communication mechanisms at schools- using the internet- later had been encouraging teachers and students for basic usage. For ICTs to be implemented more successfully in schools, the importance of leadership in the adoption of new technologies must be taken into consideration. Bry (2003) stated that "the notion of leadership to teaching does a disservice to both teachers and leaders" (p. 393). Further he argues that "leadership promote organizational improvement and be sustainable for the leaders themselves" (p. 393); which in fact supports for the impact of the leaders towards their organization in perpetual growth of institutions. The aspect of leaders coaching, guiding and supporting teachers as per need was evident. At Laxmidev school, subject teachers were given access to the lab which had computers and printers for their miscellaneous work at schools such as printing, worksheets and even preparing question papers etc. What approach of leadership are adopted can effectively support to adhere the new technical tools are dependable on how the leadership is also in practice at schools? Moreover, the finding suggested that the steps and decisions taken by the leadership team for providing adequate resources or training, during day-to-day meetings have impact over the implementation process.

As expressed in previous paragraph, leaders appeared to be supportive enough for the teachers to use and implement the tools in various ways. In reference to the



findings, it was observed that the principal of both schools had made to move the physical space of the computers from their office to the teacher's room so access to the teachers would increase. This shows that the need of the computers, printer and other tools exist in schools.

In the finding, I observed the principle guiding a few teachers for administrative purposes such as preparing reports and using emails, etc. Teachers were shown how it can be done to the new teacher. This kind of transfer of skill was done happening during the free period and on a voluntary basis by teachers. At Laxmidev school the teachers were eager to learn from the coordinators and peers using the new lab of the school. Mr. Rajeev had expressed to create a better use of ICT lab for the teachers increasing the access too. Similarly, at Bhav school, teachers used to stay back for at least half an hour for short meeting and discussing the major challenges. Among various challenges, the problem with printer, internet issues, requirement for printing papers etc. were also brought up. Mr. Keshav used to take notes for such challenges at the school. However, for major challenges which consist of large amounts they had to depend on support from outside. Previously the school was supported by private organizations with the printer the school. Such management of the resources were formerly taken care by the coordinators and principal to address them as soon as possible.

### **Management Practice of Available Resources**

It was evident that both schools prioritized creating an ICT lab with government assistance and some resources were already available. Teachers and leaders had worked together and applied for the funding to Nepali government and other organizations for the ICT lab in both schools. Laxmidev school had received financial assistance from the Nepal government to purchase and allocate an ICT lab.

Among many goals, while integrating ICT at school, goal of the he integration strategy is to increase students' accomplishment and attainment by integrating appropriate ICT use in a specific subject area that requires complex concepts and skills (Ghavifekr & Rosdy 2015). However, in my study I found that the notion of management practices at the schools was fragile and something discussed very less. As, in Laxmidev Secondary school, they had started to use the ICT lab for computer classes and even allowed the student to use the lab during other free time. Moreover, the teacher's had access to use the ICT lab for learning another purpose since 01/02/2022. After initially starting the lab for the students, teacheanother administrative taskve task, the use of ICT was going well as the computers were functioning well. Things were fine and normal at the begin of the class observation in the ICT lab on term of condition of the computers. The computers were being utilized in the computer classes by teachers and students. However, over the course of a few months, issues between both computer hardware and software started to surface. The computer teacher became a little frustrated because she had other responsibilities as a teacher of science too. Managing or fixing the problems was not at her skill or even her major role. Apart from the setting up the ICT lab its necessary to understand for what major purpose these new innovations are going to be used for and how it will be managed in near future. Integration of ICT requires much more thinking and strategic management (Ghavifekr & Rosdy, 2015), which indeed, when there are no strategic management practices, challenges in effective use can emerge. Similarly, for making effective use what are the possible ways that need to considered by the schools were less discussed among the leaders and teachers. It is important because, while employing ICT to enhance learning, certain applications—like Microsoft PowerPoint, Word, and other software—require precise hardware specifications from computers,

and public schools must take these factors into account for a long-term strategy-managing the computers. In finding, I had observed the condition of the computer were slowly getting hardware and software malfunction. This brought up two inquiries: 1. Who ensures the quality of ICT equipment when it is purchased by the school? 2. What strategic plans do school administrators and government officials have for managing ICT labs and resources? Consideration management practice for available ICT tools was one of the major challenges in the public schools which hinders the integration in near future.

As per observations made at the Laxmidev School, some of the most notable similarities and differences between these two schools' management techniques and resource availability include below:

- Both of the school's leaders and management committee were aware and had prioritized ICT lab for the school.
- Both of the school had basic computers, internet and printers at present, which were supporting teachers and other administrative activities.
- Both of the school teachers had direct access to computers, printers and internet allowing them to use for various purpose at school- mostly for the teaching learning process.
- Both schools lacked a proper management system to address and manage the concerning issues related to management of existing ICT tools.
- Both school had perceived integrating ICT to establish computer lab and adding other equipment's at schools.

In order to improve education quality, ICT integration must be seen as a means and a process rather than as a means to an end that simply emphasizes access at the policy and implementation levels.

### **Peer learning**

In the digital age, ICT utilization is still crucial to the teaching and learning process. ICT can help with resource planning, worksheet creation, lesson planning, and other online administration. Similarly, teachers are viewed as the essential players in implementing ICT in their regular classroom settings and teaching students for the contemporary digital world (Arnseth & Hatlevik, 2012). In my study, in both of the schools the primary teacher's usage of technology (computers, printer, online resource) were higher than the secondary school teachers. During observation, it was noticed that before the class started and after the end of last period the teachers of primary school were often seen using the computers. At Bhav school, morning and the evening time was used by the teachers for the printing worksheets and handouts for the students- mostly primary teachers. Warwick and Kershner (2008) elaborated that to deliver an effective lesson using ICT, teachers should be aware of its importance and benefits. Adoption is a decision of "full use of an innovation as the best course of action available" and rejection is a decision "not to adopt an innovation" (Rogers, 2003 p. 177 as cited in Brown, 2008). In my observation at Bhav school the acceptance of the innovation, computers, internet, printers were accepted by the teachers and had been using efficiently in daily course of classes. But it requires skills to use the resources available. When I observed that, Ms. Sanu, a new teacher at Bhav school was guided by Ms. Khushi who had been familiar with available resources – peer learning seemed to be important. It implies that even if advanced technology were made available in schools, someone would still need to instruct the stakeholders on how to use them. Indeed, to use the resource effectively, users must understand its significance and advantages which was observed during the field visit. According to Winzenried, Dalgarno and Tinkler (2010) teachers who are

aware of ICT are more effective at instructing students using technology tools than those who have not.

### **Factors Influencing ICT integration**

While implementing ICT tools and technology, I observed that teachers and leaders had the right attitude towards computers and laptops available at the schools. Most of participants with whom I interacted had positive aspects to share about the available ICT resources at the school. For instance, Ms. Khushi, Ms. Sanu, Ms. Laxmi, and others expressed their perception, which was mostly positive. Becta (2004) as cited in Lawrence and Tar (2018) proposes that there are two levels of barriers affecting teachers' adoption and integration of ICT in teaching individual (teacher-level barriers) and institutional (school-level barriers). Indeed, in the study, I came across the fact that teachers had their personal smart phone and at least one computer at home, however the institutional barrier at each school was observed. Indeed, the personal acceptance of the technology and the instructional acceptance and application of technology varies. The more the computer access or access to new innovation are given to the teachers the higher correlation can be achieved Albirini (2006). Indeed, similar instance was found in the study, where Ms. Anu had expressed how wanted to use the newly ICT lab for Nepali typing and encouraged other teachers too. The importance of attributes in the adoption and integration of ICT in teaching and learning process can be dependent in the access to the computers too, which is one factor of integration of ICT at school. It is important that right attitude towards the ICT tools can influence the usage. Another factor I want to bring in is the timing of the ICT usage. Since, the end of academic year was approaching, Ms. Anu had expressed that she wanted to focus on the science for her students and hold her thoughts for taking computer classes. Also, when she made that decision the ICT lab

at Laxmidev school was out of order. It was evident that I could see her focusing more on her science classes at the at the end of March, 2022. Kaleli-Yilmaz (2015) as cited in Turgut and Aslan (2021) expresses that while employing ICT in the classroom, teachers are concerned that they will run out of time and won't have enough time to get their students ready for tests. Similar, finding at Laxmidev school. was observed when the final exam for the students were approaching.

### **Leadership:Promoters of Change and Innovation?**

Leaders at school plays a significant role in the change if school system and how the school should progress. Similar, it affects the teaching learning process at the school. In the study done by Tubin's (2007) in schools that successfully integrated ICT as a basis of teaching and learning; it suggests that variation in ICT integration among the schools were influence by the leadership style of the principals. Indeed, in the study, personal experience which made leaders realize the significance of the ICT at school and at personal level had influence over the teachers- to learn and adapt new technology. However, there are factors, which affects or creates limitation of in the and one is policy that "constrain the 'bottom' (schools) such as limitations on material or human resources" (Hadjithoma-Garstka, 2011) leading integration to happen with efforts made by the school leaders. This results in the integration practices within the availability of specific tools provided by the government despite understanding the emergence of need of new innovation. During, the field study, I came across the fact that both the school principals had removed the barrier to use the computers and printers, to the teachers and for administrative purpose. Also, free access to internet for teachers at both schools were initiated by principals and few teachers with realization of its importance in school.

In line with the Hadjithoma-Garstka (2011) sharing that “the role of principals in implementation as promoters of change and innovation, and the role of management are sometimes taken as one and the same thing” (p. 314). Indeed, the role of the leaders sometimes are overlapped with the management of the new technology and as a promoter of new innovation. The leadership style of the person in a position of leadership affects innovation and management, but there aren't many suggestions and strategies articulated at the national level regarding how school leaders should take new innovation into account for the betterment of education at school. When new innovations or technology at school are introduced, it is affected by the leader’s response, experience or expectation, to it. As Hadjithoma-Garstka (2011) stated that “the ways in which each principal decided to respond to ICT policy were related to his/her personal leadership style” (p. 351).

I found that the school leaders, both the principals and teachers were using the computers and other available resources as per their need and also encouraging the teachers to use them at different levels. It was vividly visible the priority set by the school were encouraging the teachers to use the laptops and computers for managing the lesson plans online and use of online resources. On the other hand, the principals were focused on encouraging children to get familiar with the typing and secondary function which they had struggled in the past. It uses of the computers were depended on the perception and importance seen by leaders over the users (teachers and students).

### **Implementation of ICT during Co-vid 19**

According to Rogers (2003), diffusion is “the process in which an innovation is communicated through certain channels over time among the members of a social system” (p. 5). He further states that adoption is a decision of “full use of an

innovation as the best course of action available” and rejection is a decision “not to adopt an innovation” (Rogers, 2003 p. 177 as cited in Brown, 2008). The adaption occurs at a different level and at different times. This stresses a question on how innovation, despite being effective in a larger community should be adopted by the majority of the public- integrating ICT at schools? The adoption of new tools and technology by schools in affluent countries may provide some indication of their efficacy, but other nations may take a long time to catch up. The dissemination process is affected by the policy, priority, implementation procedure, governance, and several other aspects.

The findings of my study also showed that the participants are late adopters of computers at schools. The personal sharing by the teachers, who had the least knowledge and experience during their schooling and in their personal careers was a challenge at school for implementing ICT.

Moreover, the compatibility, of how an institution or individual perceives, the diffusion of innovation also plays a significant role. The teachers at schools may be influenced by the perspectives, opinions, beliefs, experiences, and access of different people. The possibility that innovations will spread will increase the higher the value felt by a person who finds value in integrating ICT in teaching (Sahin, 2006). The research finding suggested similar facts among the teachers’ views towards the integration of ICT at various levels. In the finding of my study, the motivation and uses of computers, laptops, the internet, and printers were different between primary teachers and secondary teachers. The level of awareness and having knowledge of the innovation is part of the process – diffusion of innovation. Roger stated that the individual attempts to determine “what the innovation is and how and why it works” (Rogers, 2003, p. 21) when an individual learns about the innovation’s existence.



Despite the fact that an individual or organization may be aware of the innovation, there is ambiguity around its application because the innovation or technology needs support in order to be employed at the intended level (Sahin, 2006).

The social system is one of the elements in the diffusion process on which Rogers (2003) defined the social system as “a set of interrelated units engaged in joint problem solving to accomplish a common goal” (p. 23). Indeed, new technology or innovation takes place in the social system. Participants of my study, school leaders, expressed that teachers and the school management committee frequently discussed possible ways and methods for carrying out remote learning when it was the alternative approach used by the majority of the schools during a pandemic. In the planning phase, they used mediums such as zoom, messenger apps, and other online group chats to communicate with one another. Later, remote learning approach as a response to the pandemic using laptops and the internet. One of the intriguing things about the public school was that both schools had a similar problem and tried to make sure the classes run for the students. These two-school had collaborated with one another for sharing resources and even skills. For instance, the teachers collaborated with one another to create a win-win situation. Some teachers whom I interviewed were part of the remote learning and they were comfortable using the online classes if a similar situation arrives in the near future. Following responses to the pandemic, leaders acknowledged the significance of ICT at schools- mostly computers and the internet at their schools.

Other elements that affect online learning include the availability and cost of computers as well as a reliable, fast internet connection (Atack & Rankin, 2002; Billings et al., 2001; Scollin, 2001). Teachers had to identified students with secondary communication tools (students who had laptops or phones which could

support google class or at least a phone at home). During the study, I came across several shadings by the teachers, who agreed that while implementing remote learning and during remote learning. Also, it was applicable during the physical classes - reliability of fast internet and access to computers printers.

After the pandemic, it was a relief for the school to physically resume operations so that regular classes could continue. Higher risk of drop out was speculated by the teachers and leaders since the classes were challenging for the school teachers and parents of both of the school shared by both of the Principals. Strategically and an efficient way: the school teachers had used phone to communicate with the parents about the school reopening and encouraging parents to send children at school which kept students and parents well aware of the school's updates and reopening.

### **Personal Integration of Innovation**

The integration of smart phones by the teachers, in day to day life, was observed in both of the school – personal integration of technology. Similarly, the school had provided to the internet on the phone which were often used by the teachers. I recall when a math teacher downloaded a video on the internet and wrote it on a note and planned her class at Laxidev school. Also, teachers were using personal phone to search some documentary, videos and energizers for the students which was discussed among the teachers- exchange of ideas. Sahin (2006) states that “personal and optional innovations usually are adopted faster than the innovations involving an organizational or collective innovation-decision.” In school I observed that the teachers had smart phones. In fact, both the school had group chat where necessary information and updates were shared among the teachers. Despite the smart phone were personal, teachers were using them as communication medium with peers and

school's online communication channel. The challenge for the public schools to adapt new technology has different aspects, school budget planning, support from the government etc., however, the integration by the individuals remains a personal choice.

### **Theoretical Lenses**

In this part I've tried to emphasize my findings in relation to the theoretical aspect –by Rogers's of his book, *Diffusion of Innovations*. I found that the Rogers' diffusion of innovation appropriate which touches various arrays of implementing new innovations he states that “an innovation is an idea, practice, or project that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, p. 12). An innovation could be an idea or a method that has been used previously or invented for a very long time, but people, a community, or an institution would have thought it was new at the time. It's not vital if the innovation is new or innovated in the past, the perceived values for the adaptation is what matters- which gives respond to the innovation (Rogers, 2003). Thus, the responses, challenges, stakeholders, persuasion etc., are included in this part of the chapter with theoretical blending for meaning making of the study.

### **The Innovation and Decision**

Rogers defines diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system” (p. 5). The major components he emphasizes are on, innovation, communication channels, time, and social system. Indeed, these major elements plays an important role in the process of implementing innovation in a social context. The “newness” of the innovation can be understood as having knowledge of the innovation, perceived value for the innovation and the decision to adapt (Roger, 2003

p. 12.). Similarly, In the study, the computers, printers and internet were lately adapted at the school despite the school leaders had known about the innovation's way before than the adaptation process. Leaders had several instances where they had felt understood and found about the new innovation, computers, internet, printers etc., however, the immediate adaptation of innovation was challenging for them. Despite the fact that innovations have been introduced and recognized, individuals still need specific supports in order to use them effectively. The Laxmidev teachers needed a guidance to use the ICT lab because they were eager to use it and had a positive impression of new ICT lab. Rogers (2003) described the innovation-decision process as "an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation" (p. 172). Further he claims that, it is necessary, when the innovation is introduced it further needs to reach from awareness to the conformation stage as the decision on the confirmation stage remains vital after individuals know about the ne innovation. Indeed, the research participants narrated that they were aware about the innovation. Participants were willing and using the available computers, printers, internet indicating that the users had made decisions for the innovation usage while some needed some support. Some participants needed support for the decision (to use the available resources) form their peers and leaders. According to Rogers (2003), the decision can be reversed if the individual is "exposed to conflicting messages about the innovation" (p. 189). In the study, some participant was reluctant to use the printer due to past experience of having trouble while using and even having worry about the making mistake while using. Roger argues about the conflicting message about the innovation but we must consider about the past experiences and the social structure on which the innovation is introduced upon. I noticed in the study that, participant knew

that the resource, innovation, was scarce and expensive for the school so while using them if certain problem occurred the accountability would fall under the individuals who were using at the moment. Thus, to change the attitude of the users we must consider about other factors which supports the decision over adapting the innovation.

### **Attributes of Innovation and Public Schools**

Rogers (2003) stated that “individuals’ perceptions of these characteristics predict the rate of adoption of innovations” (p. 219). The perceived characteristic of the innovation by individuals can differ from context to context and there seems to be less empirical research carried out which deals with the effects of the perceived characteristics of innovations on the rate of adoption (Sahin, 2006). Roger (2003) expresses that there are five major attributes of the innovation, which leads towards the decrease in the uncertainty, (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability.

### **Relative Advantage**

Rogers (2003) defined relative advantage as “the degree to which an innovation is perceived as being better than the idea it supersedes” (p. 229). Similarly, in finding the participants had perceived the innovation, computers and internet, in positive way. Leaders and teachers had perceived the computers, internet and other digital tools positively way which are beneficial for the school, their daily operations and students learning. Similarly, Roger (1983) expressed that “potential adopters want to know the degree to which a new idea is better than an existing practice” (p. 217). A similar context was observed as the school teachers were using the computers for the worksheets and using the ICT lab for their daily operations. Similarly, some teachers and students wanted to use the newly established ICT lab to learn typing.

### **Compatibility**

Rogers (2003) stated that “compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (p. 15). Participants, in the study had perceived ICT mostly as a computer lab, its use in operation and teaching learning process. Similar to this, participants were willing to use ICT technologies for the benefit of the school's daily operations and use in teaching learning process. The participants had viewed and understood the potential uses of ICT tools—ICT lab with computers. The notion of compatibility needs to be expanded for the implementation process. In the finding, the compatibility of the school consists of the teachers who was willing to use the available resources. However, the compatibility from Roger’s view are limited to the point of adaption but innovation requires management of the innovation else it’s integration could not last long or easily replace. To support this argument, at school which established an ICT lab had no management skills or capacity which created uncertainty in integration discourse. Later, such challenges and experiences can create friction on the future integration of similar or existing ICT tools and technologies.

### **Complexity**

Rogers (2003) stated that “compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (p. 15). The complexity which are expressed by the Rogers are from a individual’s perspective where individuals’ perception have effect on the rate of adaptation. In the study, there were other complexity, such as financial support, infrastructure, environment etc., which had created challenges to implement ICT at school. By environment I want to infer for the infrastructure which enables or gives space for the new innovation to be adapted. In my finding, most of the participants

had perceived the ICT positively through their experience and its efficiency. The finding suggests that despite the ICT tools are perceived positively by the adaptors, there are other factors which acts as a complexity too- social, financial and environmental.

### **Trialability and Public School**

According to Rogers (2003), “trialability is the degree to which an innovation may be experimented with on a limited basis” (p. 16). Further, he expressed that, the innovation which can be tried/trailed by the users before adapting the innovation can increase the probability of the adaptation. However, in the public schools where they seek for the fund for basic computers and other resources, the opportunity of trial of new innovation would be out of reach. Since, ICT integration at school requires support from the government or support from other organizations to be integrated at school. The phase of the tribality was not an option to the public schools despite it could increase the adaption process. As Roger (2003) defines, in line with the aspect of trialability, that “an innovation that is trailable represents less uncertainty,”(p. 16), but in the case of our context where resources, financial support to school, ICT tools which are expensive for the school, the notion of trialability seem to be less applicable. This hinders the integration for ICT process of the innovations i.e., integrating innovations. Both the schools had applied for the grant to create an ICT lab form the government despite they were well familiar about the advantages of ICT lab to schools and learners. But there are no guidelines in Nepal that direct suppliers, vendors, or the government to begin the initial ICT integration trial mode in order to accelerates the adoption rates. We need a provision which can make access of the ICT resources more easy and affordable for schools and students which can increase the rate of adaptation.

## **Observability**

Rogers (2003) defined observability as “the degree to which the results of an innovation are visible to others” (p. 16). Observation of innovation among the peer’s usage acts as a motivational factor for innovation to be adapted (Parisot, 1997 as cited in Sahin, 2006). Some similarities were observed while the study was conduct such as participants learning from each other, or having willingness to learn and implement the basic typing process at schools etc. This infers that when the usage of new innovations is actively used, individuals will see and try to implement them for their usages too. However, some aspects contradict with the observability in the study’s finding. If the resources are scarce and expensive to the school, the willing to use them can decrease. The willingness to use resources may decline if they are expensive and scarce for the school. As in findings, several elementary instructors were hesitant to face the difficulties if the printers broke down while they were using them, even though they had observed the efficiency of printing for their class engagements. The potential adaptors were aware of the innovation and use, but as the printer had been scarce resource to the school, they chose not to utilize it to prevent any potential management issues if it broke down or any malfunction occurred. The notion of observability can have impact for the possible users but there are other social dynamic which again has effect on the users perception towards the innovation.

## **Management of Existing Resources**

In the findings, I observed that teachers were seeking for permission and support to manage the resources – printer, laptops, internet usage and other usages. One of the reasons is that because these resources were scarce to the school and they had past experience of troubles when these devices went out of order. This create some decrease in willingness to use the available resources to avoid the challenges



which may occur. Moreover, the teachers wanted teachers who were comfortable and coordinators to do the task for them- even if they know how to use them. Talking about the management practices both institutions lack a dedicated group of professionals who could handle the responsibilities of managing these resources. I enquired further about management procedures, they shared that that they relied on local experts or vendors to fix issues- implying that when there were major challenges in the devices or tools someone had to take responsibility to manage them. Rogers (2003) states that the decision can be reversed if the individual is “exposed to conflicting messages about the innovation” (p. 189). While having conversation to Ms. Laxmi, I came across the fact that teachers worry about making mistakes and dismantling the resource. Even one of participant stated that she wants to avoid the taking responsibility for managing the ICT tools. She further expressed that even she gets stressed when the resources are not working at times. Most users were familiar with the magnitude of challenge when resources get stagnated and they knew it will take longer period of time to maintain these resources. When individuals stay away from using the innovation, they won't be using it for various purpose. At the confirmation stage of the diffusion of innovation, these attitudes are even more important. Later adoption or discontinuance occurs due to lack of support for people in adopting the innovation and individual attitudes (Sahin, 2006). Similarly, in the school which recently build the ICT lab had purchased smart boards along with the computers. However, it was used very less by the users at school since the dedicated teachers of the school were exploring the usage of existing computers for the students. Adding on, the dedicated teacher was taking responsibility of two subjects (science and commuter) who recently joined the school. Having classes and responsibility of another subject was one of the constraints in exploring more about the available ICT

resources at school. With her permission and school leader's permission I had opportunity to observe the ICT lab usage by the school teachers and students. Task such as writing about schools, learning how to save file and view other programmed were discussed in the class. The demonstration of book example was carried out by the teacher and students used to follow. The existing 14 computer were in working condition at the beginning but after a month a lot of challenges started to arise. Some computers were not functioning as before; some had key board problem, some had monitor and processor failures. For maintenance teachers had less knowledge to resolve hardware and software malfunction, and there were no specific concerned person or team to address these problems. Despite the lengthy process of obtaining the government funding, the school's spending for the ICT lab required proper maintenance after a period of time. However, managing the complex issues which are related to software, hardware crash or other challenges which are not in their hand can create perplex perception towards the ICT tools available. A designated team or individual was absolutely necessary in both of the school.

Furthermore, their study suggested more of an integrated view of leadership; where the teacher has high performance and learns and performs at high levels. It is important to have skilled human resources but the aspects of leadership also play a significant role. Thus, the leadership aspects which we must consider while integrating ICT at public schools.

In the time-of-adoption data when expressed in a cumulative manner, an S-shaped curve is common, where at the beginning the adaptations are exclusive and a smaller number of adaptors are at the beginning. Afterward, it progresses at an accelerating rate leading towards the non-adaptors at the end. Similarly, all instances of diffusion play out this way, especially in policy diffusion— where time to adoption

can be shorter when higher priority is given by stakeholders (Dearing & Cox, 2018) and leaders toward more adaptors in a short period of time. However, the diffusion of innovation can get slow in the progress of adaptation since innovation is defined simply as that “which is perceived to be new—not necessarily better— by potential adopters” (Dearing & Cox, 2018 p. 183). Sometimes good innovation despite being accepted by the larger community can also get into stymied situations.

### **Conclusion**

ICT is an innovation can foster the quality of teaching learning process and even the operational process of the school. The stakeholders have started to understand its effectiveness and much need in students learning process. Leaders efforts and perception towards ICT integration remains highly important; to create the desirable change in integrating of ICT at specific schools. Similarly, the perception of teachers toward innovation, and support for them to use are significant to support in successful integration of ICT in public schools. Also, having a dedicated individual or team towards managing the available resource can support in more successful integration process of ICT at school for adaptations and practices. While implementing the ICT the school must think in a strategic way focusing on access, capacity, and management practice of ICT tools. This can build robust readiness at public schools and avoid the challenges while integrating ICT. Thus, the notion of ICT has more aspects involved in social context. It may appear as simply adding the resources to a school premise but it is influenced many social factors for its effective implementation of new innovations at schools. The effective integration requires strategic planning which needs to focus on the proper management of the resources, implementation of digital tools for students’ better learning and support on the administrative work for the school.

### **Implications**

This study has unwrapped many challenges faced by the school teachers and leaders while implementing ICT in school. Despite the priorities are set by the national policies for integrating ICT in education the ground reality of integration of ICT, and its discourse, remains complex and need more qualitative research – to implement the ICT at public schools. The policies are not strategically implemented and executed to address the core problems what hinders new innovations to be integrated at schools. To ensure the quality of education ICT integration also has a significant role; government, school leader, school management committee and teachers needs to explore more on strategic importance in while implementing ICT. Empirical studies must be taken into account by stake holders for the effective use of ICT, not just in terms of access or availability but to understand more about the multiple realities of public schools. Additionally, collaboration between public schools and groups striving to improve education can help increase the effectiveness and efficiency of currently present ICT resources and facilitate the adoption of potential new ICT in schools.

### **Journey Reflection**

The journey of the research was different from what I had imagined while writing a proposal and planning my field visit. In the beginning, initiating the conversation with the principals, teachers and other stakeholders was a bit hard for me, but later, with time, I became comfortable on school premises and with different stakeholders. For instance, it was challenging to build rapport at Laxmidev school compared to the Bhav school. So, for making myself familiar with the teachers, I required help from Mr. Rajeev at the beginning.

Certainly, in the field, it is completely different from how we imagine during the preliminary stage of the research. Finding the right participants, observing, and initiating the conversations were sometimes challenging and required skills since participants had their classes and other responsibilities at school. Identifying the right time for conversation with the participant sometime required patience due to their other responsibilities.

There were other personal learnings apart from my research questions too which gave me new perspectives about the public schools of the valley. The economical challenge for the students' parents was one of the critical challenges which I observed. It was disheartening to see students struggling to join school due to financial challenges. Some support from individuals and other organizations was given to several students.

Overall, I learned more about conducting the research itself, which demands patience, dedication, and persistence. Conducting qualitative research was to understand more about the society we live in.

### **Final Reflection**

Public schools consist of teachers, individuals, and leaders who are motivated to make education better for their students, regardless of the adversities. Managing resources to fulfill the requirement of school and students in various ways was experienced in the discourse of the study. No matter how big or small a school is, the main goal is always to teach children and make learning happen. When I spent my time at public school, I came across many events and circumstances that gave me a better understanding of teamwork, the responsibilities of teachers and leaders, dedication, and the teaching-learning process too. The study showed that even if we introduce innovation or technology, it cannot work efficiently on its own if we do not

consider the leaders' and teachers' perceptions of ICT. Similarly, a systematic approach that supports the management of the available resources can act as a huge support system to the school, teachers, and operation of the school – which ultimately supports betterment in learning.

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## APPENDIX I

**Observation: Direct observation**

<b>Physical Structure</b>	Availability of ICT tools at the school premises. If ICT facilities are reliable and robust or not? Are computers and peripherals suitable for the specific purpose they are to address?
<b>Frequency of ICT tools and technology usage</b>	Time and schedules of the ICT usage and process of usage(implementation)at the school premise.
<b>Teachers' access to ICT tools</b>	Access to secondary laptops for online classes during Pandemic.

**Interview Questions**

<b>Stakeholders</b>	<b>Questions</b>
Principal	<p>How supportive is staff for the promotion of ICT?</p> <p>Does the school view and address problems as challenges of ICT implementation?</p> <p>Does the school recognize that implementation can be a positive change and opportunity for teachers and students?</p> <p>How is the school management committee supporting?</p> <p>What support do you think the government is providing for your school in the implementation of ICT in recent years?</p> <p>Is your school part of the decision-making process for infrastructure development (ICT tools) at your school?</p> <p>How do you define ICT and its role for your school?</p> <p>Has your perspective changed towards ICT in the time of pandemics? How?</p>

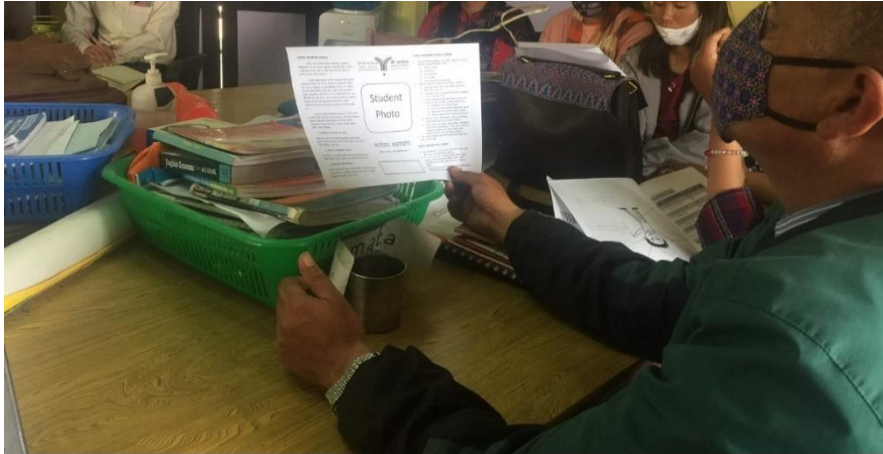


Teachers	<p>How comfortable are you using ICT in your classes?</p> <p>In this pandemic how did ICT help you to fulfill your responsibilities?</p> <p>What were the major challenges during the Pandemic?</p> <p>Did you receive any support to take classes online in a pandemic?</p> <p>Do you think the resources are adequate for the implementation of ICT if physical classes resume?</p>
School Management team	<p>Does the school view and address problems as challenges, which may bring with them benefits and opportunities?</p> <p>Are there sufficient computers and associated equipment in schools for teachers and students?</p> <p>How comfortable do you think teachers are to have access to computers and other tools for their classes and integration?</p> <p>Are the ICT facilities reliable and robust?</p> <p>Are computers and other ICT tools suitable for the specific purpose they are to address?</p>
Students	<p>How was your experience in the discourse of online classes?</p> <p>What is your preference between online and physical? Why?</p> <p>How do you think internet and digital tools are helping you?</p>

## APPENDIX II

**Figure 1**

*Teachers of Bhav School in Meeting*

**Figure 2**

*Teacher in Staff Room During Conversation*

**Figure 3**

*Smart T.V Room of Laxmidev School*



**Figure 4**

*Students Using Computers in ICT Lab*



**Figure 5**

*Teacher Guiding Students for Using Computers*



**Figure 6**

*Principal and Teacher of Laxmidev School Using Computer for Administrative Purpose*

