ICT in Education in Crisis Contexts: An Activity Theoretical Study of Teaching and Learning in Nepal during the COVID-19 Pandemic

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Thesis submitted for the degree of Doctor of Philosophy (PhD)

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July 2023

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy is entirely my own work, that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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Dedicated to my little one, Sunee Shrestha

Acknowledgements

Firstly, I would like to express my sincere gratitude to my supervisors, Emeritus Professor Françoise Blin and Professor Jennifer Bruen who guided me through my research journey to come up with this volume. Their professional and personal support made this entire journey worthwhile. With their guidance, I could hone my research skills such as discussing issues maintaining academic rigour and investigating a phenomenon with possible alternative lenses.

Secondly, I would like to thank my little girl, Sunee, who helped me forget my painful moments during my research trajectory by being a good friend of me when needed. Indeed, her innocent cooperation helped me stick with my deadlines in majority of occasions. Thirdly, my wife, Khushi became a great help to make me remain calm, composed as well as focused on my work. She is an amazing partner to make me feel that I am never alone in this journey. Fourth, I would like to thank my Dad and Mom who just wished to see that their son earned a doctoral degree without building any family pressure on me. Their wish coupled with some pride also proved to become a trigger for me to achieve this goal.

My sincere gratitude also goes to independent panel members, Ciaran Dunne and Niamh Kelly for their support during my PhD. I also thank Dr Patrick Cadwell for his feedback on my dissertation at different stages of my PhD. The School of Applied Languages and Intercultural Studies (SALIS) secretaries, Paula's and Caroline's support was equally noteworthy. Besides their administrative support, their communication with some personal tone made me always feel that there are many helping hands at SALIS. And my colleagues from research rooms CA126 and CA144 were astounding fellows as they were always ready to support when needed.

Finally, I would like to thank the Higher Education Authority (HEA), Ireland for awarding me the Government of Ireland, International Education Scholarship (GoI-IES) and SALIS for awarding SALIS Scholarship for my PhD program. And also especial thanks to Gerry O' Suillivan, the

former head of International Education and Director of the Erasmus + National Agency in

Higher Education Authority, Ireland for his kind support during my PhD.

Table of contents

List of figures

List of tables

x

Acronyms used in this thesis

AD: Anno Domini

CALL: Computer assisted language learning

CDC: Curriculum Development Centre

CEHRD: Centre for Education and Human Resource Development

CHAT: Cultural historical activity theory

COVID: Coronavirus Disease

CUG: Closer user group

DCU: Dublin City University

EFA: English for all

ET: English Teacher

ETC: Educational Training Center

GoN: Government of Nepal

HCI: Human Computer Interaction

ICT: Information and communication technologies

IEMIS: Integrated Educational Management Information System

LMS: Learning management system

MoE: Ministry of Education

MoEST: Ministry of Education, Science and Technology

MoCIT: Ministry of Communications and Information Technology

n.d.:   No date

PM: Policymakers

SEE: Secondary Education Examinations

SLC: School Leaving Certificate

SLCE: School Leaving Certificate Examinations

SM: School Manager

SSDP: School Sector Development Plan

ST: Science Teacher

STEM: Science, technology engineering and mathematics

TICKIT: Teacher Institute for Curriculum Knowledge about Integration of Technology

TT: Teacher Trainer

UK: United Kingdom

UNESCO: United Nations Educational, Scientific and Cultural Organization

UNICEF: United Nations Children Fund

USA: United States of America

Publications

Peer-reviewed journal

Shrestha, S., & Laxman, G. (2021). Emergency response in educational policies during COVID-19 in Nepal: A critical review, *9*(2). https://doi.org/10.22492/ije.9.2.10

Book chapter

Blin, F., Dey-Plissonneau, A., Shrestha, S. (forthcoming) Activity theory and CALL. In R. Hampel and U. Stickler (Eds.) Bloomsbury Handbook of Language Learning and Technology.

Abstract

Sagun Shrestha. ICT in Education in Crisis Contexts: An Activity Theoretical Case Study of Teaching and Learning in Nepal during the COVID-19 Pandemic

The COVID-19 pandemic affected numerous learners around the world including Nepalese school children. These children experienced educational disruption arising from long school closures. Among other various educational models practiced during the COVID-19 pandemic to minimise such disruption, the use of ICT in education played an instrumental role. While a limited number of studies explore the use of technology during the pandemic in Nepalese secondary schools, none have yet explored in any depth how ICT was used and what affordances, i.e. action potentials of ICT, teachers perceived and acted upon. This study uses activity theory and the theory of affordances as a conceptual and methodological framework to explore the use of ICT in education during the COVID-19 pandemic in secondary schools and whether emerging affordances were acted upon by secondary school teachers. Remote classroom observations, focus groups and interviews with a variety of stakeholders were analysed using an activity theory-inspired coding scheme.

The analysis indicates that a range of different educational practices such as Tole education, online teaching and learning among others were implemented during the COVID-19 crisis situation. Tole education is a neighbourhood-based approach that gathers children in a central location at the designated place (Tole) and holds regular learning sessions where pupils gather in small groups. Issues such as technological breakdowns, a shortage of good quality internet access at home, lack of engagement on the part of pupils, limited digital skills of teachers hindered the success of teaching during the pandemic. However, in attempts to resolve these issues, educational stakeholders such as teachers engaged with new initiatives. Consequently, educational and technological affordances emerged. Analysis of these emerging issues and affordances sheds light on issues and concerns pertaining to educational disruption in crisis situations and aids the framing of educational policies in such contexts.

Chapter 1 Introduction

In the early 2000s, when I saw the letters popping on the screen of a monitor when someone hit the keys on the keyboard at the district capital of Dolakha, one of the districts in Nepal, that act amazed me. It was when I was attending a basic computer course - the course that introduced how to create files and folders in a computer and how to use MS office package, particularly MS Word, Excel and PowerPoint. After nearly 12 years, in 2012, only after attending an e-course entitled 'Building teaching skills through interactive web' delivered by the University of Oregon upon the support of US Embassy, Nepal, I started using digital technologies in teaching and learning in Nepal. Gradually, I became interested in using technologies and experimented with tools in classrooms, such as using Nicenet, virtual classroom assistant (which is no longer available), Webquests, an inquiry-oriented online tool for learning, a class blog and so on. I started disseminating what I was doing in my class in the conferences in Nepal. This is how I gradually stepped in the use of technology in teaching and learning. Later in 2016, my master's degree at the University of Warwick, UK with a specialism in Information Communication and Technology (ICT) helped me understand the theoretical underpinnings of ICT and its further practical application in teaching and learning. The course in Warwick helped me to immerse in ICT, as a result, I decided to choose ICT in education as my area of interest. Later, in the course of exploring ICT in education, I became interested in investigating the affordances of ICT in teaching and learning. Having arrived in DCU, I became acquainted with an activity theory, the theory that I found very suitable for my work; hence, I chose to use it as an interpretive framework in my study.

Indeed, it was not a normal period when I was working in my research. After I reviewed literature for about 14 months, the COVID-19 pandemic brought chaos in all spheres of life including its impact in my research. I made an adjustment to my focus, I decided to investigate the use of technology in crisis period instead of normal period. This has helped me to

contribute to a very unique area, i.e., use of technology in crisis contexts and generate knowledge in a rarely explored but very important area.

1.1   Research background

Information and communications technology (ICT) is conceived as the term that includes all forms of technologies "to handle telecommunications, broadcast media, intelligent building management systems, audio-visual processing and transmission systems, and network-based control and monitoring functions" (Vellaichamy & Jeyshankar, 2015). ICT is a very broad term that covers technologies which can assist in our regular and some specific business. Regarding ICT in education, UNESCO (n.d.) considers that it has the potential to complement, enhance and change education for better. There is a positive impact of use of technology in teaching learning process (Light, 2009; Shrestha & Harrison, 2019; Wise et al., 2011; Zorfass & Rivero, 2005), which ensures learners engagement and achievement. Al-Bataineh et al. (2008) state that using technology in education is one of the basic skills which is required to achieve success in an educational system. Professional development activities for teachers and availability of enough technological resources are important for the successful integration of technology in classrooms (Almekhlafi & Almeqdadi, 2010).

ICT has a potential to manage educational disruption during a crisis situation. Educational disruption refers to disturbances in regular teaching and learning activities as a result of emerging crisis situations in which learning loss is one of the outcomes (Gustafsson, 2021). For example, during the Covid-19 pandemic, schools were closed owing to the national lockdown in Nepal which will be discussed in Section 5.2.During the COVID-19 pandemic, ICT was taken as one of the strongest tools to mitigate the educational disruption or chaos. When educational stakeholders, such as teachers deal with the educational crisis using technology, they act upon action possibilities of ICT, which are ICT affordances. There is a growing interest in and use and overuse of the term affordances in research related to ICT in teaching and

learning. This study explores how technology was used and what affordances were realised during crisis situations in secondary school settings of one of the developing countries, Nepal. Having used activity theory (Chapter 3) as an interpretive framework, this study unfolds systemic tensions in a series of sub-activities in which teachers participated.

1.2   Rationale for the study

Any kind of crisis caused by natural calamities, such as earthquakes, floods or pandemics or human-induced problems, namely war can take place any time, and can disrupt education. ICT can help to minimise such disruption in various ways: by conducting online teaching and learning (Espino-Díaz et al., 2020) or broadcasting educational content through radio and TV or via any other ways. Educational stakeholders can act on different kinds of affordances to minimise educational disruption. Moreover, as developing countries are less prepared to reduce the risk of any kind of potential crisis due to their unmanaged and under-resourced infrastructure, crisis can have even a significant impact in education leading to school closure for a long time in those countries, and ICT can be a means to reduce the impact of crisis in education in those countries too.

There is very limited research carried out that explores the affordances of ICT in education in crisis contexts in developing countries. Thus, this study aims to find out the affordances of using ICT in education in secondary school settings in Nepal during crisis contexts. This study aims to help policy makers, educational managers, teachers and teacher educators understand the affordances, the action possibilities of ICT and constraints of integrating ICT in education. Using activity theory, this study attempts to explore the educational practices they were used during the pandemic in both private and public and urban and semi-urban schools in Nepal and the way the teachers acted upon affordances of ICT while integrating it in education in their contexts during the crises.

1.3   Activity theory and affordances

Activity theory (Engeström, 1987/2015) has a root in Russian psychology, and this theory considers activity system as a unit of analysis. In an activity system, subjects participate in a tool and artefact mediated and object-oriented activity which are constrained by certain rules and conventions. This theory helps to analyse systemic tensions manifested by conflicts, misfits, disruptions etc. in the activity systems, which are called contradictions (see Chapter 3). In a situation where ICT is used, such as ICT use during a crisis situation, as subjects attempt to resolve some of those contradictions, new action possibilities emerge, which are called affordances. The analysis of any activity through an activity theoretical lens helps to identify contradictions which further paves the way to the identification and analysis of affordances.

1.4   Scope of this thesis

This study explores the way secondary school Nepalese teachers used ICT in teaching and learning during the crisis, particularly during the COVID-19 pandemic and the affordances that were acted upon by teachers in their science and English sessions. Thus, the research questions are:

1. How did secondary school Nepalese teachers use ICT in education during the COVID-19 pandemic?

2. What ICT affordances emerged and to what extent were they acted upon by secondary level teachers during this crisis period?

3. What are the policy implications for the integration of ICT in education in crisis and post-crisis contexts?

The thesis presents an activity theoretical study, and the data was gathered online through classroom observation, focus groups and interviews. The national and local policy documents

were collected and analysed to see how the educational crisis was addressed. This study also goes beyond classrooms and brings a society into the analysis and seeks how all educational stakeholders managed educational disruption during the pandemic. There is hardly any study that uses activity theory as an epistemological framework to understand affordances of ICT in secondary school education in a crisis setting in Nepal.

In terms of contribution, it helps classroom teachers understand the affordances of technology and assists educational managers to find the ways to manage educational disruptions pertaining to crises especially via the use of technology. Having understood how teachers act upon affordances, it helps policymakers frame the policy to address educational disruption during the crisis situations.

1.5   Thesis outline

This thesis comprises eight chapters. Chapter two aims at discussing the literature related to ICT in education in crisis situations and the affordances of ICT in education. While doing so, this chapter reviews the literature related to ICT in education in crisis situations, introduces affordances of ICT in education bringing in the ideas of Gibson (1979) and Norman (2013) and further dealing with both cognitivist and post-cognitivists' view of affordances. This chapter details the types of affordances taking help of Kirschner et al. (2004). Further, it discusses ICT in education in crisis situations that includes the recent pandemic and explains what happens to the affordances of ICT in a crisis context.

Chapter three details the activity theoretical approach to understand the affordances of ICT in education. To this end, it introduces activity theory, discusses its four generations and delineates the principles of activity theory based on Engeström (1987/2015). The remainder of the chapter presents studies related to activity theory and technology mediated educational environments and further details activity theoretical studies on technology mediated

environment. The three methodological requirements: 1. defining the unit of analysis or delineating the boundary of activity system, 2. identifying manifestation of contradictions and 3. following objects across multiple spaces and timescales, are dealt along with Mwanza's (2001) eight-step model to model the situation being investigated. Finally, the research design, implications of the study and researchers' position are discussed.

Chapter four details the research methodology. It describes settings i.e., a broad context, Nepal and the schools i.e., specific contexts where the research was carried out, and participants who took part in this study. It provides with the profiles of participating schools that comprise their sociodemographic profile, their history and the pandemic and the post-pandemic teaching and learning practices that took place in these schools. The brief details of research participants viz., teachers, pupils, parents, teacher trainers, school managers and policy makers follow the school's profile. The final section of this chapter details the approach of data collection viz., classroom observation, interview and focus groups, data encoding for example, using Elan for multimodal transcription and NVivo for coding, and analysis and interpretation of data using activity theory.

Chapter five discusses Nepalese educational policies developed during crisis situations and their implementation. The discussion of education in Nepal, ICT in education policies in Nepal and educational policies and guidelines developed to address a crisis sets a background for the analysis of schooling during the civil war, earthquake and the pandemic. The educational policies that are linked to manage educational disruptions during crises from 1996 to 2022 are discussed in the first half. In the remainder of the chapter, the empirical data that includes the excerpts of documents and of interview and classroom observation are used to triangulate the findings related to educational practices during the pandemic.

Chapter six presents the findings related to ICT uses during the pandemic. This chapter discusses extensively the use of ICT to run classes during the pandemic, which was one of the

practices prioritised by the educational institutions during the pandemic in Nepal. This chapter delineates the sequences and actions of online and onsite sessions factoring in discipline and type of schools, mediating tools and artefacts used in those sessions and rules and division of labour that guided the teaching activity system.

Chapter seven explores the emerging contradictions based on five themes viz., i) power cuts ii) poor internet connection iii) limited digital skills of teachers iv) lack of learners' engagement and v) institutional and classroom rules. The systemic tensions which were manifested in interacting activity systems are discussed as evidenced in classroom observation along with their levels to explore where these contradictions occur. While conducting science and English sessions, teachers acted upon ICT affordances, also to resolve some of the contradictions that emerged in teaching and learning during the pandemic. Those affordances which emerged due to initiatives of the teachers are discussed further.

Chapter eight, the final chapter presents the summary and conclusion of the whole thesis by answering each question. Further, it presents the limitations and challenges of the study and indicates future directions based on the findings.

Chapter 2 ICT in education in crisis contexts and the theory of affordances

This chapter aims to review key studies on ICT in education in crisis contexts and discuss the theory of affordances in relation to the use of technology for teaching and learning. At first, it highlights key elements from the literature on ICT in education, the case of developing countries and discusses ICT in education in crisis contexts. It then introduces the concept of affordances focussing on the affordances associated with integrating technologies in education. The remainder of the chapter presents the types of affordances that have emerged in human computer interaction and when ICT is used in educational settings.

2.1 ICT in education

ICT is used as an umbrella term throughout this paper to refer to any information and communication technologies used for educational purposes. It encompasses a) digital technologies, such as digital resources and devices: software (including apps and games), hardware (e.g., mobile devices, computers, USB drives and mobile projectors) and digital content (e.g. any files) (Redecker, 2017) and b) television and radio used for educational purposes. ICT is prevalent in several areas, such as in education, commerce, health, engineering and so on. As regards ICT in education, it is deemed as a newly emerging phenomenon that can help manage teaching and learning. There are many studies on the different types of technologies used in education, for example, open educational resources used in different learner contexts (Leffa, 2017), autonomous learning with mobile devices and learners' perception of affordances of mobile devices for language learning (Lai, 2017), multimodal digital videos in English as a foreign language settings (Y. Chiu, 2017), virtual reality videos in L2 Chinese festival teaching (Dai, 2017), the effect of multimodal videoconferencing in EFL learners (Hung & Huang, 2017), machinima as teaching and learning materials (Shrestha

& Harrison, 2019), mobile film-making (Martin et al., 2019), virtual reality based laboratory systems (Lamb et al., 2020) and so on.

Many researchers report a positive impact of the use of technology on teaching and learning process (Light, 2009; Shrestha & Harrison, 2019; Wise et al., 2011; Zorfass & Rivero, 2005) to ensure learner engagement and achievement. Technology has a potentially significant and positive role to play in school settings. It is changing schools and classrooms by facilitating the development of new curricula based on problems related to the real world (Kozma, n.d.). Teachers' perspectives show that ICT can act as an impetus to bring about changes in student learning (Wong & Li, 2008). Education policy makers consider that ICT can improve student achievement, enhance access to schooling, increase efficiencies and reduce cost, improve the ability of learners to learn and prepare these learners to compete in a global market (Kozma, 2010). Through the analysis of studies related to the use of ICT in education, Fu (2013) lists the benefits of integrating ICT in education as: assistance for students to access materials efficiently and effectively, support for self-regulated and student-centred learning, support for creative learning ambience, promotion of collaborative learning in a distant learning environment, support for developing learners' critical thinking skills, help for improving the quality of teaching and learning and assistance in instruction by providing relevant contents. ICT has a lot of potential to bring changes in educational systems and practices. ICT provides opportunities to access a lot of information using multiple information resources and viewing information from different perspectives as a result, it enhances authenticity of learning environments (Noor-Ul-Amin, 2013). Livingstone (2012) contends that ICT bridges the forms of knowledge and literacy and intersects places of learning as it brings together educational technologies, such as books, writing, telephone, photography, etc. which were traditionally separated. Focussing on the benefits of ICT in education, Nkhoma et al. (2012) argue that failing to bring ICT knowledge into education will prevent the citizen in gaining ICT skills which are required to carry out work in future.

Digital tools have the possibilities to expand semiotic potential (Bezemer, & Kress, 2015) that can optimise learning. Technology provides space to combine all modes such as visual, movement, sound, texts, inter alia, and it provides opportunities for learners to use them for broader understanding (Walker & White, 2013). Jewitt (2006) argues "a multimodal approach to technology-mediated learning offers a way of thinking about the relationship between semiotic resources (i.e., resources of and for making meaning) and people's meaning" (p.16). Multimodality conceives that communication always draw on several modes which help to infer meaning (Bezemer, 2012). Thus, considering a multimodal aspect of technology is important as digital tools have the quality to expand semiotic potential that can help learners in meaning making and understanding.

Unlike the positive impacts that the use of ICT can make in education, Alhumaid (2019) points out that ''technology could change education negatively through four paths: deteriorating students' competences of reading and writing, dehumanizing educational environments, distorting social interactions between teachers and students and isolating individuals when using technology'' (p. 10). ICT has also made it easier for children to access inappropriate and harmful content and also to produce such content by themselves (United Nations Children's Fund (UNICEF), 2017).

The study by Carter and his colleagues (2017) show that in-class computer usage reduces classroom performances. Their result revealed that those who were prohibited from using internet-connected classroom did perform better and students in classroom where laptops and tablets were used without any restriction scored the lowest in the final exams. Wijekumar et al. (2006) in their study point out that "the primary, learning task is interrupted and competes for memory with the secondary tasks like games and communication" when learners have computers during learning.

Several studies above have indicated that ICT has potentials to improve classroom teaching and learning, and some studies have also pointed out the negative facets of ICT in teaching and learning. In developing countries' contexts, ICT in education has been a major discourse as ICT is considered as a means to optimise pupil's learning. The following section delineates ICT in Education in the developing countries.

2.1.1   The case of developing countries

The reform in education in developing countries through the support of ICT is a long-term, incremental process which requires "sustained investment and support along multiple dimensions of the educational system, including physical and technical infrastructure, human resources, curricular frameworks, standards, and assessment" (Light, 2009, p. 63). ICT is "at a particularly embryonic stage in many developing countries, especially in the majority of least developed economies" (Wallet, 2016, p. 14). In many developing countries, the use of internet is not known whether it is used for administrative purpose or pedagogical purpose or for both as school census in those regions does not take account of it, and likewise, it is difficult to find out whom the computers are allocated to in these regions (Wallet, 2016). Wagner (2018) argues that "ICT applications to promote learning are increasingly apparent, even in poor countries, leading to a variety of legitimate questions" (p. 52), such as if ICT for education improves learning and educational quality; if it might increase a digital divide; and what the significance of technological tools is in relation to improving assessment and management related issues in education.

Tolani-Brown et al. (2011), analysing the research and impact of ICT in education in developing country contexts claim that the impacts of ICT on learning outcomes vary whereas the perception of the stakeholders on the ICT impacts is mostly positive. Agreeing with the claim of Tolani-Brown and his colleagues, Kozma and Vota (2014) contend that developing countries view the purpose of investment in ICT is to bring change in the quality of teachers, and prepare

the learners to compete globally. Addressing implementation challenges of ICT in education in developing countries, Kozma and Vota (2014) state that leveraging community inclusion to expand impact and sustainability is one of the challenges. They highlight the necessity of the inclusion of a community, as an additional stakeholder alongside those directly involved in teaching and learning.

Wims and Lawler (2007) investigate ICTs in educational institutions in one of the developing countries, Kenya, and asserts that many teachers were not making use of ICT facilities in their schools. Their study finds that those who remain longest in the profession and who teach humanities and language subjects were found not using ICT for teaching their subjects. At the school level, the issues that emerged were "the need for staff training, mainstreaming of ICT across the curriculum, additional computer equipment for staff and students and the development of relevant software and Internet access" (Wims & Lawler, 2007, p. 19). In developing countries such as, Chile and Turkey, teachers found that new national curricula, national computerised efforts and professional development activities helped them to use ICT in their teaching and learning (Light, 2009).

Regarding the technology integration in education, Jhurree (2005) compares the challenges that developing countries and developed countries contexts face and highlights that both developed and developing countries face similar challenges, for instance, the concerns related to teacher apprehension and motivation, lack of technical support and suitable education software, the challenges of providing adequate teacher training, the issue of taking care of inadequacies regarding infrastructure, and implementing student-centered instruction and proper assessment procedures in schools. Lee and Sparks (2013), based on the study carried out in one of developing regions in Nepal found that teachers lack the skills to integrate technology and informal learning was the preferred way to learn technology. They also accentuate that the administrators need the framework for technology integration. Shrestha

(2016) investigating the ICT in education in Nepal, points out the cost as a relevant factor to influence mobile learning in developing countries as readily available devices in these regions lack high-end capabilities and high-end devices are not available yet.

The discussion above shows that ICT in education in developing countries are still at the embryonic stage, which is yet to be developed fully, and ICT has a great role to optimise education in these countries.

When it comes to the ICT use in crisis settings, ICT also has a unique role as it is a potential mediating tool to minimise educational disruptions during crisis. The following section discusses ICT in education in crisis contexts.

2.1.2   ICT in education in crisis contexts

Hermann (1969) defines a crisis as "a situation that 1) threatens high-priority goals of a decision making unit, 2) restricts the amount of time available for response before the decision is transformed, and 3) surprises the members of the decision-making unit by its occurrence" (p. 414). In his definition, Hermann highlights three components of crisis: threat, time and surprises. Any kind of crisis such as crisis due to war, natural calamities, political instability in a state, epidemic or global pandemic includes all three attributes: the crisis threatens the current goals, demands prompt response, and surprises decision making units. Crisis is a sudden event which breaks expectations thereby possessing a threat to a social group and that requires an immediate response (Cadwell et al., 2019). Getting closer to Cadwell and his colleagues, Pupion (2010) describes crisis as the "process of destabilization and abrupt calling into question of modes of functioning and the regulations of individuals, groups and organizations" (p. 16). Crises are depicted as negative events in any institution's developmental trajectory that destroy livelihoods and property (Al-Jenaibi, 2015).

Brecher and Wilkenfeld (1997) have explained crisis both at macro and micro levels, especially relating to the crisis owing to a war situation. At the system (macro-) level, they have presented eight clusters of crisis dimensions: breakpoint-endpoint, setting, crisis management technique, major power activity, international organization involvement, outcome, intensity and impact, and they have presented five clusters of crisis dimensions at the actor (unit or micro-) level: trigger (catalyst to a crisis), actor behaviour, major power activity, international organization involvement and outcome. These dimensions can be used to study crisis situations particularly related to a war.

"Conflicts, disasters caused by natural hazards and pandemics keep millions of children out of school and the numbers are rising" (UNESCO, n.d.). Roughly 535 million children live in the places affected by conflict or disaster (UNICEF, 2016), and many of them are "at risk of missing out education" (Tausan & Stannard, 2018, p. 6). For instance, the crisis brought out by the Ebola epidemic impacted five million children as they were forced to be out of school for up to nine months in African nations of Sierra Leone, Guinea and Liberia (Their World, 2020).

In recent years, there is increasing attention paid to supporting education in conflict and crisis situations through information and communication technologies (Dahya, 2016; Dreesen et al., 2020). ICT in education in a crisis context is defined for the purpose in this thesis as the adoption and application of information and communication technologies "to support, enhance and enable educational opportunities and practices across educational systems" (Dahya, 2016, pp. 9 –10) during a period of crisis. During the Ebola crisis situation, for example, there were radio programs to offer distance learning (Sifferlin, 2014). In Sierra Leone, the radio program was a poor substitute for schools although it was taken seriously by the government and communities which helped to maintain a link to education during the crisis period (Powers & Azzi-Huck, 2016). Digital technologies are also used to run online classes in crisis contexts,

for instance, to cope with the COVID-19 pandemic crisis situation (Anderson, 2020; R. K. Karki, 2020; Sharma, 2020).

The United Nations (2020) reports that the COVID-19 pandemic has affected approximately 1.6 billion learners in over 190 countries, with 99 percent of learners in low and lower-middle income countries affected by the closure of schools and other learning spaces. In South Asia alone, the pandemic has interrupted the learning of 434 million children (United Nations Children's Fund [UNICEF] South Asia, 2022). Conceição et al. (2020) claim that with a large number of children's schools closed indefinitely during the pandemic, new-technology based actions are implemented to continue learning process. Referring to the pedagogies and practices during coronavirus crisis situation, Williamson et al. (2020) accentuate that in the opening months of 2020, typical approaches to pedagogy emerged, such as distance education, remote teaching and online instruction which are not novel approaches to pedagogy or curriculum design but they are the approaches having some characteristics from the previously popular approaches. Pacheco (2020), highlighting the common teaching learning practices during the pandemic, mentions that the learning spaces have become virtual not actual, affecting both student learning and the organization of schools, and the learning spaces have become websites instead of physical buildings. However, there are also reports of a very strange and unique practice which is locally driven to manage education during crisis, such as, in Peru, a loudspeaker was installed atop one of the community's tallest tree and students gathered by turns and in small groups to listen to the content related to each subject during the COVID-19 pandemic. Referring to the case of Nepal, Sharma (2020) claims that due to a lack of plans and preparedness, the effectiveness of online classes during the COVID-19 crisis context remains as a concern. Unwin et al. (2017) argue that the expansion of ICT globally has been one of the major causes of increasing inequality. In support of this argument, the study by Dawadi and her colleagues (2020) claim that the COVID-19 global pandemic has impacted students' learning, and also increased the gap between advantaged and

disadvantaged children who pursue quality education in Nepal. They argue that digital learning creates inequality in access to education in the Nepalese context which is due to the unequal distribution of access of technologies in urban and rural areas and between rich and poor in Nepal.

Espino-Díaz et al. (2020) claim that as a change in the educational paradigm, ICT has become a necessity in the COVID-19 pandemic to continue teaching and learning. Online teaching is becoming a strategy to continue with the development of academic curricula (Espino-Díaz et al., 2020). Some advantages they highlight are flexibility of schedules and availability of spaces during online learning. They also equally emphasise that the discipline and organization are the key elements to regulate interaction through chats and other forums as well as for the collaborative work, hence they accentuate the social affordances of ICT. Highlighting the potentials of ICT, Tausan and Stannard (2018) contend that EdTech (educational technology) has the feature to assist the learners in a logical and progressive manner building on their previous learning and taking them further to the complex phenomenon. Their argument is that this progress is always disrupted in emergency settings. In case technology is implemented properly, it has the potential "to fill in the gaps during disruption and increase the speed with which learners can return to full time education" (Tausan & Stannard, 2018, p. 37).

Since the expansion of technology is increasing, the judicious use of technologies could be a strategy through which global crises can be mitigated (Unwin et al., 2017). There has to be an explicit emphasis on the ways through which ICT can be used to mitigate crises relating to human interaction with the physical environment as the role of ICT in education in conflict and crisis expands beyond teaching and learning (Dahya, 2016). The study carried out by Dahya (2016) on ICT for education in crisis and conflict setting reveals that digital video is used in non-formal education and for informal learning, including disseminating essential life skills to communities facing conflict and crisis and by forming community interaction about pertinent

issues. Schooling during conflict and crisis is affected by a lack of teacher training, by breakdown in formal programs and by gaps in programming between formal and non-formal initiatives; therefore, "informal learning and pathways to education, such as through media and social networks, are important in the face of conflict and crisis" (Dahya, 2016, p. 9). They highlight a very distinct affordance of ICT i.e., delivering education through an informal mode as formal programs are broken down.

Discussing the emergency remote teaching referring to the COVID-19 context, Hodges et al. (2020) accentuate that the objective in these circumstances is not to re-design a very robust educational eco-system but to provide "temporary access to instruction and instructional supports in a manner that is quick to set up and is reliably available during an emergency or crisis" (Emergency Remote Teaching section, para. 1). It shows that educational planning in emergencies should focus on instructional support which can be promptly designed to prevent learners from having learning losses, and designing such as creative educational plan is always a challenge. Hodges and his colleagues (2020) strongly argue that "nobody making the transition to online teaching under these circumstances will truly be designing to take full advantage of the affordances and possibilities of the online format" (para. 4). Therefore, during emergency settings, the affordances acted by teachers can sharply vary depending upon the technical efficacies they have and contexts they are working in.

Learners' engagement is often an issue when running online classes. Engagement is the active participation and presence of pupils in online sessions (Ewing & Cooper, 2021; McPherson & Pearce, 2022; Sahlberg, 2021; Willermark & Islind, 2022). Mostly while conducting online classes, a teacher teaching online can meet several kinds of silences such as purposeful silences (following instructions, confirmation check, waiting for/encouraging self-correction), technical silences (operational error -tutor or pupils forgets to switch on or microphone, audio

or connection problem) and unexpected silences (turn-taking, hesitation to interrupt tutor or politeness) (Stickler, 2019). All of these silences impact in online teaching and learning.

Recently (in the early 2020s), several studies have investigated the use of technologies in teaching and learning during the pandemic. Some studies put parents at the centre to their study. Bokayev et al. (2021) carried out survey with parents and reported that the most actively used technological tools for online learning was cell phones in Kazkistan. Their study showed the positive correlation between the family members' income and their attitude to the quality of education during the pandemic. Some other studies focused on pupils' learning and engagement during the pandemic, such as Greenhow et al. (2021) investigated initial educational response in the UK and States during the pandemic who argue that the pupils having wide access to technology benefit from all available resources compared to limited access to resources, and equally they claim that parents support is crucial for the learners to have time to help children solve technical problems in learning during the pandemic. In Australia, during the pandemic despite the teachers' attempt, students were engaged less, and lack of social interaction was a challenge for many students and they found online learning less personalised (Ewing & Cooper, 2021). Only 43 percent of teachers in a nationwide survey in Australia had confidence that their students were positively engaged with learning from home (Sahlberg, 2021). For pupils' engagement in learning, teachers have to provide various resources for learning and well-designed digital materials which demand less cognitive load as well as they have to adopt small support group to ensure relatedness in online environment (T. K. F. Chiu, 2022). Some studies focused on teachers' participation in teaching and learning during the pandemic, such as Rana (2022) who found that teachers had to develop their own ways of working with remote learning that would fit to their local contexts. For example, they also visited pupils' homes to support learning along with conducting online sessions. He found that the internet in rural areas in Nepal was not reliable which impacted online sessions that teachers conducted.

During crises to address educational disruption, stakeholders, such as teachers act upon action potentials i.e., affordances of ICT in course of dealing with educational chaos. The following section deals with affordances of ICT in education and what happens to the affordances of ICT in a crisis context.

2.2 Affordances of ICT in Education

The concept of affordances facilitates a deeper understanding of the potential and constraints around ICT in education introduced in the previous section. Hammond (2010) argues that affordance offers a very unique perspective on the use of ICT in education as it accentuates possibilities for action. The notion of affordances has been widely defined by several scholars in the field of psychology, human computer interaction, computer assisted language learning and teaching etc., and there are also various types and taxonomies of affordances proposed by various scholars in relation to ICT in education. The following sub-sections briefly introduce affordances and further discuss the taxonomies, classes and types of affordances with particular reference to its applications to the use of ICT in education.

2.2.1 Defining and categorizing affordances

In the field of psychology, Gibson (1979) introduced the term 'affordances' to mean "properties of things taken with reference to the observer" (p. 143). His widely cited statement, "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill" (p. 127), reveals that affordances are action possibilities that the environment offers to organisms. Norman (2013), in the area of human computer interaction (HCI), defined affordances as the relationship between the properties of artefacts and the capabilities of a person who uses the artefact. Norman takes past knowledge and experience into account to perceive the affordances (McGrenere & Ho, 2000). Unlike Gibson, Norman focused on perceived affordances since for him, "any other affordance of the object if

not perceived, is not relevant to the usability of that object" (Nocchi, 2017a, p. 48). Usability, which will be discussed at the end of this section, is the objective of the product design linked to physical objects.

The term 'affordances' has no uniform definitions (Hammond, 2010b; John & Sutherland, 2005; Nocchi, 2018), which equally necessitates further exploration to explain the affordances in the domain of educational technology. According to Kaptelinin (n.d.), "affordance is not only one of the most central of HCI concepts, but also one of the most controversial: its history in HCI is abundant with twists and turns" (Introduction: Why Affordances section, para. 11).

There are different views of affordances among cognitivists and post-cognitivists. Cognitivists claim that affordances are "a set of observable technology attributes provided by a designer" (Vyas et al., 2006, p. 93). Norman (2013), Gaver (1991), and McGrenere and Ho (2000) belong to the cognitivists' pole. Gaver (1991) emphasises that affordances are independent of perception. He further asserts that whether the perceiver takes account of them or not, whether they could perceive or not or whether there is a presence of perceptual information or not, affordances do exist. He gives the example of a glass of water which affords drinking whether the person is thirsty or not. The views on affordances of HCI cognitivists have been criticised for their limitations in covering the complexity of technological environments and associated human activities, their overemphasis on direct perception and their focus on interaction at the operational level (Blin, 2016). Post-cognitivists, such as Kaptelinin and Nardi (2012), view the affordances as relational attributes that actively emerge when a user interacts with the technology. In other words, post-cognitivists take account of the actors and their interaction with the artefacts during action. Post-cognitivists equally value the social and cultural contexts. Kaptelinin and Nardi (2012) proposed for theoretical re-grounding linking to the notion of socio-cultural framework to understand the technology affordances for human interactions mediated by cultural means. They proposed a mediated action perspective on

technological affordances which not only considers the interaction between person and tools but also the situational needs and cultural environment. Blin (2016) argues that "[w]hether from a cognitivist or post-cognitivist perspective, the concept of affordance provides HCI researchers and interaction designers with conceptual and analytical tools that can help them make interactive technologies more intuitive, more usable, and more useful" (p. 54).

In relation to ICT in education, Kennewell (2001) defined affordances as the "attributes of the [ICT-enhanced] setting which provide potential for action" to the users (p. 106). Kennewell (2001) also introduced the notion of constraints and defines the constraints as "the conditions and relationships amongst attributes which provide structure and guidance for the course of actions" (p. 106). For instance, uploading the presentation slides in a cloud before a lecture affords teachers the way in which they can organise a lecture more coherently as a result, learners can have access to presentation slides anytime; however, it might constrain teachers from having more engaging talk in the classroom (Hammond, 2010a). Kennewell (2001) argues that affordances and constraints are complementary rather than being opposites, and constraints are equally necessary for the activity to be accomplished as it can structure and guide actions. If the task given to the learners is too easy, there will be little learning outcomes, and in that case, a teacher needs to consider of reducing affordances and constraints (Kennewell, 2001). The usefulness of the concept of affordances is enhanced when the affordances are considered as being the outcome of a whole learning environment, of which online technologies are a core part, rather than only the inherent properties of technologies. Day and Lloyd (2007) claim that the actualization of the affordances can be understood in relation to all the contextual factors that help to promote or constrain them.

While presenting their affordance framework for a collaborative learning environment, Kirschner et al. (2004) also discuss the notion of 'usability' and 'utility'. Usability refers to 'a well-known objective of industrial or product design dealing with physical objects ranging from

video-recorders to teapots, and human-computer interaction dealing predominantly with graphical user interfaces composed of interface objects such as buttons and scrollbars' (Kirschner et al., 2004, p. 50). The usability of a design can be enriched by explicitly designing the perceptual information (Norman (2013) also calls it signifier) that denotes these affordances (McGrenere & Ho, 2000). Utility is "the set of functionalities that a system incorporates" (Kirschner et al., 2004, p. 52). McGrenere and Ho (2000) argue "designing the utility of an object is related to but separate from designing the usability of an object" (Usefulness and Usability section, para. 1) and they further claim that this is the distinction between usability and usefulness. They express the view that, the human computer interaction (HCI) community emphasises usability at the expense of usefulness. A designer should also focus on useful actions during design as a useful design contains the right functions which enable users to perform their jobs efficiently and help them achieve their goals (McGrenere & Ho, 2000).

2.2.2   Taxonomies, classes and types of affordances

Different scholars have described and categorised affordances in multiple ways. Norman describes perceived affordances as the affordances which can be easily discoverable thus perceivable. For example, "[a] door knob has the perceived affordance of graspability" (Norman 2013, p. 145). Gaver deals with the affordances for complex actions, that is "actions comprising several sub-actions" (Kaptelinin, n.d. Gaver section, para. 3) and introduced sequential affordances and nested affordances. The sequential affordances are "situations in which acting on a perceptible affordance leads to information indicating new affordances" (Gaver, 1991, p. 82). For example, the action of grasping of a handle of the door, that is informed through visual information leads to turning the handle which is informed via tactile information. The nested affordances are affordances grouped in space, for instance, the

affordances of pulling a handle of a door are nested within pulling a door if the action is related to opening the door.

Kirschner et al. (2004) propose a design framework for collaborative learning and describe affordances as technological, social and educational. They describe technological affordances in terms of usability, that is, whether a technological system allows users (learners) to achieve an action in an efficient way that satisfies them. They claim that social and educational affordances are linked to the criteria of utility. To them, social affordances are the attributes of artefacts that enhance social interactions and which assist learners to be in such interactions. Kreijns et al., (2002) defined social affordances—analogous to technological affordances—as the "properties of a CSCL [computer supported collaborative learning] environment that act as social-contextual facilitators relevant for the learner's social interaction" (p. 13). For Kirschner and his colleagues (2004), educational affordances are the attributes of an artefact that ascertains whether action can be performed in a specific teaching learning environment. The web tools are deemed to have educational affordances if they provide opportunities to complete a task in a collaborative way in a particular teaching learning environment.

Vyas et al., (2006) proposed an interaction-centred view of affordances and introduced two broad classes of affordances such as affordance in information and affordance in articulation. Affordance in information is associated with the users' cognisance of a technology based on the interpretation of their structure and meaning. These are the interpretations of the users on 'What' aspects of technology. Affordance in articulation is the interpretation of users about the use of technology. It is the user's procedural understanding of the technology which means their understanding about how to use technology; therefore, it is the user's interpretation on 'How to' use aspect of technology. For instance, we can check the understanding of users on 'what' aspect and 'how to' aspect of technology by asking a user to interpret through certain prompts such as 'Explain to your friend what … is' to learn their

conceptual understanding and 'how can you do… Explain it.' to check their procedural understandings of the technology use. A respondents' interpretations will help learn their understandings of the affordances of the particular artefact.

Hartson (2003) proposes four different types of affordances viz., cognitive, physical, sensory and functional in interaction design. For him, cognitive affordance is a design feature that helps users in knowing something, for instance, a label on the button that helps a user know what will happen next if he/she clicks on it. Physical affordance is a design feature that helps users in doing a physical action on the interface. For example, the button is large enough so that the user can click accurately on it. Sensory affordance proposed by Hartson is the design feature that helps users sense something for example, the font size on a label is large enough to read easily, and functional affordance is "the design feature that helps users accomplish work (that is, the usefulness of a system function)" (p. 323), for example, "the internal system ability to sort a series of numbers (invoked by users clicking on the Sort button)" (p. 323).

Zhang (2008) discusses affordances through the lens of users' motivation and proposes motivational affordances as "the properties of an object that determine whether and how it can support one's motivational needs" (p. 145) and she further argued that ICT should afford leadership and followership. In the studies of ICT in teaching and learning, affordances have been used to relate characteristics of technologies to their potential values in the learning process and for assessing the influence of ICT in education (Nocchi, 2017a).

In a language learning context, van Lier (2004) introduced linguistic affordances and claims that linguistic affordances are "specified in the linguistic expression, and available to the active interlocutor (or addressee) who may pick up one or more of those affordances as they are relevant at the moment" (p. 95). For example, the linguistic affordances are connected to non-verbal aspect which help to derive meaning such as, gestures and artefacts (Strömmer, 2016). Strömmer (2016) contends physical and social surroundings provide many relevancies which

the language learner perceives and may use for interaction and language learning and it is necessary for a language learner to have the ability to perceive and utilise these affordances. In the context of computer assisted language learning (CALL), Blin (2016) defines linguistic affordances as the "opportunities for learner-computer interactions that have been specially designed for language learning" (p. 57). Blin illustrates linguistic affordances through tutorial CALL systems, for example, while watching a video, the learners receive the linguistic support from captions. She equally considers that the feedback provided by a computer while learning a language is another linguistic affordance of CALL applications. Dealing with the affordances relating to ICT use in science learning and teaching, Webb (2005) accentuates that "[c]omputer simulations, internet-supported student research projects and computer-based modelling provide new affordances that enable students to gain a wider range of experience relating to science in the real world" (p. 728). For example, computer simulations provide learners the opportunities for learning those phenomena which cannot be easily observed or explored in the real-world (Webb, 2005).

2.2.3   Affordances of ICT in education in crisis contexts

Studies that explore affordances of ICT in education during emergency situations are still limited. Some studies just mention the term 'affordances' without giving much detail on how affordances were acted upon. The study by Willermark and Islind (2022) looks into educational affordances of the virtual classroom during the pandemic. They identified one-to-one communication, hidden back channels (teacher doesn't know what is going on at pupils' end) and teaching in right time (pupils can watch the recorded lectures when they need them) among others as educational affordances. Willermark and Islind did not base the notion of affordances merely with the functionalities of tools. In the rural Ugandan context, factoring in secondary level girl's participation in educational technology during the pandemic, Damani et al. (2021) found that radio became a useful edtech to engage girls in academic learning as girls

became more interested in tuning radios compared to boys. Having looked into affordances of different technology, Damani et al. (2021) conclude that educational technology (in their case, radio, telephone calls and SMS) played a positive role in pupils' perceived learning progress during the COVID-19 school closures. They have also not explained what 'affordances of technology' were acted upon albeit the mention of the term 'affordances' in their study. Chen (2022) investigated the relationship between teacher agency and digital affordances in the context of teaching Chinese as a second language during the COVID-19 pandemic and found that an interaction between teacher and pupils were declined in online classes. Like Damini et al. (2022), Chen, although touching upon the idea of affordances, does not explain how digital affordances emerge in his study. Sadeck (2022) argues that "The choices [of technology to be used in classrooms during the pandemic] made are based on a learning need and not on any of the inherent attributes of the technologies, but more on what how it will enable the learning (the affordances)" (p. 9). Sadeck takes perceived usefulness of technology rather than its attributes as technological affordances.

To sum up, there is still limited research that explores the affordances of ICT in education during the crisis contexts which rigorously discuss or link affordances to its theoretical underpinnings. However, in emergencies or crises, such as COVID-19 pandemic, some studies (Chen, 2022; Sadeck, 2022; Webb, 2005; Willermark & Islind, 2022) reported new attempts by educational stakeholders such as teachers to address the educational chaos. This shows the need of the study, which explores the affordances of ICT realised in teaching and learning during a crisis period.

2.3 Conclusion

ICT in education policies around the world commonly agree that ICT can enhance modern education. Technology is also conceived of as potential means of delivering education during

crisis situations. However, studies demonstrate that integrating technology into instruction both in crisis and normal periods does not always have positive outcomes.

Despite the complexity and controversy around the definition of affordances, scholars have proposed and elaborated upon several types in relation to HCI or integration of technology in education. The types of affordances identified and explored include technological, linguistic, social, educational, sensory, and functional affordances, which emerge when digital technologies are used in teaching and learning.

For the effective implementation of ICT in education both in normal and crisis contexts, the users as well as other concerned parties, such as policy makers, need to understand the affordances of using ICT in education. In case of one of the developing countries, Nepal, no study has, as yet, explored the affordances of ICT in education in either normal or crisis contexts. Despite a small number of studies such as Koirala et al. (2016), which explored school and system level barriers to using ICT in education and Laudari's (2019) study of barriers to using ICT in higher education, a clear need exists for a deeper understanding of the affordances of using ICT in Nepalese education especially in a crisis period.

Chapter 3 Towards an activity theoretical approach to the study of affordances of ICT in education

Having set a background by reviewing literature on ICT in education in crisis situations and the theory of affordances, this chapter introduces activity theory, briefly traces its development over evolving generations and explains the principles of activity theory. It reviews, in particular, studies that have used activity theory as a lens to investigate technology-mediated educational environments, explains the link between affordances and activity theory, and presents methodological requirements and implications for this study.

3.1 Activity theory

Activity theory is a socio-cultural and socio-historical lens through which investigators analyse human activity systems (Jonassen & Rohrer-Murphy, 1999). It provides a theoretical framework and terminology to investigate a variety of phenomena linked to human activities (Engeström, 1987/2015). Activity theory is considered as a broad conceptual approach rather than a theory designed to predict phenomena, processes or outcomes (Batiibwe, 2019; Blin, 2004; Kuutti, 1995).

Engeström (1987/2015) points out that activity theory has its roots in Marxian philosophy with reference to dialectical materialism. The origin of activity theory, which became popular after Engeström's (1987/2015) contribution, is linked to 1920's Soviet scholarship. It is based on the notion of Vygotsky's mediated action and Leont'ev's idea of object-oriented activity, where the object in an activity system is a raw material or problem space (Engeström & Sannino, 2010), motive (Batiibwe, 2019; Leont'ev, 1977/2009) or goals and intentions (Zurita & Nussbaum, 2007).

Activity theory has evolved through different generations of scholarship. The first generation of activity theory is based on Vygotsky's idea of culturally mediated action (Engeström, 2001b;

Sannino & Engeström, 2018). Vygotsky (1978) argues that a role of second order stimulus exists between the simple S-R (the stimulus and the response) formula, even though every basic form of behaviour presupposes a direct reaction to the task available for the organism. According to Vygotsky (1978) a second order stimulus 'x', the intermediate link (Figure 3.1) creates a new relation between S and R (stimulus and response)" (Vygotsky, 1978, p. 39).

Figure 3.1 Vygotsky's complex mediated act (Vygotsky, 1978, p. 40, adapted --texts in the [...] are of the author)
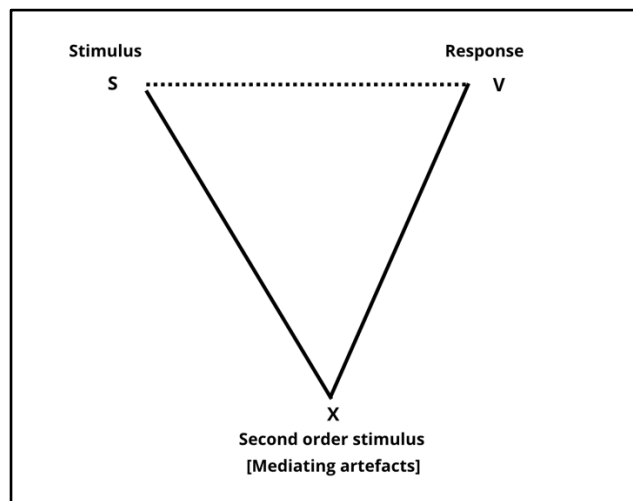
The above figure indicates that the subject, that are individuals or a group, carry out actions mediated by cultural artefacts. The insertion of cultural artefacts in the S-R model by Vygotsky is prominent and aligned with the rationale that the individual cannot be understood without his or her cultural means and the society cannot be understood without the agency of an individual who uses and produces those artefacts (Engeström, 2001b).

Second generation activity theory is centred around Leont'ev's work (Sannino & Engeström, 2018) and activity was considered as a unit of analysis. Leont'ev (1977/2009), posits activity from the angle of psychology and defines it as "a unit of life, mediated by mental reflection, by an image, whose real function is to orientate the subject in the objective world" (p. 3). One of the major contributions of Leont'ev (1977/2009) is the hierarchical relationship between activity, actions and operations in an activity system. For him, operations are "methods for

accomplishing actions'' (p. 102) and are related to conditions whereas actions are goal-oriented processes that can serve different activities and sub-activities. When actions are routinised, they become operations. Leont'ev (1977/2009) conceives of activity as a highly dynamic system that is represented by constantly occurring transformations.

Engeström (1987/2015) uses a triangular diagram (Figure 3.2) to explicate the complex model of an activity system. He delineates that subjects, either individuals or groups, perform object-oriented activities mediated by artifacts. The other components of the activity system are rules – the formal and informal regulations or convention that can constrain or regulate the activity – the community who share the activity's objects with the subject and division of labour which refers to the way tasks are undertaken by the community. The rules, community and division of labour are the social mediators of the activity depicted at the bottom of the model (Engeström, 2008b). The outcomes, which are more societal and collective, arise as the mediated actions carried out by the subjects trigger the transformation of the object. Yamagata-Lynch (2010) argues that the Russian word 'object', which carries multiple meanings when it is translated into English, is used interchangeably to refer to "the goal of an activity, the motives for participating in an activity, and material products that participants try to gain through an activity" (p. 17). One of the issues with activity theory is identifying the object of the activity (Kuziola, 2019). Kuziola (2019) argues that this issue persists partially because Engeström extended Leont'ev's idea of object by situating it in its social context and expanding the model to inculcate the collective nature of human activity. Therefore, it is difficult to relate the concept of the object to a typical notion in activity theory. Objects can be material or ideal, for instance, a problem or an idea (Blin & Munro, 2008). In this chapter, an object is largely considered as a purpose or motive that drives a subject to participate in object-oriented activities.

Figure 3.2 Engeström's model of an activity system (Engeström, 2015, p. 63, adapted)
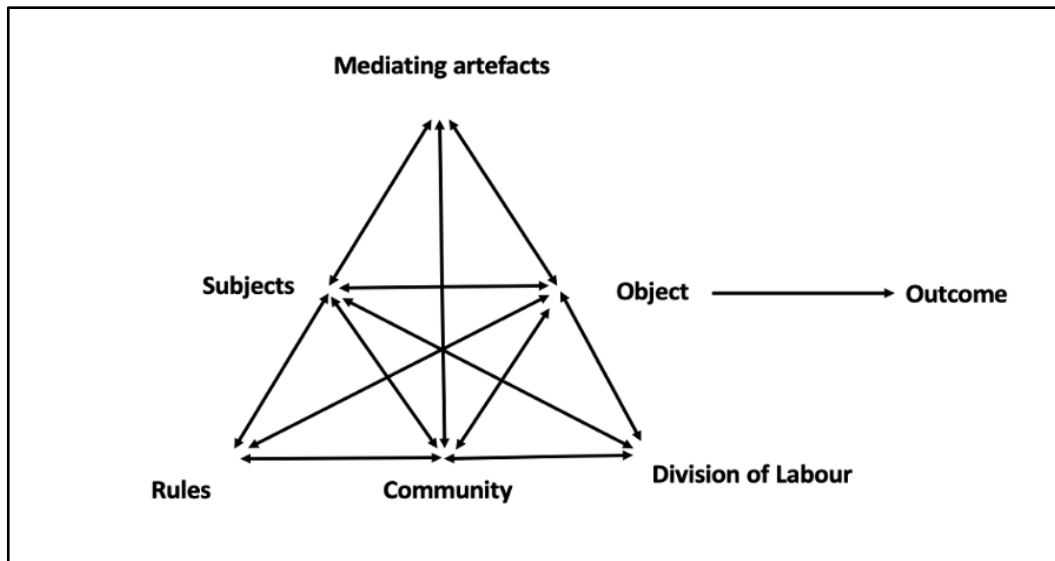
Engeström's model of an activity system facilitates the analysis of the broader activity context in which the actors or subjects are involved, the relationship between subjects and the community mediated by artefacts, tools and signs and also by rules (conventions) and a horizontal and/or vertical division of labour.

The unit of analysis in the third generation of activity theory is interacting activity systems, which Spinuzzi (2020, p. 6) calls as "activity networks". This generation of activity theory recognises multiple activity systems having both different objects (see O1 and O2) and common objects (O3) (Figure 3.3).

Figure 3.3 Two interacting activity systems having a common object for the third generation of activity theory (Engeström, 2001, p. 136)
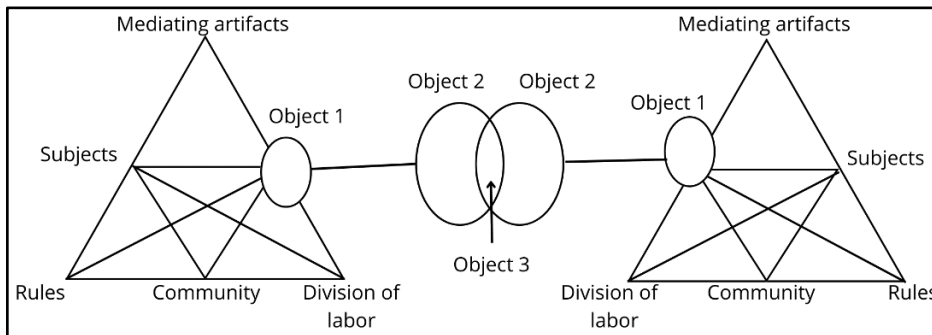
According to Engeström (2001b) "the object moves from an initial state of unreflected, situationally given 'raw material' (object 1…) to a collectively meaningful object constructed by the activity system (object 2…), and to a potentially shared or jointly constructed object (object 3…)" (p. 136). Engeström (2001b) gives the example of a patient's case – a patient entering to a doctor's ward as an Object 1 and a patient's case diagnosed as a biomedical disease as an object 2 and finally developing a care plan for a patient as an Object 3. This example reveals that the object moves from individual case of a patient to the collectively meaningful object towards which both patient and doctors are oriented.

Engeström and Sannino (2021) have further developed activity theory, into the fourth generation, conceptualised by Engeström in 2009 and proposed by Sannino in 2017 to deal with runaway objects. Runaway objects, which are difficult to control, "have the potential to escalate and expand up to a global scale of influence" (Engeström, 2009, p. 3). These objects are the result of issues such as poverty, pandemics, climate change, economic war etc. Engeström and Sannino (2021) point out that in the recent years of capitalist globalization, objects such as poverty, homelessness, and the recent pandemic cannot be treated as isolated issues as "they influence and pervade the objects of innumerable activities and call for radical revisioning of the ways our societies and lives are organized" (p. 14). Therefore, these issues call for a fourth generation of activity theory, which treats coalitions of heterogeneous

activities as the unit of analysis (Engeström & Sannino, 2021) and this is particularly an interventionist approach (Sannino, 2011).

Engeström (2001b), drawing on the works of Vygotsky (1978) and Leont'ev (1977/2009), explains the five major principles of activity theory. The following section discusses the principles that underpins activity theory.

Principles of activity theory

Activity system as a prime unit of analysis

As per Engeström (2001b) "goal-directed individual and group actions, as well as automatic operations, are relatively independent but subordinate units of analysis, eventually understandable only when interpreted against the background of entire activity systems" (p. 136); therefore, the minimal meaningful context for individual actions is the basic unit of analysis and this unit is called an activity (Kuutti, 1995). Subjects who can be individuals or groups do not act in isolation, but they are part of a community which is defined as per the common object directing and giving sense to their actions.

Multivoicedness of activity systems

Engeström (2001b) posits that "an activity system is a community of multiple points of view, traditions and interests" (p. 136). Different voices depict the language of a society which is "rooted in different societal positions, ideologies and traditions of practice" (Spinuzzi, 2020, p. 12). There will not be a unitary perspective of the subjects or community involved in the activity system as their histories, their vertical and horizontal relationship and the rules that facilitate or constrain the activity system, have the potential to influence the subjects and community in the activity system. Activity theory aids understanding of dialogues, multiple voices and the ways objects may be constructed differently by the subjects.

Historicity

Each activity system has its own history that leads the activity system to be never fixed (Kuutti, 1995). The history is very important as it assists an investigator to explore and understand the problems and potentials in the activity system. Engeström (2001b) claims "history itself needs to be studied as local history of the activity and its objects, and as a history of the theoretical ideas and tools that have shaped the activity" (p. 137). It is important to explore history present in human activity to learn about the nature of the outcome of each activity (Engeström & Sannino, 2021). Linking the element of historicity to the context of language learning, Blin (2005) mentions that learners bring different histories with them, which shape their motives and goal for learning their second language. All elements in an activity system have their own histories; therefore, understanding history related to these components is essential.

Contradictions as sources of change and development

Contradictions represents a fundamental concept in activity theory (Engeström, 2001; Engeström, 1987/2015; Engeström, 2001; Kamanga & Alexander, 2021; Sannino & Engeström, 2018)/2015; Kamanga & Alexander, 2021; Sannino & Engeström, 2018). The concept of contradiction in activity theory is derived from Marxist philosophy (Engeström, 1987/2015). "In capitalism, the basic contradiction is the dual nature of commodities, the tension between the use value and the exchange value" (Engeström, 1990, p. 84). Sannino and Engeström (2018) argue that "contradiction is a foundational philosophical concept that should not be equated with paradox, tension, inconsistency, conflict or dilemma" (p. 49), which are the manifestations of contradictions. The term contradiction is used in activity theory to indicate misfits, disruption, disturbances, etc. within the elements, between them, between different activities, or between different developmental phases of a single activity (Kuutti, 1995). Contradictions are systemic tensions that emerged historically within and between activity

systems (Engeström, 2001b) and they produce disturbances and conflicts, but also some novel attempts to change the activity. In technology mediated educational environments, particularly in online sessions, breakdowns, disruptions, focus shifts, inter alia, are the manifestations of contradictions. Breakdowns comprise a breakdown in communication due to technological problem or a silence observed due to pupil's cognitive overload (Stickler, 2019), as a result, pupils do not respond to teachers' query. Disruptions can be attributed to any kind of disturbances that occur in online sessions such as pupils getting engaged in non-lesson materials when a class is going on – which is "deviation from the normal scripted course of events in the work process" (Engeström, 2008a, p. 24) – a teacher's struggle to run some applications due to their limited technological skill that ultimately disturbs the flow of teaching etc. The interruption such as pupils getting engaged in a conversation in a real world when they are attending classes virtually is a virtual corpsing, which is a shift in user's attention from the mediated to the real world (Marsh, 2003). Focus shifts refer to the transformation of an object into a mediating tool and vice-versa. At times, a technological device or digital application temporarily becomes the object of the activity instead of being a tool in technology mediated learning environments.

Some contradictions emerge in activity systems as external elements that change components of activities cause imbalances between them (Engeström, 1999). Engeström (1987/2015) explicates four different levels of contradiction. Primary contradictions exist within the element of activity systems. Secondary contradictions emerge across the elements in the activity system. "Tertiary contradictions appear when the activity system is reshaped and the new pattern collides with vestiges of the old one, generating resistance and forcing the new model to be modified" (Sannino & Engeström, 2018, p. 49). In other words, tertiary contradictions occur when a new intervention is directed towards the object or motive "where the tendency is naturally to go back to the more familiar old way of doing things" (Kamanga &

Alexander, 2021, p. 4). The final one is the quaternary contradiction, which exists between the elements of two interacting activity systems.

Expansive transformations in activity systems

Expansive transformations are often the outcomes of the activity system participants' effort to resolve contradictions that emerge in an activity system. For example, subjects at times make a collaborative attempt to change the situation when pre-determined norms are not helping to make an activity remain functional (Engeström & Sannino, 2011). According to Engeström (2001b), "activity systems move through relatively long cycles of qualitative transformations" (p. 137) and those expansive transformations reconceptualise object and motive of the activity to include other wider possibilities (Engeström, 2001b; Engeström & Sannino, 2010; Sannino & Engeström, 2018).

Having discussed the theoretical background above, the upcoming section reviews studies of technology mediated educational environments that have adopted activity theory. Also, activity theoretical studies on affordances in technology mediated educational environments are discussed.

3.2 Activity theory and studies of technology mediated educational environments

Activity theory provides a way to investigate how technology can mediate teaching and learning, a technology mediated educational environment, as it assists an investigator to look into mediated and object-oriented activities. Su et al. (2013) explicate that activity theory serves "as a useful framework for conceptualizing technology as a dynamic mechanism that conditions and enables development and change in learners and in the mechanism itself" (p. 2577). It is also helpful to understand the design and evaluation of technology use (Kuutti, 1995). The use of technology is guided by a user's history in using technology, the community

they are working with, the roles and relationships they have in the community, the types of mediating tools they are using, the formal rules and informal regulations that guide their practice and the motive for the technology use.

Several empirical studies have used activity theory to study the design and implementation of learning supported by technology (Dey-Plissonneau, 2019; Kuziola, 2019; Laudari & Maher, 2019; Marwan & Sweeney, 2019; Murphy & Rodriguez-Manzanares, 2008; Nocchi, 2017b; Su et al., 2013). Some of the activity theoretical studies relating to ICT in education are discussed below.

Murphy and Rodríguez Manzanares (2008) explored the contradictions between the interacting activity systems of physical and virtual high school classrooms in Canada. During coding, they looked for the instances of contradictions in their interview data. The contradictions they identified are related to time and workload, physical presence, interaction and rapport building, and use of direct messaging and email. What they found is that in virtual classrooms, teachers could not rely on body language, visual cues and facial expressions which serve as tools in the physical classrooms to check learners' understanding, control for attention and build rapport. They highlighted that spontaneous and informal interactions and rapport building inside and outside of class in corridors and extra-curricular activities which would take place in physical classrooms became more formal in virtual classrooms; therefore, the practices that relied on the physical classrooms got disturbed in the virtual classrooms. In another study, Laudari and Maher (2019) identified contradictions to explain the barriers to ICT use in English as a Foreign Language (EFL) teacher education courses in Nepal by drawing on the theoretical tenets of activity theory. They have used the construct of contradictions in their study to identify the barriers; therefore, their approach is also closer to the one adopted by Murphy and Rodríguez Manzanares (2008). Laudari and Maher (2019) have identified barriers related to resources, training, assessment, curriculum, policy, administration and

students, and categorised them as quaternary and secondary contradictions. For example, one of the secondary contradictions that emerges in their study is the lack of ICT resources constraining the teacher educator's ICT use.

In another study, Marwan and Sweeney (2019) used third generation activity theory and methodological framework to examine discursive manifestations of contradictions to identify tensions within and between activity systems of the teachers and school management. They investigated the use of technology in a public secondary school in Indonesia and identified four types of contradictions: "a dilemma related to teachers' perceived value and use of technology for personal and professional purposes; a conflict focused on the support required for teachers' technology integration; a conflict related to teachers' workload and a critical conflict related to the silencing of teachers in decision making" (p. 115). They place the primary contradiction, which is a dilemma related to teachers' perceived value and use of technology for personal and professional purposes, at the shared object node of the teacher's and management interacting activity systems.

Su et al. (2013) used activity theory to conceptualise technology as an activity system that facilitated a tendency towards self-direction in contemporary learning and to introduce and illustrate the role of technology in mediating learner agency and development in real practice. They presented the example of Facebook to show how the university students in Taiwan used this social networking site to achieve their learning and professional development goals. They argued that "instructors or learning facilitators must realise how technology as an activity system can nurture and optimize students' understanding and actions and can holistically address student needs" (p. 2580). An activity theory perspective shows that the motives of the students should be taken into account while developing educational technology to engage students in learning (Su et al., 2013).

In another study, Kuziola (2019) investigated the contexts in which drones were implemented in secondary STEM classrooms and explored the academic value of drones in STEM education through the lens of CHAT. He conducted interviews with six educators and five administrators in the United States and analysed the documents and artefacts related to the drone implementations. He used CHAT to interpret the data, and modelled the activity system using the components in a textual form. He found out that drones are used as a tool to enhance existing STEM curricula and to develop the workforce. Administrators, in their interviews, focused on drone-infused projects which can potentially help develop critical thinking, collaboration, oral and written communication and teamwork.

To sum up, Murphy and Rodríguez Manzanares (2008) and Laudari and Maher (2019) used activity theory to identify emerging contradictions in technology-mediated educational environments whereas Marwan and Sweeny used activity theory to identify the manifestation of contradictions. At their core, all these studies aimed to identify the contradictions using activity theory whereas Su et al. (2013) and Kuziolo (2019) examined the role of technology in their study contexts via activity systems. These all reveal that activity theory can fundamentally assists a researcher to investigate technology mediated educational environments. Since activity theory guides to analyse emerging contradictions, which further leads to identify action potentials as some action potentials emerge in course of resolving contradictions, some studies have also focused on such action potentials in technology mediated educational environments which are discussed in the coming section below.

3.3 Activity theoretical studies of affordances in technology mediated educational environments

Baerentsen and Trettvik (2002) in their discussion of affordances for the discussion on affordances) in Human Computer Interaction from an activity theoretical perspective, argue that "affordances are not properties of (everyday) objects in isolation, but of objects related to

subjects in (possible) activities" (p. 59). In any activity system, systemic contradictions emerge which often lead to new initiatives as subjects attempt to resolve those contradictions. And while subjects attempt to resolve contradictions, they act upon some action possibilities, which are affordances. Thus, by investigating contradictions in an activity system, an investigator can identify and further investigate affordances. In other words, activity theory sets a firm ground to identify contradictions which further assists an investigator to explore affordances.

Both activity theory and the theory of affordances offer conceptual tools to understand transformations beyond spatial and temporal zones (Dey-Plissonneau, 2019). Baerentsen and Trettvik (2002) explain that the "perception of affordances (like perception in general) is not based on the momentary sensory input, but on the spatio-temporally extended and continuous activity of the perceptual system" (p. 53). Put simply, affordances are perceived across multiple spaces and timescales as an extended perceptual activity.

From the activity theoretical lens, designed artefacts have material and ideal characteristics connected to intended use (how designers want users to use them) and possible use (how users use them) (Baerensten & Trettvik, 2002). There can be unintended use of artefacts which alludes to the new action possibilities which when acted upon "will contribute to the transformation of the activities and the environment" (Blin, 2016, p. 53). In the following section, as cases in point, the researcher explains how and why two activity theoretical studies have explored affordances in technology mediated environments and discuss how activity theory leads to the investigation of affordances of ICT.

Drawing on activity theory, Dey-Plissonneau (2019) explored the emergence and realization of linguistic, pedagogical, technological and socio-cultural affordances in tutor-learner multimodal interactions via videoconferencing for second language learning and teaching. She analysed the multimodal data generated in tutor (masters' students of French as a foreign

language from a French University) and tutee (undergraduate business students learning French at an Irish University) online interactions by decomposing the primary activity system into specific actions that develop into moment-to-moment interactions, and she zoomed into them. She took account of unexpected breakdowns, tensions, focus shift and potential innovation, and annotated actions and operations that emerged during online interactions. This enabled her to identify what affordances are triggered by environmental and contextual needs and what kind of changes occur in perception-action cycles which lead to affordances to emerge. She also zoomed out from micro interaction level to the participants' perception and reflection level which helped her to identify the interaction breakdown and systemic tensions that were perceived by the participants. She found that the design of pedagogical and technological tools, institutional norms and the division of labour within and between institutions bring contradictions and these contradictions are resolved by novel tools and learner-pedagogical interactions.

In another study, Nocchi (2017a) investigated the affordances that virtual worlds offer for foreign language teaching and learning using an activity theoretical framework. She chose a language task as the smallest unit of analysis. She modelled the language task and zoomed in to investigate the episodes of tension and disruption in the language task activity system. She carried out in-depth analysis of the cause of disruptions to the tasks which provided insights related to the participants' role, their use of medium and its technical and social affordances. She analysed each of episode as the sub-activity of the language task activity system which could help her identify the actions carried out by the subjects to understand the problematic issue. She could analyse those actions as the enactment of emerging language learning affordances of the virtual world.

These studies reveal that through the analysis of discursive manifestation of contradictions based on the principles of activity theory, a researcher can identify different levels of

contradictions. Those contradictions lead the subjects to act upon affordances as they carry out some activities to resolve contradictions. For example in Dey-Plissonneau's (2019) study, the unexpected breakdowns and tensions, which are the manifestations of the contradiction lead linguistic, pedagogical, technological and socio-cultural affordances to emerge and likewise, in Nocchi's (2017a) study, the episodes of tension and disruption in the language task activity system led to the emergence of technical and social affordances. The common thing between both studies is that they analysed the contradictions guided by activity theory which helped them identify the ICT affordances in language learning contexts.

An investigator faces some methodological challenges when they select activity theory as a guiding framework in their study. In the following section in the course of discussing methodological challenges, I will highlight what a researcher is required to do when they use activity theory in their study.

3.4   Methodological Challenges

The three primary methodological challenges in activity theory are delineating the boundary of activity systems or defining the unit of analysis, identifying the manifestation of contradictions and following the objects across multiple spaces and timescales, which are briefly discussed below.

3.4.1   Delineating the boundaries of activity systems

Activity system analysis helps researchers get meaning of real world data sets in a meaningful and manageable way (Yamagata-Lynch, 2010). Lim and Hang (2003) argue that activity system, i.e., the unit of analysis enables the investigators to "observe the actual processes by which activities shape and are shaped by their context" (p. 51). Delineating a boundary of activity system is equally a challenging task for a researcher, as they tend to strive in deciding a unit of

analysis during their activity theoretical study. Having delineated a boundary, an investigator can model activity systems for an in-depth analysis of an activity.

Mwanza (2001) lists a set of questions (Table 3.1) that guides a researcher to model the situation being examined. This set of questions further helps to model an activity system in an Engstrom's triangle and list components of activity on each node. Having done so, a researcher can see different components of activity theory graphically.

Table 3.1 An eight-step model to model the situation being examined (Mwanza, 2001, adapted)

S. No.	Elements	Questions
1	Activity of interest	What sort of activity am I interested in?
2	Object or objective of activity	Why is this activity taking place?
3	Subjects in this activity	Who is involved in carrying out this activity?
4	Tools mediating the activity	By what means are the subjects carrying out this activity?
5	Rules and regulations mediating the activity	Are there any cultural norms, rules or regulations governing the performance of this activity?
6	Division of labour mediating the activity	Who is responsible for what, when carrying out this activity and how are the roles organised?
7	Community in which activity is conducted	What is the environment in which this activity is carried out?
8	Outcomes	What is the desired outcome from carrying out this activity?

The first step Mwanza suggests is defining the unit of analysis or the activity a researcher is interested in. After that, a researcher can answer each question and list the answers on each node on a triangle. For the purpose of demonstrating how activity theory is modelled using Mwanza's guide, the activity system modelled by Yamagata-Lynch (2010) is presented below.

Figure 3.4 Hillsdale-Berkley activity system: before Teacher Institute for Curriculum Knowledge about Integration of Technology (TICKIT) teacher activity (p. 99) (adapted)
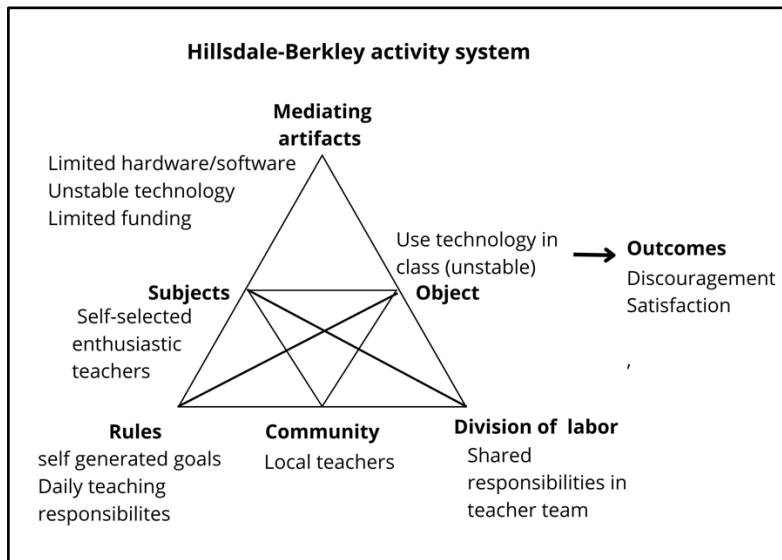
Yamagata-Lynch (2010) models the activity system of Hillsdale-Barkley School district as shown in the triangle above (Figure 3.4). She was interested in exploring the use of technology by Hillsdale-Berkley school teachers in their classrooms before Teacher Institute for Curriculum Knowledge about Integration of Technology (TICKIT), a year-long professional development program. The object was to use technology in the classrooms by the Hillsdale-Barkley school teachers. The subject is a group of self-selected individual teachers who were willing to experiment with technology in the classroom as they believed that technology could assist students in their learning. Subjects were participating or getting involved in this activity by means of hardware/software and available funding. The rules that guided the subject in the Hillsdale-Berkley activity system were self-generated goals, which were related to the willingness of teachers to use technology in the classroom, and their daily teaching responsibilities. The division of labour was the shared responsibilities among teachers in teams and the community that the subject was working with was the local teachers in the districts.

3.4.2   Identifying manifestations of contradictions

An investigator can understand how activity is taking place by looking at contradictions and tensions within and between elements at all levels (Timmis, 2014). According to Murphy and Rodriguez-Manzanares (2008) "a specific focus on contradictions provides an opportunity to explain and understand how teaching practices can change when ICTs are introduced into teachers' activity system" (p. 453). Contradictions often lead to the emergence of action possibilities in the activity system. A researcher can investigate how activity is transformed and new objects develop in an activity by closely observing the contradictions that emerge in an activity system (Timmis, 2014), and they can study how action potentials are emerged. As explained in Section 3.1, because the contradictions are manifested in different forms in an activity system, at times identifying contradictions in activity system also appears as one of the challenges for an investigator who conducts activity theoretical study.

3.4.3   Following the objects across multiple spaces and timescales

Activity systems operate under different levels of granularity, from macro level to the micro level and on different timescales (Blin, 2016). Following the objects across multiple spaces and timescales is another methodological requirement in activity theory if a researcher aims to examine how activity develops. Time and space are linked to any activity. Especially when an activity is technology-mediated, multiple timescales and spaces, in which an activity is interwoven, need to be taken into account for the analysis to understand the development of an activity. Ligorio and Ritella (2010) explicate "space is not just a passive aspect of the context, but it is actively constructed and emerges as a result of users' interaction" (p. 443) in an activity, and "the space-time of the imagined future activity and the recalled past activity interweave with the present space-time" (p. 451). Objects of an activity remain fluid when an investigator looks into situated activity, their historical development and future-oriented envisioning (Engeström et al., 2003).

3.5   Implications for this study

In this study, activity theory guided understanding and explanation of the interactions between different elements, such as who the subjects are in activity system, why they are participating in an activity, what tools mediate them to get involved and how formal rules and informal regulations, the available community and the existing division of labour interact in activity systems. When subjects participate in an activity, several contradictions emerge, manifested by tensions, misfits, dilemmas, conflicts, double binds in the activity systems, and to resolve those emerging contradictions, subjects realise affordances offered by the mediating technological artefacts. The analysis of contradictions using a coding scheme based on the principles of activity theory helped me to analyse different types of contradictions in activity systems, and the analysis of contradictions led me identify and discuss affordances.

3.5.1   Research Design

I have categorised research design into three broad stages. Stage 1 is about the data collection; stage 2 is related to data management and stage 3 is about analysis and interpretation of data. All these three stages will be discussed in detail in chapter 4. To touch upon here, after getting an approval from DCU Research Ethics Committee and local institutions, during the analysis and interpretation, both the institutional policy and national policy documents that were developed to minimise educational disruption were analysed. Next, the unit of analysis was defined i.e., teaching and learning interacting systems as a unit of analysis, those interacting systems were modelled and the teachers' activity system is decomposed into each session of English and Science classrooms. Both interview and classroom observation data were coded based on the coding scheme guided by activity theory and the contradictions were identified that lead to find out the emerging affordances. To explore the use of ICT by teachers during the pandemic, the sequences and actions of classroom sessions, mediating artefacts and rules were examined, and eventually the findings

were interpreted using activity theoretical lens. The following diagram (Figure 3.5) illustrates

how the research was carried out.

Figure 3.5 Research design
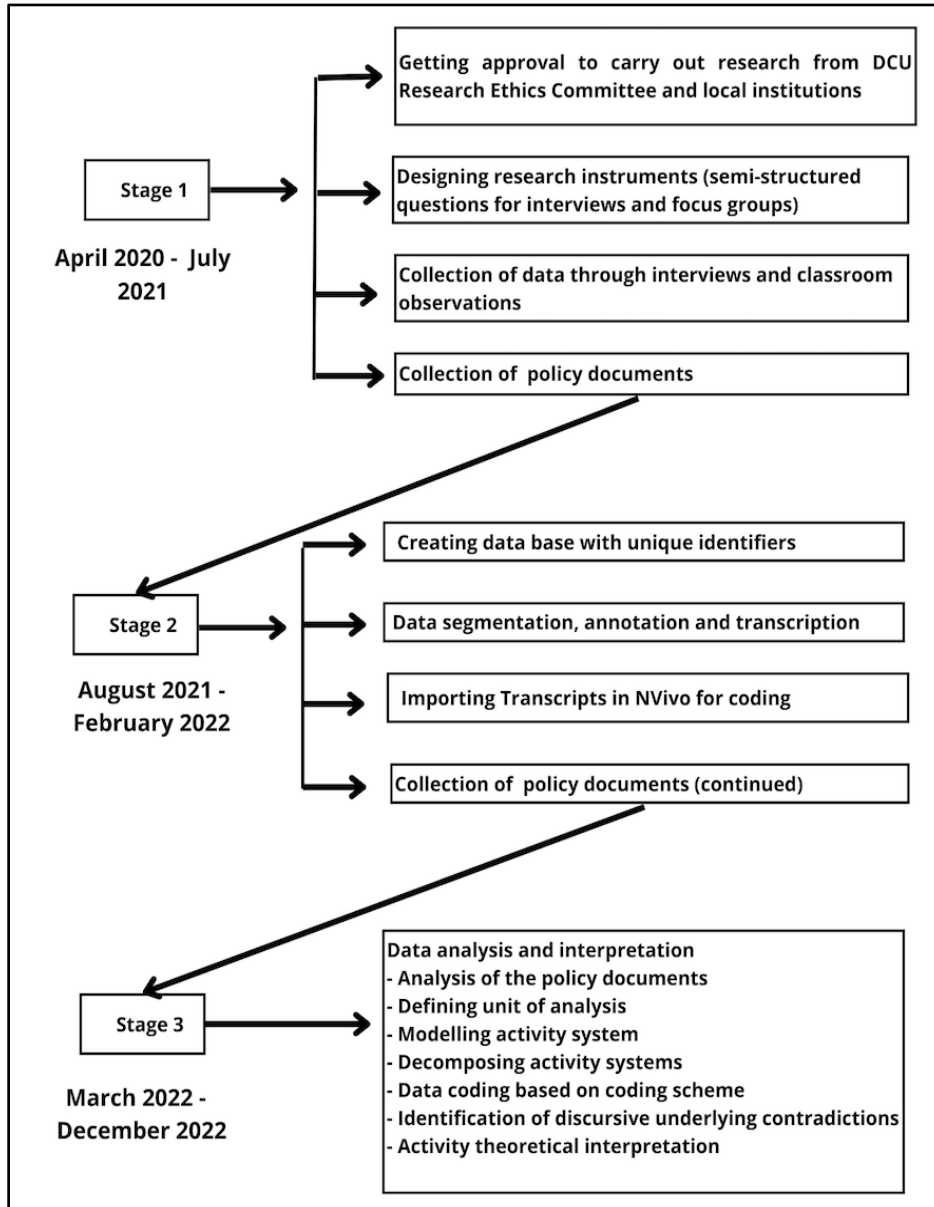
3.5.2 Researcher's Position

My take in this study is "reality is the product of human interaction with [to] the real world."

(Dawadi et al., 2021), and I consider that knowledge is built socially and there is no single

reality. I was not a researcher interventionist (See Section 3.1, p. 33), instead I investigated the

activities that teachers carried out to minimise educational disruption in the pandemic. With

interpretivists' and/or constructivists' lens, I valued the subjective meaning of social actions (Dawadi et al., 2021). Having observed classrooms as a non-participant observer and employing interviews and focus groups as research instruments, I analysed the findings. Having done so, it helped me have a rich understanding of the participants' life-world experiences (Taylor & Medina, 2013).

3.6 Conclusion

Activity theory helps to investigate an object-oriented and mediated human activity considering minimal meaningful context for individual actions as the basic unit of analysis. Activity theory has evolved through different generations from the 1930s Soviet scholarship of Vygotsky and his disciple, Leont'ev to the current most influential Finnish scholar, such as Engeström. As activity theory has developed, it has expanded its focus from cultural mediation to a collective activity that integrates a community and division of labour to the inclusion of networks of interacting activity systems. Activity theory can provide an analysis of the human activity taking account of multiple traditions, history of the activity and contradictions that emerge in activity systems. The analysis of contradictions that are manifested by disruptions, breakdowns among others lead to the identification of affordances as they emerge when subjects try to resolve those contradictions while participating in an activity. Having set this activity theoretical background for this study, the upcoming chapter will discuss the context this study is based on and the methods it has adopted.

Chapter 4 Context and methods

Chapter three discussed activity theory as a theoretical framework that guided this study, and in an activity theoretical study, understanding contexts and history is very important to know why activity is occurring in its current form. Thus, this chapter details the research context -- both at the national and school level -- in which this study was carried out as well as the participants who were involved in the study. It further delineates the methods including the research instruments and the approaches to data encoding, analysis and interpretation which were employed.

4.1 Contexts

4.1.1 Introducing Nepal

This study was carried out in Nepal, a small land-locked developing country in South Asia which borders two big Asian blocks, India and China. Nepal is divided into seven provinces and 77 districts (Figure 4.1). Districts are the second level of administrative division after provinces in Nepal, and each district has its headquarters (henceforth, district capitals) which include government offices to handle administrative issues of a particular district.

Figure 4.1 A map of Nepal highlighting project locations
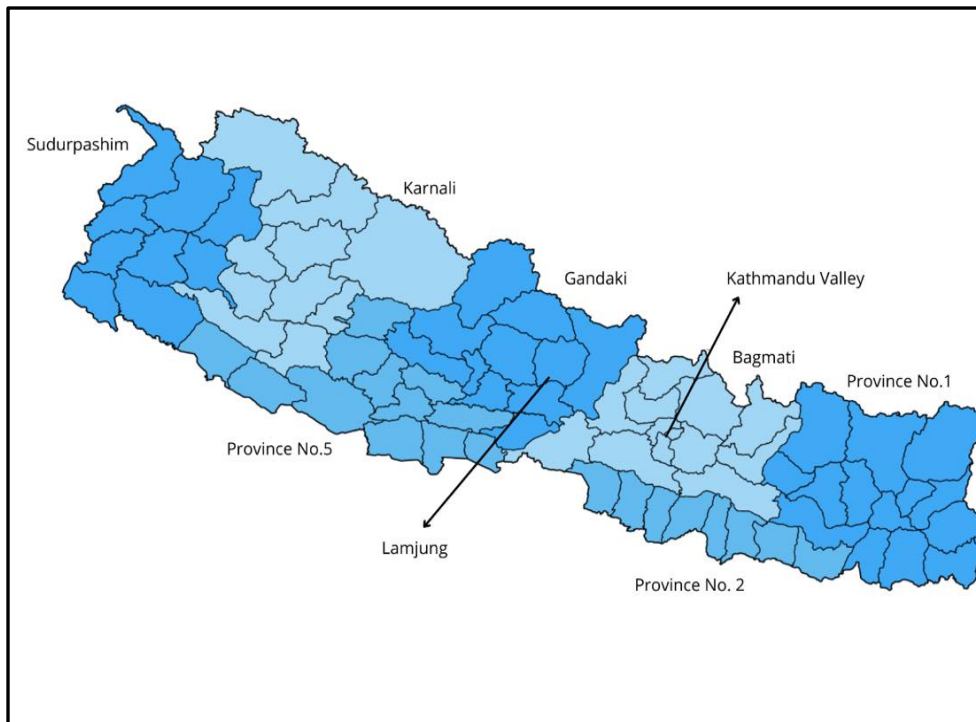
Source: By Sagarjkhatri - Own work, CC BY-SA 4.0,
https://commons.wikimedia.org/w/index.php?curid=91779821 (adapted)

Geographically, Nepal has three main regions: 1) Terai, a plain area bordering India, 2) a hilly region with valleys, which includes the capital city and is highly populated, and 3) a mountainous region that borders China and is less densely populated. Urban areas, particularly the big cities such as Kathmandu and Pokhara are in the hilly region, and Biratnagar is in the Terai region. The areas around and in district capitals – except those areas of district capitals that have major cities – are semi-urban regions. These semi-urban areas have basic facilities such as internet access, shopping centers, local transportation, etc.; however, they are limited compared to major cities. For example, in these areas, there are fewer opportunities to choose an internet network provider compared to the major cities that have a plethora of options so that users can select network providers as per their choice and requirements. Rural Nepal has very few of the facilities mentioned above.

This study was conducted in both urban and semi-urban settings as the technology use in schools in these two settings varies significantly and it is worth exploring how teachers perceive the affordances of technologies in those settings.

In 2022, the population in Nepal is nearly 30.2 million (World Population Review, 2022). Chettri is the largest caste or ethnic groups making up 16.6 percent of the total population followed by Brahman-Hill, with 12.2 percent, Magar with 7.1 percent, Tharu with 6.6 percent, Tamang with 5.8 percent, Newar with 5 percent, Kami with 4.8 percent, Musalman with 4.4 percent, Yadav with 4 percent, Rai, with 2.3 percent and, finally, Gurung with 1.97 percent (Central Bureau of Statistics, 2012). Although the Hindu caste system, which treats some castes as superior and vice versa, is no longer in practice and is outlawed in Nepal, an ethnic group of Dalits continues to face segregation and discrimination. Dalits in Nepal comprise 13.6 percent of the total population (Samata Foundation, n.d.). Dalits are considered as the 'scheduled castes', specifically designated groups of people who are counted as 'untouchables' or the members of the lowest group in the Hindu caste systems.

Nepal, a multicultural and multilingual country, records 123 languages spoken by 126 caste and ethnic groups across the region (Central Bureau of Statistics, 2012). The languages spoken in Nepal fall into four major language families: Indo-European (Indo-Aryan), Sino-Tibetan (Tibeto-Burman), Astro-Asiatic and Dravidian, and the Kusunda language which is a language isolate without any genetic relationship with other languages (Phyak & Ojha, 2019; Yadav, 2014). The language family with the greatest number of speakers is Indo-European (Indo-Aryan) as 44.6 percent of speakers speak Nepali, an Indo-European language, as their first language (Central Bureau of Statistics, 2012). In terms of the number of languages that a particular language family comprises, Sino-Tibetan (Tibeto-Burman) is the largest language family and includes Gurung (1.23%), Magar (2.98 %), Newari (3.20%), Tamang (5.11%) etc. Nepali is the official language whereas other languages (local languages) are categorised as

languages of the nation (The Constitution of Nepal 2015. Part 1, Preliminary 6), and English is

the first foreign language in terms of Nepalese people's preference. The Interim Constitution

of Nepal 2007, Part 1, Preliminary 5 (1) defined other languages (local languages) or mother

tongues spoken in Nepal as national languages, which is just a terminological variation

compared to the one used by the Constitution of Nepal 2015.

4.1.2   Education in Nepal

The Education Act Eighth Amendment Bill 2016 categorised school education in Nepal into two

levels: a) basic education -- years 1 to 8 -- and b) secondary education -- years 9 to 12 --

(Bajracharya, 2016). There are basic education (primary) schools that run classes from pre-

primary and or years 1 to 8, secondary schools that run classes from pre-primary and/or years

1 to 10 and higher secondary schools that run classes from pre-primary and/or years 1 to 12. In

Nepal, the educational standard of a school is gauged through the performance of the pupils in

the School Education Examinations (SEE) and lately through School Leving Certificate

Examinations (SLCE). As regards examinations at the secondary level, before 2016, there was

only one board examination called School Leaving Certificate (SLC) held at the end of grade 10.

Since 2016, the board examinations such as SEE have been conducted at the end of year 10 (at

15/16 years of age) at the regional or provincial level and School Leaving Certificate

Examinations (SLCE) is conducted at the end of year 12 (at 17/18 years of age) at the national

level (National Examinations Board, n.d.). These two examinations, new in their form, are

managed and operated by the National Examinations Board. The successful pupils in the SLCE

can continue into higher education managed by universities.

English and Nepali are the two dominant languages used as media of instruction in Nepal. The

majority of public or community schools adopt Nepali as a medium of instruction, whereas all

private schools use English as a medium of instruction. The need for mother-tongue based

multilingual education is a current debate in Nepal. The Department of English Education[1] (2011) argues that in Nepal, policies relating to multilingual education are good in theory but in practice their implementation has been feeble. There is an increasing trend in public schools towards shifting their medium of instruction Nepali to English since public schools are finding it difficult to retain pupils at the schools as parents prefer to send their children to English medium schools which are privately run (Sah & Li, 2018). Parents think that their children can be better professionals in future if they attend private schools (Basnet, 2022; Joshi, 2021). Therefore, English as a medium of instruction has been used as a tool to recruit and retain pupils in the institutions in Nepal.

4.1.3 Selected districts and schools

Kathmandu and Lamjung were selected as locations for this study. Kathmandu is a densely populated city which is located in the central Nepal at an altitude of 1400 meters, and Lamjung is one of the districts which lies in the mid-hills of Nepal where a large number of Gurung community live. Kathmandu valley is composed of three small districts, Kathmandu, Lalitpur and Bhaktapur, and Lamjung is 183.7 kilometres away from the capital city, Kathmandu. The primary reason for selecting these two locations was to obtain data from both urban and semi-urban settings. The selected schools in these regions use either only English as a medium of instruction (EMI) or only Nepali as a medium of instruction (NMI) to teach subjects other than language subjects or use both languages as mediums of instruction. In the latter case, pupils belonging to a particular year/class are split into different groups (called sections) primarily based on pupils' interest in elective subjects, and these groups use either English or Nepali as a medium of instruction. As an example, pupils who choose economics have a separate section, and they are taught through the medium of Nepali whereas the pupils who have chosen engineering are taught in English. Sections in Nepal are the years split into different groups

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[1]The Department of English Education is one of the departments (schools) in Tribhuvan University, Nepal.

randomly or in terms of pupils' selection of subjects in a particular year or on the basis of individual student's academic performance. I selected three schools in each location: Kathmandu and Lamjung, thus altogether I selected six schools – four of which (two public and two private schools) use EMI and one (public school) uses both EMI and NMI at a secondary level. The sixth school is a public school that uses NMI. During the pandemic, one of the schools, which also used NMI for certain sections of a class at secondary level merged all the sections to deliver online classes; therefore, the school did not stick with any particular medium of instruction, instead it used both Nepali and English as mediums of instruction.

In the year 2016, 17.7 percent of schools were private and 82.93 percent were community schools. Public schools are fully or partially funded by the government, whereas private schools are run with the support of tuition and other fees they collect from pupils. There are also trust schools which are managed by the Trust, a not-for-profit organised body established to manage the institution. The High Level Education Commission, 2018, recommended the conversion of private schools into trust schools by 2028 (Ghimire, 2019).

The following table presents the key information relating to each school.

Table 4.1 Schools' locations and medium of instruction

Schools	Type and school established year	Location	Medium of instruction
School 1 (SC1)	Public, 1988	Kathmandu Valley (urban)	Some sections of secondary classes are in English and some in Nepali
School 2 (SC2)	Public, 1963 as a primary school	Kathmandu Valley (urban)	Some sections of secondary classes are in English and some in Nepali
School 3 (SC3)	Trust-run,	Kathmandu Valley (urban)	Completely English
School 4 (SC4)	Public, 1958	Lamjung District (Semi-urban)	Some sections of secondary classes are in English and some in Nepali

Schools	Type and school established year	Location	Medium of instruction
School 5 (SC5)	Public, 1955	Lamjung District (Semi-urban)	Completely Nepali
School 6 (SC6)	Private, 1993	Lamjung District (Semi-urban)	Completely English

4.1.4   Profiles of participating schools

This section contains profiles of the above six schools who participated in this study. Each school is presented under the following four headings: school overview; sociodemographic profile; ICT infrastructure, history and training; and pandemic and post-pandemic teaching and learning practices. As mentioned in the previous section, out of six schools, three are located in the capital city and three are located outside the capital city in the district called Lamjung. Two public schools and one private school participated from each region[2].

School 1 (SC1)

School Overview

SC1, a public higher secondary school (offering classes from nursery to year 12) established in 1988 AD[3], is in the heart of the capital city, Kathmandu. This is a state-funded school. The SEE grade point average (GPA) in the academic year 2019/20 and 2020/21 of this school is 3.4. Its GPA in SEE before the pandemic was 3.12. The majority of sections of the secondary level classes use English as a medium of instruction, and a small number of sections of the same level classes use Nepali as a medium of instruction.

Sociodemographic profile

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[2] The information in relation to each school was provided by a teacher and/or a member of the school administration.

[3] All the dates mentioned in this work are AD.

SC1 has 65 teaching staff and 1200 pupils in total of whom 700 pupils are at the secondary level. The pupils are from both middle-class and economically disadvantaged families. It is situated in a very limited space only having a school building and a small front yard of approximately 1,526 square meters. In 2018, this school was recognised as the best school by Kathmandu Metropolitan City based on its management and academic performance.

ICT infrastructure, history and training

SC1 began offering a computer science course in 1993. The course is designed to give information about computers and different programs run on computers. The use of technologies to teach all subjects began around 2012.

There are two computer laboratories that comprise 50 computers and one audio-visual room. The school also has regular internet access and during the pandemic, it started running its own mobile application developed with the help of local developers. SC1 primarily uses its application to send information to parents and to notify parents of their child's attendance. Parents have asked the school not to send reading materials from the application as many pupils need to use their parents' mobile to read the materials, and these parents also found that their children spent too much time on mobile phones during the pandemic. Parents of children in this school can monitor their children's participation in classroom activities via this mobile application.

In 2022, SC1 distributed laptops to 40 teachers with financial support from one of the parliament members. Teachers can take these laptops home and use them for teaching and learning. Science, maths, social studies and language subjects are taught by taking learners to the audio-visual rooms. The school head is committed to supporting teachers by providing training and managing ICT infrastructure to facilitate the use of technologies in classrooms.

Pandemic and post-pandemic teaching and learning practices

During the pandemic, the school used a Messenger Group below Year three (pupils aged eight/nine), and for other years, Google Meet was used to run online classes. They ran online classes three hours a day in different shifts, for instance, from 10 am to 1 pm for year 4 to year 7. Classes below year 3 ran in the morning from 7 to 9 am. While teaching technical subjects, such as science during the pandemic particularly at the secondary level, Nepali was used to explain the concepts whereas the PowerPoint slides were in English. Before the pandemic, secondary classes in this school had some sections that used English as a medium of instruction and some that used Nepali as a medium of instruction. When schools were back on site, as in previous years, the medium of instruction was English in two sections of classes nine and ten, and one section of classes six to eight. Nepali was the medium of instruction in one section of classes six to ten. The sections were split as per the subjects that pupils had chosen. For example, there was a section for pupils who had chosen computer engineering and another section for the ones who chose optional maths, and those pupils were taught through the medium of English. The pupils who had chosen economics were in another section that was taught using Nepali.

School 2 (SC2)

School overview

SC2 is a public higher secondary school (offering classes from nursery to year 12) established in 1963 as a primary school in the Lalitpur district. A nursery class comprises children belonging to three to four years age group. SC2 is a state-funded school. The SEE average GPA in the academic year 2019/20 of this school was 3.7 and was around 3.5 in the academic year 2020/21. The medium of instruction was mostly English. Nepali was used occasionally especially during explanation.

Sociodemographic profile

The total number of pupils in SC2 is around 3,600, out of which 1,870 are at the secondary level. The total teaching staff is over 100, and 15 are non-teaching staff. 60 percent of pupils are from economically well-off families, and 40 percent are from economically disadvantaged families. SC2 is one of the model schools in Nepal.

ICT Infrastructure, history and training

This school's use of technology dates back to 2008 when the Pakistani Embassy helped create an ICT lab that had 40 desktop computers. The lab was used to teach computer science as a subject. The use of ICT to teach other subjects began in 2016. In 2019, the school had given tablets to its teachers. However, before lockdown, those laptops were returned to the school as the school head asked teachers to return them to the school. The reason given to the teachers was that these tablets required updating and the school head needed to report the conditions of tablets to the support providers when these providers made queries related to the updates of these gadgets. Laptops are also provided to the teachers in this school, but those laptops cannot be taken home.

In 2019, for ICT management training, a school head, an English teacher and an ICT teacher visited South Korea where they were trained on the use of ICT materials provided to them by the Korean government. The support of the Korean government was obtained through the Ministry of Education, Nepal, as the school was selected for this scheme and the support this school received from the Pakistani Embassy is through the personal network of a teacher as that teacher could submit the school's request to the embassy. The school head is committed to supporting teachers by providing training and managing ICT infrastructures to use technologies in classrooms.

SC2 has two computer halls and three ICT laboratories. The difference between laboratories and halls in this specific school's context is that a hall is a spacious location where teachers can

conduct classes by projecting the digital materials whereas the ICT laboratory is quite small, and a teacher takes pupils to this laboratory to sit in front of computers and practice software or programs. One of the ICT halls which was built with the support of the Korean government has 60 laptops and 60 tablets (20 provided by the Korean government and 40 by Samsung). The second ICT hall, supported by Samsung, has a Samsung Interactive board, and some benches for seating. When the latter hall was built, there was also wi-fi. This hall is no longer in use as construction is taking place above this hall making this space more suitable for storage.

Out of the three ICT laboratories, one ICT laboratory has 40 desktop computers and was built with the help of the Pakistani Embassy, a second has 24 desktop computers built by the school itself for the civil engineering group and a third has 24 desktops and one projector provided from Nepal Telecom (NTC) to teach computer education for year 11 and 12 pupils. There are 8 projectors fixed in classes 10, 11 and 12. For other classes, the pupils are taken to the ICT hall if they need to be engaged in audio-visual materials. A teacher needs to fill out a form a day in advance to book a slot for taking pupils to the ICT hall. In the ICT hall, there is internet connectivity, one big screen, three interactive boards, a solar-generated power supply and a sound system.

In relation to the use of ICT for teaching and learning, the problem the teachers are facing is that the ICT hall is occupied more frequently because of a large number of visitors to this school as this is one of the model schools in Kathmandu Valley. Mostly visitors are from outside of Kathmandu valley. They are generally school committee members, parent teacher association members, and even at times school pupils come to observe the ICT material available in this school. During their visit, SC2 provides their school-related information using the ICT hall. Despite the readiness of the teachers to use the ICT hall, at times, they cannot use it as it remains busy due to visitors.

Prior to commencing online classes, the teachers of SC2 sourced training by different institutions during the initial days of lockdown. This training was not provided by school management but explored by the teachers on their own via social media.

Pandemic and post-pandemic teaching and learning practices

Approximately from the end of May 2020, the school started online classes -- four 45-minute periods, three days a week -- for years 9 and 10 in the beginning, and gradually they engaged other years as well in online classes. In the beginning, SC2 used Zoom for online classes, and later they switched to Google Meet and finally to Microsoft Teams. The main reason for switching from Zoom is that they were using free Zoom that limits time and they also faced some issues as outsiders with access to Zoom links disturbed their classes. MS Teams became the stable video conferencing platform used to run online classes during the pandemic. Some teachers even went to the school to take classes as there were laptops and internet connectivity. Some pupils who did not have devices as well went to the school and used the school tablets to join online classes. SC2 also created class-wide Messenger groups in which homework was posted. Pupils who could not join online classes could receive homework from the Messenger group and submit their works in the same group. Teachers also provided their comments and feedback in the Messenger groups.

School 3 (SC3)

School Overview

SC3 is a trust-owned and managed school (offering classes from nursery to year 12) established in 1988. It is situated in Kathmandu and is funded privately via tuition and other fees it generates from the pupils. The average GPA in SEE in the academic year 2020/21 was 3.5. The medium of instruction in this school is completely English.

Sociodemographic profile

SC3 currently has 2,577 pupils and 92 teaching staff and 33 non-teaching staff. The pupils are generally from well-off families, and many of them use bus services provided by the school to commute to and from school. It is regarded as one of the good and reputed private schools in the capital city on the basis of well-built infrastructure such as spacious classrooms, library, playground, cafeteria and music hall, and also owing to its academic performance.

ICT Infrastructure, history and training

The discussion around using technology in the classrooms in SC3 amongst school team members began in 2012. The use of technology for teaching and learning escalated in 2017/18. Before 2017/18, digital technology was not so frequently used for pedagogical purposes.

Local Area Network (LAN) is available in all the classrooms while wi-fi is available only in the staff room designated for teachers. Projectors have been fixed in many classrooms and there are televisions in each junior class. Laptops are available for teachers to use in their classrooms. The teachers in this school can also buy laptops in instalments as the school has liaised with one of the local banks.

Since school management team members are knowledgeable on using technology in classrooms and are aware of the potential of using technology in classrooms, they encouraged teachers to use technology even before the pandemic. For instance, a school Vice Principal is good at handling technology, and he provides required support such as helping teachers learn the functionalities of web tools to enable them to use technology in their classrooms. There was also a workshop held on how to use technology before the pandemic which was attended by almost all the teachers. During the pandemic, they also organised a success story colloquium in which many teachers shared their successful practices. As a result, they could learn from each other's initiatives especially in managing online classes.

Pandemic and post-pandemic teaching and learning practices

During the pandemic, at first, this school used Tenscent VooV, a video conferencing platform for two days followed by Zoom which continued till August 2020. They discontinued Tenscent VooV due to security reasons as anyone could join the class organised in VooV. When one of their parents suggested Microsoft Teams (MS Teams) to the school management, after learning all the features, this school switched to MS Teams. It pays operating costs only for MS Teams. These are around € 6035, and the school has obtained 500,000 faculty licenses, 1,000,000 student licenses (package provided by MS Teams). The cost covers training, creation of emails for staff members and pupils, creation of required Teams for each class and one year service. They also used Microsoft Office Package, and ran exams using Online MCQ, a feature of the Microsoft package. The other benefit they are getting through MS Teams is that the school members are getting free access to some online resources as each member in this school has got an email ID associated with School's domain.

School 4 (SC4)

School overview

SC4, a public school (offering classes from nursery to year 12), is in the district capital of Lamjung. This is a state-funded school. The average GPA of this school in the SEE in the academic year 2020/21 was 3.2. It uses English medium at secondary level classes.

Sociodemographic profile

SC4 was established in 1958. There are around 700 pupils, 39 teaching staff and five non-teaching staff. Around 25 percent of pupils in this school are from economically-disadvantaged families and 50 percent are from mid-range families who are less economically-disadvantaged compared to those 25 percent. More than 100 pupils in SC4 are Dalits.

ICT Infrastructure, history and training

SC4 started using a computer for accounting purposes in 1995, and from 2004, computers were used to teach computer studies in this school. SC4 has 20 computers in a laboratory and 10 laptops in its office. There is a digital room where Midas eClass, the digital materials developed by the private organization called Midas Education Private Limited, were used before the pandemic when physical classes were running. Midas Education Private Limited develops online teaching learning materials in Nepal. There is a regular internet connectivity at school.

The school Head Teacher, though not proficient, seems to be reasonably knowledgeable about using technology as he can handle emails and some other digital tools. Primarily, an accountant and a computer teacher at this school help the teachers in using technology in their classrooms.

Pandemic and post-pandemic teaching and learning practices

During the pandemic, SC4 could not continue delivering lessons for the pre-primary level, that is from Nursery to Kindergarten. Some alternative ways, such as a) running online classes and b) asking the parents to get homework from school, were adopted to deliver lessons for years 1 to 3. Many pupils from these years joined online classes. As regards the years above 3, the maximum number of pupils joined online classes that were held using a free version of Zoom. The younger pupils which were below 3 could not join as parents could not provide enough time to them and in some cases, amongst the siblings who were studying in different years, older pupils were given devices to join but younger siblings could not get connected as the family did not have a sufficient number of devices. During the pandemic, the use of technology for pedagogical purposes by other subject teachers increased significantly as they had to run online classes.

School 5 (SC5)

School Overview

SC5 is a public school (offering classes from 1 to 12) in the Lamjung district and was established in 1955. It is approximately two kilometres away from the headquarters, BeshiSahar. It has an approval for lower-secondary level but has only temporary approval for secondary level which means this school does not get a full teachers' quota for secondary level. It is a state-funded school. Regarding the SEE performance record of SC5, it stands between second and third positions amongst the schools located in the municipality. It uses Nepali as a medium of instruction.

Sociodemographic profile

SC5 has a total of 300 pupils of whom 125 are at secondary level, and there are 20 teaching staff and three non-teaching staff. Around 40 percent of pupils are from the Dalit community and most of the remaining pupils are from Tamang and Gurung ethnic communities. The pupils are the children of those parents who came to Lamjung for low-paid work from Dhading, Rukum and Rolpa districts – the latter two districts are considered remote districts of Nepal. This implies that the pupils joining this school are not from well-off families. It has also achieved a foundational International School Award (ISA) from the British Council.

ICT Infrastructure, history and training

SC5 has an intriguing history of using technology. Until 2008, there was no telephone point near to the area where the school is located now. Therefore, the school, on its own initiative, bought 25 poles and erected them at different points in order to hook the cables to extend the internet connection to the school. They got support from the parents of the Royal Grammar School, UK to manage the logistics. They had one old laptop at that time. This school has a partnership with the Royal Grammar School and it has received ICT infrastructure support from

the Alex Memorial Fund. The Alex Memorial Fund was established in the name of a volunteer teacher from Royal Grammar School, UK, who died in the Kaligandaki river in Lamjung. In 2013, the school received funding for an internet connection from the same fund. Teachers from this school first began using technology in 2013.

SC5 has a laboratory where 20 pupils can use computers at any one time. It has two mobile projectors which teachers can take to any classrooms and unlimited broadband from two service providers. There is also solar backup which was donated to the school. Solar back-ups are important as there are scheduled and unscheduled power-cuts in Nepal.

The school head supports the teachers to use technology in the classrooms by managing the available ICT infrastructure. The school has not organised any training related to technology use in education.

Pandemic and post-pandemic teaching and learning practices

As this school could not run any online classes during the pandemic, particularly during the first wave of Coronavirus in Nepal, they organised Tole teaching, in which the teachers asked the pupils of the particular area (Tole) to gather at some point and provided assignments there and collected the completed assignments for correction later. Owing to the fact that the pupils were commuting from different Toles, they were asked to gather at their Toles to get assignments. This practice of providing the assignments at a particular location and collecting the completed assignments for correction from there continued when Nepal was hit by the pandemic.

School 6 (SC6)

School Overview

SC6 is a private school (offering classes from Nursery to year 12) in the Lamjung district established in 1993. It is privately funded via tuition and other fees it generates from the pupils who are enrolled in this school. As regards the performance in SEE, the average GPA of this school in the academic year 2019-20 was GPA 3.2. It uses English as a medium of instruction.

Sociodemographic profile

There are 950 pupils in total, of whom 270 pupils are at secondary level. SC6 has 37 teaching staff and six non-teaching staff. 75 to 80 percent of pupils in this school are from the Gurung and Tamang communities and five to seven percent are from the Dalit community and the remaining ones are from other castes such as Brahaman, Chettri and so on. More than 65 percent of parents of this school rely on foreign remittances to pay the school fees. The members of these families (especially males) have either joined Indian army forces or are engaged as a worker in Gulf countries and the female members of those families (particularly mothers) take care of their children. The remaining 35 percent are in different professions such as in business, teaching, civil service among others.

ICT Infrastructure, history and training

The SC6 has been using a Multimedia projector for teaching and learning since 2017. This school has one computer laboratory that has 30 computers; however, all computers are not up and running. There is one projector in the school and the internet connection at school is regular. Some teachers have their own laptops, which they use sometimes for teaching and learning.

This school has also gained some experience of running classes during the crisis in Nepal, particularly at the time of the great earthquake in 2015. For a month and a half, it ran temporary classes by converting a canteen into a classroom.

Pandemic and post-pandemic teaching and learning practices

During the pandemic, the SC6 used Zoom to run online classes. They began online classes in October 2020. As regards the support of a school head in using technology, there was not much support during normal times; however, during the pandemic, there was ample support that he could render to the teachers to run online classes. The school provided regular internet access to both pupils and teachers during the pandemic by allowing those teachers and pupils, who did not have internet access at home, to come to the school for teaching and learning. Teachers of technical subjects such as science and maths would come to the school to use a blackboard like in a regular class even though they were using zoom.

Summary

Thus, in summary, the schools in Kathmandu both public and private are better equipped with technology compared to both public and private schools in Lamjung. Overall, it seems that public schools, whether they receive funding from government or not to build their ICT infrastructure, rely largely on external funding other than the government funding, which these schools can potentially receive after they network with NGOs, INGOs and other possible donors to develop their ICT infrastructure. Private schools mostly rely on the fees they collect from pupils to establish and promote their ICT infrastructure.

Table 4.2 presents a second overview of the institutions that were part of my study (See also Table 4.1, Section 4.1.2) this time focussing on demographic details of schools and ICT infrastructure available there.

Table 4.2 Overview of participating schools

Schools	Number of pupils, teachers and non-teaching staff	Pupils' background	ICT Infrastructure
SC1	Total pupils: around 1200 pupils at the secondary level: Total teaching staff: 65 Non-teaching staff:	Mixture of pupils from both medium class and economically-disadvantaged family	2 Computer laboratories (50 computers), 1 audio-visual room school App, internet

Schools	Number of pupils, teachers and non-teaching staff	Pupils' background	ICT Infrastructure
SC2	Total pupils in the school: Pupils at the secondary level: Total teaching staff: over 100 Non-teaching staff: over 15	60 percent pupils are from economically well-off family and 40 percent are from economically-disadvantaged family	3 Computer laboratories and 2 ICT Hall (built from the support of Korean Government and), 1 ICT hall that has 50 to 60 laptops and 50 tablets, 40 desktop computers in the ICT laboratory (help received from Samsung)
SC3	Total pupils in the school: 2,577 pupils at the secondary level: Total teaching staff: 92 Non-teaching staff: 33	Majority of pupils are from well-off and literate families	Wi-fi only in teachers' office, LAN connection in all the classrooms, projectors in some classrooms, stock of mobile projectors, laptops that can be used by teachers and 1 computer laboratory
SC4	Total pupils in the school: 700 pupils at secondary school: Around 317, Teaching staff: 39, Non-teaching staff: 5	Around 25 percent pupils are from economically-disadvantaged family, 50 percent are from mid-range family (less economically disadvantaged compared to those 25 percent) Over 100 pupils are Dalit.	20 computers in a laboratory, 9/10 laptops Laptops worth NPR 6,00,000 from one of the organisation (to be received) 1 digital room, Internet
SC5	Total pupils in the school: 300 pupils at secondary school: 125, Teaching staff: 20, Non-teaching staff: 3	Around 30-40 percent pupils from economically-disadvantaged family (Dalit community) Mostly from Gurung and Tamang community	2 mobile projectors, 1 computer laboratory for 20 pupils, Internet from two service providers, Solar back-up
SC6	Total pupils in the school: 950 pupils at secondary school: 270 Teaching staff: 37, Non-teaching staff: 6	75 to 80 percent pupils are from Gurung community: 5 to 7 percent from Dalit community and the remaining ones are from Brahaman, Chettri etc., Over 65 percent parents rely on foreign remit to pay the school fee (These parent members are either in Indian army forces or engaged as a worker in Gulf countries)	1 Computer laboratory that has 30 computers (not all running as they require maintenance) 1 Projector Some teachers have individual laptops, Internet

4.2 Participants

Five teachers, 12 pupils, three parents, two educational managers, two teacher trainers and three policy makers participated in either a focus group discussion, or an individual interview.

In addition, approximately 210 pupils and those five teachers, who were interviewed, had their classrooms observed. Further detail follows for each category of participant:

Teachers

The four participant teachers who joined focus groups are two secondary level science teachers (ST1 and ST2) and two English teachers (ET1 and ET3).ET2 joined an individual interview. Out of 5 teachers whose classes were observed, the teachers for a focus group and interview were selected randomly but at the same time, making sure that no two teachers from the same school attend to a focus group or an interview. Table 4.3 contains summary detail and unique identifiers for the teachers.

Table 4.3 Participants: Teachers

Unique identifiers for participants	School/ Institution	Role	Their participation		
			Classroom observation	Focus group discussion	Interview
ST1	SC1	Science Teacher	Yes	Yes	No
ST2	SC6	Science Teacher	Yes	Yes	No
ET1	SC2	English Teacher	Yes	Yes	No
ET2	SC3	English Teacher	Yes	No	Yes
ET3	SC5	English Teacher	Yes	Yes	No

Amongst the focus group teacher participants, ST1 is a public-school teacher from an urban school whereas ST2 is a private school teacher from semi-urban school. ET1 and ET3 both are English teachers from public schools, but the former is from urban school whereas the latter one is from semi-urban school. Initially, I had selected six teachers, each one from school for the focus group discussion; however, of those, only four teachers from four different schools (SC1, SC2, SC5 and SC6) managed to join the focus group, and an English teacher (ET2) from SC3, a trust-owned private school located in urban setting, who could not join the focus group discussion, agreed to be interviewed.

Pupils

I selected two pupils from each school for two focus group discussions based on their willingness and availability. Table 4.4 contains summary detail and unique identifiers for the pupils.

Table 4.4 Participants: pupils

Unique identifiers for participants	School/ Institution	Role	Their participation		
			Classroom observation	Focus group discussion	Interview
S1	SC1	Pupil	Yes	Yes	No
S2	SC2	Pupil	Yes	Yes	No
S3	SC3	Pupil	Yes	Yes	No
S4	SC4	Pupil	n/a*	Yes	No
S5	SC5	Pupil	Yes	Yes	No
S6	SC6	Pupil	n/a	Yes	No
S7	SC1	Pupil	n/a	Yes	No
S8	SC2	Pupil	Yes	Yes	No
S9	SC3	Pupil	Yes	Yes	No
S10	SC4	Pupil	n/a	Yes	No
S11	SC5	Pupil	n/a	Yes	No
S12	SC6	Pupil	n/a	Yes	No

n/a * : *The researcher could not locate this pupil in a classroom observation recording*

S3 and S9 were from urban trust owned (private) schools whereas S6 and S12 were from semi-urban private schools. Similarly, S1, S2, S7 and S8 are from urban public schools and S4, S5, S10 and S11 are from semi-urban public schools. With regard to their level, S1, S2, S7 and S8 were in year 9 and all other remaining pupils were in year 10. While organizing the two focus groups, I made sure that each focus group comprised pupils from all of the selected schools. Pupils joined a group based on their availability as focus groups were organised during school hours. Teachers did not accompany pupils during their focus groups.

Other Participants

Parents, school managers, teacher trainers and policy makers are other participants who took part in interviews. Table 4.5 contains a summary detail and unique identifiers for other participants.

Table 4.5 Other participants

Unique Identifiers for Participants	School/ Institution	Role	Their Participation		
			Classroom Observation	Focus Group Discussion	Interview
P1	SC1	Parent	No	No	Yes
P2	SC6	Parent	No	No	Yes
P3	SC3	Parent	No	No	Yes
SM1	SC4	School Manager	No	No	Yes
SM2	SC3	School Manager	No	No	Yes
TT1	ETCKAT	Teacher Trainer	No	No	Yes
TT2	ETCKAI	Teacher Trainer	No	No	Yes
PM1	ME	Policy Maker	No	No	Yes
PM2	STCTU	Policy Maker	No	No	Yes
PM3	EUBM	Policy Maker	No	No	Yes

Parents

Three parents from SC1, SC3 and SC6 were selected for interviews. They were the parents of the children at secondary level. They were selected on the recommendation of the school administration based on their involvement with the school and willingness to participate. P1 (female) and P3 (male) both based at urban areas were digitally literate compared to P2 (female). P1 and P3 themselves communicated to my emails. As regards their formal qualification, P1 has a master's degree in comparative local development, P3 has completed school education whereas P2 has completed only year 8.

School Managers

A Head Teacher (SM1) of SC4 and a Deputy Principal (SM2) of SC3 were selected for interview. The reasons for selecting them were 1) both of them belonged to different types of school: public and trust-owned (private), and from the schools situated in different geographical settings: semi-urban and urban area and 2) they were willing to volunteer. In Nepal, generally, a school head in public school is called a Head Teacher (Head Master) whereas the term 'Principal' is used in case of private schools. SM1 has been a Head Teacher for this public school for 17 years. He has spent nearly 25 years in teaching and learning. SM2 is relatively new in a leadership role as he has been Deputy Principal for three years in this trust owned school whereas he has been teaching for 20 years. Regarding knowledge of technology, SM2 has extensive knowledge of using web tools for teaching and learning compared to SM1.

Teacher trainers

Teacher trainers for each subject (science and English), who were delivering training for the government body responsible for training teachers, Educational Training Center (ETC), in semi-urban and urban areas were identified as the potential trainers for interviews. Amongst many trainers, the teacher trainer for English (TT2) was chosen on the recommendation of an active member of Nepal English Language Teachers' Association (NELTA) and the teacher trainer of science (TT1) was chosen on the recommendation of a science teacher of SC3. TT2 is a roster trainer at ETC in one of the remote districts of Nepal. He has been teaching English at the secondary level for 17 years. Another trainer, TT1 has been working as a science teacher trainer for the last 15 years and he has also been teaching science at secondary level. Apart from this, he is also the textbook writer for Years 6, 7 and 8 for the last 15 years.

Policy makers

Policy makers who were interviewed were working at national and/or local levels. Policy makers were selected upon the recommendation of colleagues who were working in the field of education in Nepal. PM1, who is affiliated to the Ministry of Education, is working at national level whereas PM2, who is affiliated with the university, is working on policy formulation at both national and local levels, and PM3, who is based at the municipality in the Lamjung district, is working at a local level.

Ethical approval

Ethical approval for this study was obtained from my University[4]. Having given information using a plain language statement (See Appendix A2: Plain language statement, p. 238), I obtained written consent from all teachers, school managers, teacher trainers, pupils, parents and educational policy makers who were directly involved in my research before collecting data (See Appendix A3: Informed consent form, p. 242). I also obtained written approval from the institutions who participated in my study. As some of the learners were minors, I collected consent forms from their parents or legal guardians on their behalf and assent forms from them. I safeguarded their personal information and treated it confidentially. I anonymised participants' details which could potentially reveal their identities in my dissertation and any publications arising from this research.

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[4] REC reference: DCUREC/2020/061

4.3 Methods

4.3.1 Data types and collection

The data for this study was collected primarily using classroom observation, interviews and focus groups. Policy documents developed and implemented to address the educational issues during crisis contexts also served as data.

Classroom Observation

Bielefeldt (2012) argues that the observation of pupils' and teachers' classes can record the teaching and learning experience itself. I chose classroom observation as it enables researchers to investigate the experiences of the participants in naturalistic settings and it facilitates the gathering of details and evidence (Waxman, n.d.). Another reason for choosing classroom observation is that it helps to examine whether what the research participants say in an interview confirms or contradicts what they practice in their classrooms.

As a non-participant observer, I observed a total of 12 online English and science classes in five schools and explored the nature of the technology used while delivering the lessons related to these subjects. I observed their live online classes, which were run using the video conferencing platforms, Google Meet and Microsoft Teams. I also observed four classes via Messenger calls as the teachers found that it was easy for them to live stream their physical classes using Messenger calls. During the classroom observations, notes were taken focusing on classroom activities such as activity type, participant organization, content, and materials and technology used. All the observed classes were recorded using Camtasia, the screen casting software.

The 12 sessions represent science and English language sessions delivered in schools that are in urban and semi-urban and public and private settings. These sessions helped me observe the practices of using ICT particularly concentrating on the affordances and contradictions

manifested while using ICT for teaching and learning in both private and public and semi-urban and urban based settings. Each topic to be dealt with in each session is the motive of an activity; therefore, topics of each session are treated as objects. The details of the 12 sessions are presented in the table below (Table 4.6).

Table 4.6 Details of classroom observation

Classroom Observations									
S. No.	Unique Identifier	School	Teacher	Subject	Class	Topics	Platform used	No of pupils (approximately)	Duration
1	SC1SCO1	SC1	ST1	Science	9	Nose and tongue	Google Meet	65	53:09
2	SC1SCO2	SC1	ST1	Science	9	Exercises related to eyes and ears and some gases (the separate topic)	Google Meet	66	48:45
3	SC2ECO2	SC2	ET1	English	9	Prepositions	Microsoft Teams	13	44:50
4	SC2ECO3	SC2	ET1	English	9	Prepositions	Microsoft Teams	11	44:24
5	SC3ECO1	SC3	ET2	English	10	Poem: Past and present	Microsoft Teams	35	51:03
6	SC3ECO2	SC3	ET2	English	10	Writing about one's past and present	Microsoft Teams	36	45:03
7	SC3ECO3	SC3	ET2	English	10	Jitiya festival	Microsoft Teams	38	22:43
8	SC3EC04	SC3	ET2	English	10	Jitiya festival	Microsoft Teams	30	50:51
9	SC5ECO1	SC5	ET3	English	10	Listening exercise: language function - watching a movie	Messenger Call - live streaming (recording of a face-to-face class)	25	16:51
10	SC5ECO2	SC5	ET3	English	10	The chimney sweeper (poem)	Messenger Call - live streaming (recording of a face-to-face class)	25	15:51
11	SC6SCO1	SC6	ST2	Science	10	Electricity	Messenger Call - live streaming (recording of a face-to-face class)	25	41:02
12	SC6SCO2	SC6	ST2	Science	10	Electricity and other exercises related to other scientific contexts	Messenger Call - live streaming (recording of a face-to-face class)	25	43:36

Focus groups

Focus groups allow access to participants' interaction, attitudes and experiences. I conducted two focus groups with 12 pupils (six in each focus group) and one focus group with four teachers. Six pupils in each focus group were from six different schools. I moderated the focus group in Zoom and the language used for interaction in the focus groups was mostly Nepali. At times pupils switched their codes to English in a focus group. The first focus group of pupils lasted for one hour and 24 minutes, the second focus group lasted for one hour and nine minutes and the teacher focus group lasted for one hour and 19 minutes.

Interviews

Gillham (2000) argues that the strength of the interview is richness in the communication. Thus, an interview is one of the appropriate instruments to get thick description of any case from the participants. Individual online interviews were conducted with one teacher, three parents, two school managers, two teacher trainers and three policy makers to explore their perception of the affordances of ICT and the contradictions manifested during the activity of using ICT in classrooms. Zoom and Messenger were used for the online interviews. The participants, particularly teachers were selected using purposive sampling. Bryman (2012) states "Purposive sampling places the investigator's research questions at the heart of sampling considerations" (p. 416). I selected the teacher participants having certain criteria in mind for example, each teacher would represent their schools and they would represent public, private schools from both urban and semi-urban areas. They also represented both types of schools that involved pupils in online teaching and learning and in onsite classrooms so that the technology use in both types of schools could be explored in order to address research questions one and two.

A purposive sampling procedure is the most time-effective method as I rely on my own judgement to select the participants who could help me explore ICT affordances perceived by teachers during crisis contexts. The purpose of the interview was to find what systemic tensions emerge in using technology and what ICT affordances are acted upon by educational stakeholders such as teachers. I also sought participants' opinions on the potential strategies that can be developed to integrate technology in their classrooms. For this, I developed different sets of questions as prompts to use them during interviews and focus groups (see Appendix B: Semi-structured focus group and interview questions, p. 248). 'Questions for teachers' were used for interviewing a teacher and conducting a teachers' focus group and the 'questions for pupils' were used during pupils' focus group discussions. The other sets of questions having different levels, such as 'questions for school managers', 'questions for teacher trainers', 'questions for parents' and 'questions for policymakers' were used to interview school managers, teacher trainers, parents and policy makers respectively. I conducted interviews for a maximum of an hour. I recorded the interviews conducted in Zoom in its cloud and the interviews conducted via Messenger in a computer using Camtasia. I downloaded all the recordings and saved them in DCU Google drive and deleted the recordings that were in Zoom cloud.

Policy documents

Apart from collecting data using classroom observation, focus groups and interviews, I also collected documents such as Emergency Action Plan for School Education 2020, Student Learning Facilitation Guidelines 2020 and Framework for School Operation 2020 produced by GoN related to the ICT use in education during the time of the pandemic to explore how these documents guided their practice. In addition, I gathered documents created by selected schools to manage teaching and learning, and information related to technological artefacts produced by these institutions to gain further insights into the ICT practices in education

during the COVID-19 pandemic. The documents created by schools comprised rules they created for teachers and pupils to join online classes, information for teachers, parents and pupils about assessment system, information to the teachers about questions formation among others.

Challenges of collecting data

The classroom observation data I collected were 8 online sessions in urban areas and 4 onsite sessions in semi-urban areas. While collecting data in online sessions, I had to be ready early in the morning (Dublin time) to observe 8 sessions (due to the time zone difference between Nepal and Ireland). The challenge I faced during online sessions was that I could not observe everything what pupils were doing. I could only see the screen that teacher shared to everyone. When the pupils were taking part in online activities, I could only notice the ones whose activities I could observe on the screen. Apart from that I could not get information pertaining to their activities in which they were participating on the background. Similarly, due to travel restrictions owing to the pandemic, I could not observe the onsite classes run by two schools (SC5 and SC6) in person, as a result, I had to rely on live streaming of the sessions that were held onsite as their local educational units gave a permission to schools to conduct onsite classes. As in SC5's case, one of ET3's colleagues helped to live stream ET3's sessions for about 15 minutes. In doing so, he was moving from one corner of the classroom to the next; therefore, the recorded video was not very clear. ET3 used to inform me shortly to observe the class, and I observed his sessions that his colleague would live stream. I missed to observe how he began his class, how he revised a lesson and so on. Hence, I could not observe the full sessions of ET3. Regarding ST2's sessions, his colleague would place the mobile that was used to livestream his sessions right in front of him so that I could see a teacher and a whiteboard most of the time. The way the sessions were live streamed significantly limited my observation as I mostly observed only teachers' activities.

4.3.2   Data encoding

Classroom observation

An Elan file was created for each of the selected classroom recordings and allocated a unique identifier. Five tiers namely a) Sequences b) Action descriptions c) ET/ST, which refers to English Teacher/Science Teacher d) Pupil(s) and e) Artefacts, and three types, namely a) Activity or Action Sequences b) Talk and c) Other AT (activity theory) elements were created. , Sequences are chains of actions that are frequently occurring in typical lessons or classes and are directed towards a goal that contributes to the transformation of the object of the lesson into outcomes. For instance, 'greetings and socialising', 'discussing previous lessons', 'warm-up exercises', etc are the sequences found in a classroom session. Multiple actions occur within each sequence in an individual session. For instance, within the sequence, 'warm up exercises', actions, such as 'sharing a screen', 'using chat', etc. occur.

The Activity or Action Sequences type included the controlled vocabulary which were used to annotate sequences, the Talk type included the chosen segmented transcription, whereas the Other AT type consisted of the description of the actions and artefacts used during different sequences. For segmenting in Elan, I first uploaded a recording in Elan, went through the entire recording and chose the segmentation functionalities. I segmented an entire recording using five tiers as mentioned above and transcribed segments or sections of segments for ET/ST and Pupil(s) tiers that demonstrate the use of ICT in the classrooms. I added descriptions to actions and artefacts. The tiers, ET, ST and Pupil(s) are the teachers' and pupils' talks, other tiers are sequences, and artefacts. The latter one contains the use of any artefacts used during classrooms (See Figure 4.2).

Figure 4.2 A screenshot of segmentation, annotation and transcription done in Elan
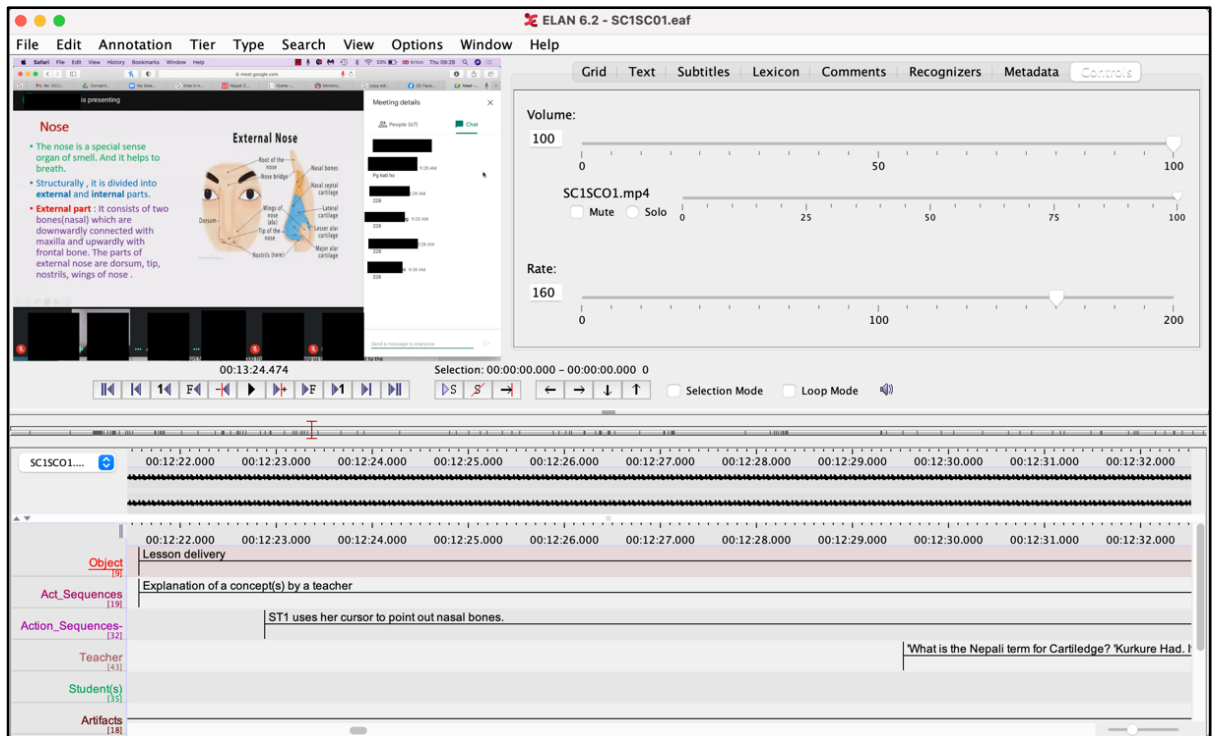
Once segmentation was completed, the 'transcription' option of Elan (one of the functionalities in Elan) was chosen, and those chosen segments for ET/ST and Pupil(s) tiers were transcribed. The segments chosen for transcription are related to the conversation around the use of ICT or episodes of a session that includes the use of ICT in a session. Controlled vocabulary for sequences were selected and the details were added to artefacts and action description tiers.

All of the data was encoded in NVivo 1.6.2. First, I created the excel spreadsheet of the video recording data obtained from Elan which helped me visualise the segmentation, annotation and transcription of classroom observation data (see Appendix C3: Segmentation, annotation and transcription of SC1SCO1 (Sample), p. 287), and later I changed it into word document for coding in NVivo. The multimodal coding in Elan approximately took 288 hours as it involved segmenting the sessions into different sequences, transcribing the sequences that included use of technology and annotating them.

Focus groups and interviews

The focus group discussions and interviews which had been conducted in Nepali were transcribed manually by the researcher. It took approximately 64 hours to transcribe nearly 11.5 hours of recordings. First, the focus group discussions and interviews were uploaded in Audacity to listen to the chosen segment of the recordings repeatedly during transcribing. Then, those handwritten transcriptions were typed using Devanagari script. The focus group discussions and interviews conducted in English were transcribed using 'dictate' in Microsoft Word for Mac Version 16.59. As the product of auto-transcription needed thorough editing, the researcher went through the transcription produced by 'dictate' and edited as required. The auto-transcribing and editing the auto transcription nearly took 12 hours. The following was the transcription convention used for this study.

Some transcription conventions used in the transcriptions:
(xxx)   : unable to transcribe
(2.0)   : pause of 2 seconds
(3.0)   : pause of 3 seconds
-         : abrupt cut off
( )   : descriptions of actions
=   : latched utterance
 (Source: Richards, 2003)

I used the selected conventions of Richards (2003) as these are basic ones (some noticeable basic conversational features) which are adequate to guide the transcribing of focus group discussions and interviews, and also my purpose is to carry out thematic analysis. While transcribing, the message was given importance, and the effort was made to rightly represent the message rather than factoring in other conversational features as this study does not engage on detailed conversational analysis.

For interviewee transcripts review, five sample transcripts, two in Nepali and three typed in English were sent to the interviewees to review to test the validity of the transcription. The selected transcripts represent diverse participants including a teacher, a teacher trainer, a

school manager, a parent and a policy maker. None of the participants indicated a need for any changes.

First the word files of the recordings of focus group discussions, interviews and classroom observation data were uploaded in the NVivo tool for the analysis. Since the Devanagari script that Nepali is based on for the orthographical form is not compatible with the NVivo tool for data processing, the interview data that had Devanagari script was converted into Unicode and uploaded as a word file having Unicode in NVivo. The interviews which were conducted in Nepali were coded without translating them into English; however, the codes were in English (See Appendix D: Sample coding of classroom observations, focus groups and interviews, p. 303). After coding, the excerpts of interview and focus group discussion which were in Nepali were translated into English by the author. While translating the author tried to remain close to the original.

Coding Scheme

The data was codified both deductively and inductively. I used the activity theoretical lens of affordances to analyse the affordances of ICT in relation to its use in secondary level classrooms. For this, the coding scheme was developed based on Engeström's activity theory (1999), (2001a) and the types of affordances (educational and technological) proposed by Kirschner et al. (2004) (Section 2.2.2, p. 22) and I revised the coding schemes as per the themes identified in the data (Table 4.7).

Table 4.7 Final coding scheme

S. No.	Categories	Codes
1.	Sequences	greetings and socializing, preparing to begin a lesson, warm-up exercises, addressing a pupil's question, discussing how to use technological tools, discussing previous lessons, eliciting learners' responses, giving feedback, introduction to a new topic, giving tasks based on the content or topic of the lesson, teacher's presentation
2.	Actions	asking pupils to read, asking pupil or pupils questions, briefly revising lessons taught the day before, checking if the content presented legible or could be seen by pupils, discussing technological issues, discussion on the topic,

S. No.	Categories	Codes
		explaining rubrics or giving instructions, explanation of lesson related terms and or concepts, following up how pupils are doing tasks, giving feedback on pupil's work, giving tasks to pupils, introducing a topic, observing pupils doing exercises, playing audio recording, playing videos, preparing to set up technology, reading out pupils' answers, reading the text given in a book, sharing a screen, taking attendance, tracking time for pupils' task completion using chats, using pictures, using PowerPoint presentations, waiting for pupils to join
3.	Mediating tools and artefacts	book, content in a table, marker, myth related to Teej, poem, tasks, technological artefacts and tools used by a teacher, texts on a board, teachers' digital skills
4.	Rules	assessment system, institutional rules, rules set by a teacher

5.	Affordances of using ICT for teaching and learning	Educational affordances
		  bringing a variety to a lesson delivery, clarifying terms and concepts, engaging learners in the tasks
		Technological affordances
		  changing meeting background, conducting test in MS Teams, directing learners to the figures or texts while screensharing, sharing a screen, showing answers in Mentimeter, tracking time in Mentimeter, using chat option, zooming the text

6.	Contradictions	power cuts, poor internet connection, limited digital skills of teachers, lack of learners' engagement, institutional and classroom rules

4.3.3   Data analysis and interpretation

At first, the policy documents that were created by different stakeholders to address educational issues during crisis situations in Nepal were analysed and how those policy documents were implemented during crises was discussed further. Also, the guidelines and artefacts created by participating institutions were analysed and the focus group discussion and interview data were used to explain pandemic educational practices.

The teaching activity which incorporated teaching science and English was defined as a primary unit of analysis. At first, in NVivo, I created the classifications of data such as interviews, focus groups and classroom observations. Further, I added attributes namely 'region', 'mode of delivery', 'type of school' and 'discipline' to each session recording. I defined each attribute with some binary values such as 'urban' and 'semi urban' for 'region', 'onsite' and 'online' for 'mode of delivery', 'private' and 'public' for 'type of school' and 'English' and 'science' for 'discipline'. I coded interview and focus group data according to the coding scheme, and six broader categories were derived namely sequences, actions, mediating tools

and artefacts, rules, division of labour, contradictions and affordances (Table 4.7). Division of labour relates to roles of and power relationship between community members, such as they have either vertical or horizontal relationship when they are engaged in an activity (Section 3.1). For instance, the horizontal relationship between pupils is seen during instruction when pupils cooperate with each other, whereas the vertical relationship is seen between a teacher and pupils as pupils answer the questions when pupils are asked by calling out their names by their teacher.

After coding, I ran matrix coding query and crosstab in NVivo. Cross tab helped me gain the comparative data of each code based on the selection of attributes and values, and the matrix coding query produced the matrix (for example, number of occurrences) of each code. I merged the findings populated by cross tabulation and matrix coding query to present the tables in the discussion of findings.

ICT use during the pandemic was discussed comprehensively taking account of sequences and actions, mediating tools and artefacts, rules and division of labour in online and onsite classes and also taking account of discipline and type of schools.

To identify contradictions, only the online sessions were analysed as it was very difficult to notice contradictions in the recordings of onsite classes due to poor quality of recordings (Section 4.3.1, p. 79). The emerging contradictions in online English and science activity systems were investigated very carefully and while doing so, contradictions were categorised under five themes viz., power cuts, poor internet connection, limited digital skills of teachers, lack of learners' engagement, and institutional and classroom rules. Some of these contradictions led to new initiatives which enabled the researcher to identify affordances that were realised in teaching and learning. Affordances are discussed under two broad headings - i) technological affordances and ii) educational affordances.

For interpreting, I used Engeström's interacting activity systems and the triangles that helped to present the findings graphically as well as interpret them taking each node into account. I have factored in teaching activity system as the primary activity system in which English and science teachers are subjects and learning activity system, management activity system and policy making activity system as interacting activity systems. Thus, while analysing data, I have focused on teachers' activity.

It is important to investigate activity by decomposing them into smaller units to get a complete picture of how ICT was used during the pandemic. Thus, the micro level analysis focusing on sequences and actions helped to zoom in on each individual session (See Chapter 6). The analysis was primarily based on classroom observation data, and the focus group discussion and interview data fleshed out the findings.

4.4   Summary and conclusion

This chapter outlines the settings and participants in this study, and discusses the methods used to carry out this research. The locations chosen were urban and semi-urban contexts in Nepal from which each three public and private schools were selected. Teachers, pupils, parents, educational managers, teacher trainers and policy makers were the research participants and individual interviews, focus group discussions and classroom observations were the research instruments used in this study. Elan was used to segment, annotate and transcribe the classroom observation data. The final output was prepared in an excel spreadsheet and NVivo was used for coding both the Elan output and the interview data. I created codes guided by activity theory and by a taxonomy of affordances. Some new emerging codes were also identified. The codes were later merged based on the common patterns, and six broader categories were created, which were interpreted through an activity theoretical lens. In the upcoming chapter, I will analyse the policies that were developed to

address educational disruption during the crises, especially during the pandemic, and how they

were implemented then in Nepal.

Chapter 5 Nepalese educational policies for crisis situations and their implementation

The previous chapter outlined research contexts of the study and the methods this study followed. This chapter in the first half describes ICT in education policies that have been enacted to date in Nepal, and the educational policies that were developed and implemented during the crisis situations that occurred in Nepal between 1996 and 2021. In the second half of this chapter, the educational practices that emerged during the pandemic are discussed based on focus groups and interviews gathered for the purpose of this research.

5.1   ICT in Education Policies in Nepal

Education policies and plans in Nepal such as, the Information and Communication Technology (ICT) in Education Master Plan (2013-2017), School Sector Development Plan (SSDP) 2016/17-2022/23, and National Education Policy 2019 among others have stressed the importance of integrating technology in education. During the implementation of Education for All (EFA) (2004 -2009), the Department of Education[5] developed a program for ICT support (basically to build infrastructure) through a scheme whereby the government provided 60 percent of funding required for a project where a school could provide the remaining 40 percent (Dhital, 2018). The recent SSDP 2016/17-2022/23 prioritises the use of technology in education as it aims to provide pupils with ICT skills (GoN, MoE, 2016). The Nepal Education Policy (2019) also stresses the digitization of Science, Technology Engineering and Mathematics (STEM) curricula, textbooks and teaching and learning content and it plans to develop ICT infrastructures in schools (GoN, MoEST, 2019). It also aims to develop digital tools that support teaching and learning and enhance the capacity of teachers to use digital technology. The most intensive ICT related policy in education in Nepal so far is the ICT in Education Master Plan (2013-2017) which focused on primarily four different components: 1. development of ICT infrastructure 2.

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[5] The Department of Education is now called Center for Education and Human Resource Development (CEHRD) which is under the Ministry of education in Nepal.

development of human resources. 3. development of digital learning materials and 4. enhancement of the education system (GoN, MoE, 2013).

The following table (Table 5.1) shows the strategies of ICT in Education Masterplan (2013-2017) and SSDP 2016/17-2022/23 that are related to the integration of technology in education in Nepal.

Table 5.1 Core strategies in the ICT Masterplan in Education (2013-2017) and the SSDP 2016/17 - 2022/23

ICT Masterplan in Education (2013-2017)	SSDP 2016/17-2022/23
Promoting and acknowledging user-created innovative contents;	Developing portals and websites including e-libraries;
Creating environment to use open source materials through the use of ICT to make learning horizon of the learners wider;	Developing online and offline training courses and materials (focusing on science, maths and English);
Establishing linkage with a Government Integrated Data Centre (GIDC) for wider access to digital content;	Preparing ICT teaching and learning materials, initially for science, maths and English; and
Establishing a network among the global educational institutions for easy access to the digital contents/resources; and	Developing and distributing subject-wise e-learning resources for students and teachers and establish a repository of them.
Encouraging teachers/learners to create and exchange their contents innovatively.	

The above table (Table 5.1) displays some congruence between the objectives and strategies in the ICT in education policies. The policies aim to promote user-created innovative contents, develop learning portals, develop online and offline tranining courses, build networks with educational institutions for easy access to digital content which all mean to assist teaching learning process through the use of digital materials. Although the objective and strategies are precise, studies (Koirala et al., 2016) show that the degree to which the outcomes have been achieved is still questionable, as teachers, the primary stakeholders of education, have not

been able to use technology effectively due to teachers' limited knowledge on using digital resources and limited provision of teacher training (Laudari & Maher, 2019; Rana et al., 2022).

As a part of SSDP, the GoN has supported selected schools to build ICT infrastructure under a Model School Program that began in 2016, and the aim of the Model school program is to improve learning outcomes in science, maths and English subjects, especially at secondary level, and the GoN intends to upgrade at least one secondary school in each of Nepal's municipalities (Asian Development Bank, 2022). The schools were selected on the basis of "(a) geographical and demographical spread, (b) size of school-going population in catchment areas, (c) electricity and internet accessibility, and (d) educational achievements of the school" (GoN, MoE, 2016, p. 112). There are schools not selected by the GoN for the programs listed above who have nonetheless managed to obtain ICT resources. In such schools, a school head or a schoolteacher networks with potential local, national and international funders to obtain funding to build ICT capacity.

5.2   Crises and impact on education

Nepal is one of the high-risk countries in the world for continuously occurring natural hazards, including earthquakes, floods, landslides, fires and drought (Government of Nepal, 2018; United Nations Nepal, 2022). In the last 25 years or so, Nepal had to face several crises, which greatly impacted education among other sectors. During the civil war (1996-2006) that took place between the then government and Maoist rebels, over 13,000 people were dead, 1,300 were missing and some teachers were brutally killed during the war (United Nations Office of the High Commissioner for Human Rights, 2012). The Maoists rebels would call for occasional strikes that would bring all educational institutions to closure. On the other side, Nepal army personnel would enter the school buildings in the name of providing security and look into the classroom while a teacher was teaching (Pherali, 2011). During the civil war, schools were closed for months at a stretch (Mishra, 2021). However, during those days, teaching and

learning were never continued using online or other alternative modes. Valente (2014) investigated the impact of being exposed to the Maoist insurgency at a young age on education outcomes, and her study reveals that despite the intense armed conflicts, the completion rate of primary school was high in Nepal whereas the abductions of civilians especially school children by insurgents adversely affected the girls' school attainment but not of boys. This quantitative study reveals the percentage of primary school completion, but not of other levels during the time of Maoist insurgency. The study only shows the quantitative aspect i.e., the number of girl's school attainment, however. The quality of education during that time was not explored.

The 7.8 magnitude earthquake and aftershocks in 2015 also led to the closure of the schools nearly for a month. The earthquakes and aftershocks destroyed 33,000 classrooms in 7,923 public schools in 32 districts across the country and 370 such schools were merged as there were not enough pupils, and as of January 2020, 4,476 school buildings had been rebuilt and 1,772 buildings were under construction (R. K. Karki, 2020). During the post-quake period, schools resumed teaching and learning by building temporary classrooms. The 2015 earthquake resulted in large-scale disruptions to education, with no teaching alternatives put in place.

More recently, during the COVID-19 pandemic, over nine million children were affected by school closures from 24 March 2020 onwards (Dawadi et al., 2020). In Nepal, by June 11, 2022, 979,242 positive cases of Coronavirus had been reported (Worldometer, 2022) and schools were closed for 82 weeks (UNESCO, 2022). On March 3, 2020, as a response to the need to manage education during the pandemic, the MoEST, GoN, issued a brief notice asking schools to conduct all the year-end examinations in March, the final month of the academic year in Nepal. On March 24, 2020, as the second COVID case was identified in Nepal, the GoN announced a nation-wide lockdown (CEHRD, 2020a) and the schools were completely closed

without any indication in relation to measures for continuing education. The initial plan was to close the educational institutions until April 27, 2020, but as the COVID-19 situation worsened, schools remained closed until November 4, 2020, i.e., for about 8 months. Only 48 percent of public schools and 80 percent of private schools conducted online sessions to engage students in learning (Rai, 2020). Of the approximately nine million children who were affected by school closures in Nepal during the pandemic, 1,093,394 had internet access, 3,958,270 had access to other media, 2,357,959 had no access to media and 995,090 individual pupils were classified as 'at risk' (CEHRD, 2020a). Pupils classified as at risk are children with disabilities or children from poor or marginalised communities who are at high risk of discontinuing their education and require tailored packages.

In the past, Nepal has undergone several crises at different times. In the former days, GoN did not have specific policies to manage disruptions brought to education owing to crises. However, during the pandemic, GoN acted very logically in developing some policies to address educational disruptions. The following section explicates educational policies developed to respond to crisis contexts in Nepal.

5.3   Educational policies in response to crises

In the course of responding to major crises in Nepal, the comprehensive educational policies were produced only during the pandemic. During the civil war, there was no educational policy or measures formed by the then government to address such crises in education. Likewise, no policy was developed to guide the educational disruption caused by April 2015 earthquake. However, the framework, such as National Disaster Response Framework, 2013 existed before the earthquake that serves as a key guideline for disaster response endorsed by the government of Nepal. This framework states that in case of disasters, electricity services, water supply, sanitation and hygiene facilities will be provided within 48 to 72 hours and the Ministry of Home Affairs should do a rapid assessment of schools within the same time frame.

It also sets out a plan to restart schools to help children feel secure and return to normal life within two weeks' to one month's duration. Nonetheless having investigated the situation of the earthquake, as many school buildings in the earthquake-hit areas were destroyed, it took over one month for schools to reopen. There is almost no mention of how education will be managed during the emergencies in the *National Policy for Disaster Risk Reduction, 2018*. *Nepal Education Policy (2019)* also mentions briefly how educational issues will be addressed during crises, and it intends to run programs to orient teachers and pupils towards disaster management, environmental conservation etc. and create a favourable environment during disasters by ensuring basic amenities when schools need to be shifted to a different area. These education and disaster risk reduction policies developed in the past years reveal the fact that there was very little concern over addressing the educational issues during crises.

5.4 Educational policies during COVID-19 Pandemic

In response to COVID-19 pandemic, the educational bodies of the Government of Nepal developed a series of policy documents that helped to address the educational crises in Nepal. *The Emergency Action Plan for School Education 2020* (GoN, MoEST, 2020a) developed to address the educational disruption, lists actions and processes to manage such disruption, timelines and the implementers as well as supports to carry out those actions. One of the strongest aspects of this action plan is that it divided the pupils into five different categories: pupils having no access to any resources; pupils having access to a radio/FM; pupils having access to a television; pupils having access to computers but no Internet connection; and pupils having access to all of the above. Having divided pupils into these five categories, the pupils were expected to be supported by schools by providing possible assistance to continue learning during the pandemic. However, the division of pupils in these categories during the pandemic was not a very easy task as in many schools, the readymade data was not available then. And collecting data during the pandemic was not feasible during COVID-19 crisis

situations as the pupils had travelled to their hometowns (to their own districts) due to indefinite school closure.

The *Emergency Action Plan for School Education 2020* set the tasks to distribute textbooks to the pupils, develop self-learning materials that align with school curricula and implement home schooling. Online learning that a school could facilitate was only briefly mentioned without amply dealing with online teaching and learning. This plan also suggested the establishment of a temporary learning facilitation centre, managed by local educational bodies and schools to facilitate the learning of those pupils who are out of school, and convert them into free Wi-Fi zones. The actions delineated in this plan are vague, and they lack clear explanations. Some actions are very ambitious such as making mobile data free while operating the first-ever learning portal created by the Center for Human Resources and Educational Development (CEHRD). As there was no clear indication of how mobile data would be made freely available, it was a very broad statement just phrased to indicate that it attempted to address some of the pertinent issues of learners. However, this action plan provided a background for a relatively comprehensive set of guidelines called *'Student Learning Facilitation Guidelines 2020'* to facilitate student learning.

Student Learning Facilitation Guidelines 2020 is one of the crucial sets of guidelines that aimed at helping educational stakeholders to minimise educational disruption during the pandemic (GoN, MoEST, 2020c). These guidelines also categorised pupils into same five categories, as was done in the *Emergency Action Plan for School Education 2020.* The roles of different stakeholders such as the CEHRD, Curriculum Development Centre (CDC), municipalities and rural municipalities, schools and parents to facilitate pupils' learning were specified. Another strength is that these guideline factor in a way of facilitation for the differently abled children. In addition, the guidelines aimed to involve a head teacher to provide data related to their school's pupils into the Integrated Educational Management Information System (IEMIS) so

that this would potentially help future policymakers to develop any plans and polices based on the available data. *Student Learning Facilitation Guidelines 2020* recommended to institutions the adoption of online teaching by targeting the students who have access to internet. The guidelines also suggested to develop a mobile application where all curriculums, textbooks and teaching materials approved by Curriculum Development Center (CDC) would be uploaded. The mobile application, eClass Nepal was developed for the android phones from CEHRD and some contents were uploaded there.

Probably for the first time in the history of education in Nepal, *Student Learning Facilitation Guidelines 2020* and *Emergency Action Plan for School Education 2020* also validated home schooling. The *guidelines* delineated some roles of parents to assist their children's day-to-day learning. Another beneficial aspect of the guidelines is that instead of focusing on rigid educational regulations as practised in the past, the guidelines aimed at helping pupils achieve their learning goals during the pandemic. Thus, the teacher was not bound to complete a structured course but could instead adjust the syllabus and curriculum as per needs and practicalities of the pupils. The guidelines continue to recommend creating the learning centres in the community that will be facilitated by volunteers or teachers.

Like the former action plan, the guidelines also have a lot of concerns. For instance, the guidelines might escalate the existing digital divide, as they advocate for the provision that a pupil having access to more than one program could choose the programs of their choice. In that case, a pupil who is digitally resourced can access multiple resources, such as resources available on the internet or disseminated via television and radio etc., and digitally under-resourced pupils can have only limited access to resources. Likewise, the suggestion to create the resources in a local language, although pleasant to hear, is a question since the guidelines did not delineate the nature of plan or processes of creating resources in a local language. Another concern is related to the plan to make a provision for teachers to access resources

from the sites such as www.learning.cehrd.edu.np (Center for Education and Human Resource Development Learning Protal), www.youtube.com/ncedvirtual (NCED Virtual) and www.moecdc.gov.np (MoEST, Curriculum Development Centre). Nevertheless, the question is to what extent teachers were engaged in developing content for a learning portal. The next concern is related to the provision the guidelines have made for uploading the contents produced at local levels to the sites created by a school or local level. Having done so, their contributions will be limited to a local level even though some of their contributions can potentially impact at the national level.

Preparations for reopening schools

As the number of COVID positive cases began to fall in Nepal in November 2020, MoEST planned to run onsite classes, consequently they developed the *Framework for School Operation 2020* (GoN, MoEST, 2020b). The *Framework for School Operation, 2020* developed by the GoN, MoEST presented a basis on which schools could resume after closure due to the pandemic. It listed the preparation strategies that an institution should adopt prior to reopening schools such as disinfecting the schools used for quarantine, arranging help-desks and, consulting with local authorities (parents and the members of children's clubs) with regard to the possibility of reopening schools. It also provided authority to local bodies that includes municipalities or rural municipalities, children's clubs, parents and schools to decide the timeframe for the reopening of a school. The framework stated that based on the risk of COVID-19 expansion, available physical resources and pupils' number in a school, the local bodies help implement one of the following alternatives: running all the classes at once; running classes in different shifts; running classes for a shorter length of time; running classes on alternate days; and running classes with subgroups of pupils from the same class. The provision outlined in the framework ensured multiple alternatives for educational institutions for school reopening so that they could decide the school reopening model based on the

situation of their local context. It also stressed the role of a school management committee to assist learners to make them mentally prepared to join the school; nevertheless, it remained silent regarding how a school management committee could assist the children to prepare them to join schools. Either the framework should have indicated explicitly these procedural steps, or it should have indicated the documents that could allude to this aspect.

5.5 Implementation of policies

The education policies developed in response to the crises in Nepal that preceded the COVID-19 pandemic were general in nature. The first set of crises-related educational guidelines and policies to give reasonably precise direction to schools on how education was to continue were those produced in response to the recent pandemic. This section considers the measures implemented by schools in Nepal during the COVID-19 pandemic in line with these policies also the data gathered from the schools and participants the researcher has worked with will be brought in as evidence.

Some initiatives were driven by the educational policies, such as the creation of a Learning Portal (https://learning.cehrd.edu.np/) by CEHRD and circulation of Procedures for Communication Networking in Schools (CEHRD, 2020b) to establish a closer user group via communication networking for teaching and learning purposes among others. To date the learning portal is used primarily as a repository of readymade e-materials produced centrally.

The schools were allowed to reopen on the 5th November 2020, guided by the *School Operation Framework, 2020*, that gave authority to 753 local governments to decide to open the schools (Mishra, 2021). Since many schools could not manage the logistics as delineated in the Framework, the majority of schools remained closed until February 2021. Some schools, predominantly private ones, who estimated that their learners could join online classes, continued their teaching and learning in online mode after a couple of months of lockdown.

Some public schools also restarted teaching and learning gradually. During the period of the pandemic, these schools conducted online teaching with whatever resources available to them in their own local settings.

Alongside educational disruption brought by COVID-19 in Nepal, the COVID-19 crisis also witnessed the emergence of new and alternative educational modalities to address pertinent educational issues. Some of the noticeable educational practices that the participants of this study revealed are Tole education, education through radio and television, Online teaching and learning and online exams which are discussed below.

5.5.1   Tole education

In Nepal, World Education, a non-profit international non-governmental organization introduced the concept of Tole Shikshya (Tole Education), a community learning initiative (World Education, 2022). Tole is a specifically designated area within a ward which is the smallest administrative region in Nepal. World Education (2022) defines Tole Education as "a neighbourhood-based approach that gathers children in a central location and holds regular learning sessions where pre-primary through grade 3 pupils gather in small groups." Prior to the pandemic, Tole education was in use to address the needs of those out of school children who were facilitated by trained community volunteers and older pupils; however, during the pandemic, it was expanded further and adopted beyond the 3rd class and was facilitated by schoolteachers.

Tole Education was practised by schools customising it as per the school's own local context (see Figure 5.1). This approach was intended to engage learners in their study. For example, SC6 from semi-urban area ran Tole Education at their own school instead of sending their teachers to a designated location to assist pupils. To this end, they classified the pupils based on the Toles and taught them creating different pods (classes) at the school. Having done so,

pupils of SC6 belonging to one area would not have chance to have contact with the pupils of another area which could mitigate the chance of getting COVID (in case anyone is positive) transferred from pupils of one area to the pupils of other areas. They circulated a very comprehensive notice with all details such as how the classes will be conducted, why the classes will be conducted, and the timing of such classes. The regular time was changed, and they began a class from 6:30 in the morning to 7 pm in the evening having a break during the afternoon. They also had some objectives to run such classes. Indeed, they made these classes to supplement to what they learnt through radio and TV which started to air and telecast some sessions as the Government of Nepal took this step. They also stated that this class was also to make them feel that they were promoted to a different level as the pupils never got an opportunity to be in a different class ever onsite ever since they were promoted from their earlier years.

Figure 5.1 A notice regarding Tole education sent to the parents by SC6

आदरणीय अभिभावक ज्यू
नमस्कार

मिति-२०७७/०२/३२

विषय: टोल शिक्षा कक्षा सञ्चालन सम्बन्धमा ।

उपरोक्त सम्बन्धमा कोरोना महामारीका कारण नेपाल लगायत पुरै विश्व प्रभावित भइरहेको यहाँहरुलाई अवगतै छ । नेपाल सरकारले पछिल्लो दिनमा लकडाउनको मोटालिटी परिवर्तन गर्दैछ । तैपनि शिक्षण संस्थाहरु निर्बाद रुपमा सुचारुहरु हुन अझै महिनौ दिन लाग्ने देखिन्छ । निश्चित रुपमा स्वस्थ, शिक्षा भन्दा भहत्वपूर्ण कुरा हो कोरोनासँग कसरी बच्चे बचाउने हामी सबैको पहिलो जिम्मेवारी हो । कोरोना सँग बच्चै पठनपाठनका गतिबिधीलाई अघि बढाउने हाम्रो कर्तव्य पनि हो । On line प्रविधि बाट पठनपाठन गर्ने कार्य वैज्ञानिक र जोखिम शुन्य भएता पनि हाम्रो परिवेश र हामा अभिभावकहरुको पहुँच नभएका कारण सम्भव भएन । कक्षाकोठामा गरिने face to face सिकाइ जति प्रभावकारी अन्य विधी देखिएन । यसरी एकातिर कोरोनाबाट बच्नु पर्ने चुनौती छ भने अर्कोतिर बाबुनानीहरुले अहिले सम्म सिकेका कुरा पनि बिर्संदै जाने, पढ्ने बानीको विकास हराउँदै जाने कुलतमा फर्ने कुराले अभिभावकहरु चिन्तित भएको देखियो । यस परिप्रेक्षमा नेपाल सरकारले TV, Radio बाट केहि बिषयहरुको पठनपाठन शुरु गर्ने र यस्को सहजीकरण टोल टोलमा शिक्षकहरु गई गराउने निर्णय भए अनुसार यस विद्यालयले पनि यही असार ३ गतेबाट कक्षा २ देखि १० सम्म अध्ययन गर्ने बाबुनानीहरुलाई देहाय बमोजिमको समयमा, टोल निर्धारण गरि पठनपाठन अघि बढाउने निर्णय गरिएको जानकारी गराउछु ।
बिभिन्न टोल टोलमा शिक्षकहरु आफै गई पठनपाठन सञ्चालन गर्दा विद्यार्थीहरु बस्ने भवन, घर, फर्निचर आदिको उपलब्धता सहज रुपमा नपाइने भएकोले यसको सट्टामा हरेक टोलका विद्यार्थीहरु फरक फरक समयमा विद्यालय भित्रै भिन्न भिन्न कोठामा राखी निजहरुको सम्पर्क आउने अबसरै नदिने कोरोना जोखिमबाट बच्ने उपायहरु जस्तै साबुन पानीले हात धुने, Mask प्रयोग गर्ने र Distance कायम गरी पठनपाठन गर्दा प्रभावकारी हुने ठानी सोहि निर्णय गरिएको व्यहोरा अनुरोध गर्दछु । कक्षा नर्सरी देखि १ कक्षा सम्म अध्ययन गर्ने बाल बालिकाहरुलाई घरमा नै प्रायः सबै अभिभावकले गाइड गर्न सक्ने र निजहरुलाई हाम्रा शिक्षकद्वारा समय समयमा फोन सम्पर्क गरी पढाइमा अभिप्रेरित गर्ने कुराको जानकारी गराउन चाहन्छु ।

उद्देश्य

१) दिन भरीमा कम्तिमा ३,४ घण्टा पढाइ सिकाईमा केन्द्रित गराउने
२) TV, Mobile को अति प्रयोगबाट उत्पन्न नकरात्मक लतबाट बिमुख बनाउने ।
३) उपल्लो कक्षामा उत्तीर्ण भइ गए पनि सिकाइको शुरुबात नहुदा विद्यार्थीहरुमा कक्षा चढेको अनुभुत नै नभएकाले सो अनुभुत गराउने ।
४) नयाँ किताव किनी रुटिन बनाई पढ्ने र लेख्ने बानीको विकास गराउने ।

रुटिन

क्र.स.	टोलको नाम	समय	
१	हस्पिटल टोल	०६:३० – ०८:३०	(बिहान)
२	बजार टोल	०७:०० – ०९:००	(बिहान)
३	अर्थली टोल	०७ : ३० – ०९: ३०	(बिहान)
४	पुरानो बोर्डिंङ तथा फिल्महल टोल	०४: ३० – ०६:३०	(बेलुका)
५	रानीकुवा टोल	०५:०० – ०७ ००	(बेलुका)
६	भकुण्डे टोल	०७:०० – ०९: ००	(बिहान)

Translation of the contents of Figure 5.1

Date: 14 June, 2020[6]

Dear Parents
Namaste!

Re.: About running Tole education

You are aware of the fact that the whole world including Nepal is being impacted by COVID-19 pandemic. The Government of Nepal has lately changing the modality of lockdown. However, it seems that it will take long time to resume schools. It is obvious that health is important compared to education, and being safe and making others safe from COVID-19 is our first responsibility. It is also our duty to continue teaching and learning being safe from COVID-19. Despite the fact that online education is scientific and appropriate during a disaster period, we cannot adopt online education because of our current circumstances and also the fact that our parents cannot access it. No other methods are seen effective compared to an onsite teaching. On one hand, we are facing a challenge to be safe from COVID, and on the other hand, it is

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[6] All the data in italics is the translation of the original from the researcher.

seen that parents are worried as their children can forget what they have learnt till date, or their habit of learning will be deteriorated, and they might get engaged in notorious activities. At this backdrop, as the government of Nepal has decided to start classes of some subjects from TV and radio, and for the facilitation of these classes, the teachers would visit the Toles, I would like to inform you that we would also start Tole education based on the schedule given below.

As there is no easy access to buildings and desks and benches in Toles, instead of sending teachers to different Toles, we have decided to bring pupils based on their Toles in different shifts in the schools and teach them keeping in separate classrooms, and also for this, we will ensure that the pupils of each Tole will not contact with the pupils of other Toles and also they will wash their hands with a soap, use masks and will maintain distance during teaching and learning. For the children of classes nursery to 1, the parents can guide their children at home and our teachers will encourage them by calling them over phone occasionally.

Objectives:
1. To make children concentrate on learning for three to four hours a day;
2. To prevent children from overusing television and mobile devices;
3. To make them feel that they are promoted to a different class as they have not felt that they are promoted to a different class even though they are; and
4. To make them read and write based on the routine by buying a new textbook.
Routine

S. No.	Name of Toles	Time
1	... Tole	06:30 to 08:30 (morning)
2	...Tole	07:00 to 09:00 (morning)
3	... Tole	07:30 to 09:30 (morning)
4	... Tole	04:30 to 06:30 (evening)
5	... Tole	05:00 to 07:00 (evening)
6	... Tole	07:00 to 09:00 (evening)

(Translated by the researcher)

SC6 continued Tole education only for a week. As COVID cases increased, they had to halt Tole education and shift to online education which contradicted SC6's own rational of running Tole education as it had stated in the notice earlier. In the notice, SC6 stated that it began Tole Education as parents had a difficulty to make learners access online education but as COVID positive cases rose, SC6 quickly changed its plan. One of the pupils, S6 from SC6 elaborated this in a focus group discussion (Excerpt 5.1).

Excerpt 5.1: Student Focus Group Discussion 1 (SFGD 1)

```
S6: ... Umm... in our school, we had Tole education for a week.
The class was run on the basis of Toles. It was done to ensure
that the pupils of one area do not meet the pupils of other
```

```
areas... But it was also practiced for a limited time. Once the
positive case increased, later the teaching learning was shifted
to online classes. For online classes, some teachers who did not
have internet connection at home came to school, went inside the
classroom and started teaching (xxx) and we would attend from our
home...
```
(Translated by the author)

Out of six schools, only SC6 adopted Tole education. The other public school, SC5 from the

semi-urban location, Lamjung which could not run online classes helped learners in a slightly

different way relatively similar to Tole Education. Teachers of SC5 travelled to a village once a

week and met pupils at a particular location such as a community building (Excerpt 5.2). They

collected homework from there. Each student got 10 to 15 minutes time to interact with a

teacher. This practice continued for three to four months.

Excerpt 5.2: Student Focus Group Discussion 2 (SFGD 2)

```
I:      Umm, how long did you have to travel to meet your teacher
        and to submit your homework to them?
S11:    My teachers would come to the village. I mean they would
        come below my house by motorbike. They would come at the
        community building. It didn't take me long to reach there
        ...
        We had no contact with teachers [in the beginning], and
        there was limited time. Teachers would come to the village
        for a limited time, and we did not get sufficient time to
        understand.
I:      When you said limited time, for how long did teachers use
        to come there?
S11:    I mean, they would come there for one or two hours.
I:      Oh, in that period, a teacher had to interact with all! And
        how much time would you get from your teacher? For example,
        you as a student, how much time did you get from your
        teacher - five minutes or two minutes or three minutes?
        Approximately 10 minutes?
S11:    10 to 15 minutes.
```
(Translated by the author)

SC5 had also given an opportunity for the pupils to drop their homework at their school so that

they could drop their work the week earlier and collect it from their schools the following

week. SC5 was engaging pupils in learning by making them do some tasks. Even though Tole

education seemed to be one of the good options to reach out to those children who were

without access to any resources or the ones with access to a radio/FM and/or a television, out

of six schools, only these two schools have found to have adopted it for a very limited period of time.

5.5.2   Education through radio and television

The pupils of SC5 and SC6 reported that they used television to continue their learning during the pandemic. No pupils stated their engagement in learning using radio, which is another telecommunication technologies equally popular in developing countries. Damani et al. (2021) found that radio appeared to be the most beneficial educational technology for academic learning during the pandemic in one of the developing countries, Uganda; however, they did not report about learning through television as they were investigating engagement of pupils in rural and low-income communities. One of the pupils, S6 stated that she would watch the lessons delivered in the television daily even though it started quite late during the pandemic (Excerpt 5.3).

Excerpt 5.3: Student Focus Group Discussion 1 (SFGD1)

```
S6:     ...The government of Nepal had televised classes. They did
        it after the pandemic started. I would attend these classes
        daily. As a pupil of year 10 [who should prepare to appear
        in the School Education Examinations (SEE)], I was quite
        worried. My concern was whether exams would happen on time
        and whether a teacher could complete entire syllabus. What
        I did is I searched the recorded classes of science in
        YouTube as science is the difficult subject for us as well
        as of other difficult subjects and also asked questions to
        the teachers whom I had a contact with.
(Translated by the researcher)
```

S6 would also search for the recorded classes in YouTube. In this case, she could doubly benefit as she had access to both types of resources -- online resources and resources which are televised by TV channels. Since S6 was from a private school in semiurban area, her family could support her to access online learning resources as they could afford to purchase broadband Internet.

In the Excerpt 5.4, another student, S11 from SC5 also talked about financial hardship that she underwent as a result, she could not use mobile data for learning as she wanted during lockdown. However, as S11 knew the timetable of TV broadcasts, she would watch them in a regular way, and was engaged in her study. Because the multiple channels would broadcast sessions based on each class, she could watch those sessions in different channels (Excerpt 5.4).

Excerpt 5.4: Student Focus Group Discussion 2 (SFGD2)

```
S11:    These days I do take help of books but during lockdown, I
        would use mobile data.
I:      Okay. During lockdown, you used data. How long did you use
        data during lockdown?
S11:    I did not use much. We had financial problem; therefore, I
        did not use even for a month.
I:      Oh, you did not use even for a month. How far did radio and
        TV support you for your learning? What TV channels did you
        watch? I am asking this question again.
S11:    Umm, NTV, Himalayan (xxx) ...
I:      Did you use to watch regularly?
S11:    I would know the schedule of broadcasting time so I would
        watch during those times.
I:      And how did you know their schedule?
S11:    At first, I would listen [watch] to it daily; therefore
        [that's how] I would know the time (xxx)
(Translated by the researcher)
```

It reveals that pupils also followed televised programs to continue their learning. No pupils reported that they followed radio programs that were aired locally or from the centre. Out of twelve pupils who took part in focus groups, only two pupils reported that they watched television to continue their learning.

5.5.3 Online teaching and learning

Running online sessions was a very sudden response to educational crisis as teachers were not well prepared for it. Out of six schools, five schools selected running online sessions to minimise the disruption in teaching and learning during the pandemic. Most of the teachers ran online sessions like physical classes. The following focus group excerpts of pupils (5.5 &

5.6) and a teacher (5.7) disclose how teachers would teach them during the pandemic using online mode.

Excerpt 5.5: Students Focus Group Discussion 1 (SFGD1)

> S6:   ... In online classes as well, they would teach like in physical class for example, when they would write on the board, they would ask a question to a pupil. They would ask to unmute microphone and ask the formula or meanings of Nepali [words]. They did this way too. I found that it became effective.
> **(Translated by the researcher)**

Excerpt 5.6: Students Focus Group Discussion 2 (SFGD2)

> S7:   During the lockdown, the teachers of mathematics and science would go to the classroom, write on the white board and show them (the texts written on the white board) by turning on the device camera.
> I: Okay. Oh my god, how? ...
> S7:   They would use a laptop. They would take a laptop in the classroom and show (the content written on the board using a laptop's camera).
> **(Translated by the researcher)**

Excerpt 5.7: Teachers Focus Group Discussion (TFGD)

> ST2:   We used to have a 45-minute class as we would have in a regular onsite class. In a Zoom class, as an attempt to make pupils understand what we teach, we would write the numerical problems on the board or show the chart placing on the wall.
> **(Translated by the author)**

The above excerpts (5.5, 5.6 & 5.7) show that teachers conducted online sessions being in their physical classrooms. While teaching technical subjects such as Maths and science, which require special characters to be written, teachers went to physical classrooms, wrote content on the board and showed them through a camera of their laptop when they were in the video conferencing platforms such as Zoom or MS Teams.

The above practice strikingly differed from the practice of the private school of an urban area, SC3. The private school teachers in the urban area were more advanced in using technology compared to the public school teachers, and they could also prepare themselves better pedagogically during the pandemic. Instead of teachers going to a school to teach technical

subjects such as science, the teachers at SC3 used the online blackboard application namely

Idroo to write the contents that they wanted to show to their pupils during their online

sessions. The interview with the school manager, SM2 revealed that SC3 ran a systematic

teacher training to enable teachers to be familiar with webtools to have those tools used for

online teaching and learning. The following quotes of teacher cum school manager, SM2

(Excerpt 5.8) and a pupil, S9 (Excerpt 5.9) from SC3 disclose teachers used online white board

during their sessions.

Excerpt 5.8: Interview with a School Manager, SM2 (SC3SM2I)

```
SM2:   At first, our meeting started from Zoom class. After that,
       instantly within a month or half, we used Teams. Then we
       started using Microsoft Office sub-tools such as
       PowerPoint, Microsoft Words, Pdf so on. And there was
       idroo.com, there was a website. And we would type there and
       teach. These were the apps that teachers used.
```
(Translated by the researcher)

Excerpt 5.9: Student Focus Group Discussion 2 (SFGD2)

```
S9:    ... Our online class was started from 21 April (2021). And
       our teachers would download the White board application
       (xxx) they would teach. We used to have 6 sessions – from 9
       am in the morning till 3 pm.
```
(Translated by the researcher)

In Excerpt 5.8, a school manager stated that teachers used white board application such as

idroo.com while conducting online sessions, and a pupil of the same school, S9 in Excerpt 5.9

confirmed it. It also demonstrates that the teachers from SC3 have relatively better

understanding on the use of web applications compared to other participating schools.

Another interesting aspect of online teaching and learning is the class timetable. In SC6,

secondary school classes began from early morning 6:20 till 8:20, and there was a break in

between, and the classes resumed at 3:40 in the afternoon and ended at five pm (Figure 5.2).

This strangeness in timetable is to address issues, such as some parents do not have enough

devices for their children to use, if they have multiple children at home. In such a case, if the

school splits the class timing on the basis of levels, children belonging to a same family can join classes taking their turns during different times.

Figure 5.2 A class timetable prepared by SC6

२. रुटिन Routine

Period Class	1st Morning 06:20 07:00	2nd 07:00-07:40	3rd 07:40-08:20	4th 08:20-09:00	5th 09:00-09:40	1st Evening 03:40-04:20	2nd 04:20-05:00	3rd 05:00-05:40	4th 05:40-06:20	5th 06:20-07:00
II				Maths I (1-4) DMG Science 5,6 Toran	Dolphin (3-6) KK GK 1,2 BD			Science 1,2 Toran Social (3-6) BD	Maths II (1-4) PS Nepali 5,6 CKR	Nepali 3,4 CKR Headway1,2,5,6 KK
III				Maths II (1-4) NG GK 5,6 CKR	Dolphin (3-6) DMG Science 1,2 KK			Science 5,6 KK Nepali (1-4) NK	Maths I (1-4) TG Headway 5,6 Toran	Headway 3,4 Toran Social 1,2,5,6 PB
IV				Math II (3-6) KP GK 1,2 MMG	Nepali (3-6) SG Headway (1,2) Toran			Maths I (3-6) PS Social 1,2 BD	Science 1,2,5,6 DS Headway 3,4 Toran	Dolphin (1-4) RA Social 5,6 Bd
V				Maths II (1-4) PS Nepali 5,6 IG	Nepali 1,2 IG Dolphin (3-6) Toran			Science (3-6) DS Headway 1,2 DMG	Social (1-5) PB GK 6 NG	Headway 3,4 DMG Maths I 1,2,5,6 TG
VI	Maths I (1-4) BG Maths II 1,2 TG	Nepali (3-6) NK Social 1,2 NG	Science (1-4) RS Social 5,6 NG			Grammar (1-3) MMG Headway (4-6) SN	OBTE (1-4) KP Moral 5,6 DMG			
VII	Social (3-6) DG Nepali 1,2 CKR	Maths (1-5) KP OBTE 6 DG	Headway (1-4) PB Nepali 5,6 CKR			Science (1-4) RS Moral 5,6 RS	Grammar (4-6) MMG OBTE (1-3) DG			
VIII	Maths (3-6) TG Moral 1,2 DG	Science (3-6) RS Health 1,2 SS	English (1-3) NG Grammar(4-6) SN			Social (1-4) DG OBTE 5,6 MMG	OBTE 1,2 MMG Nepali (3-6) SG			
IX	Science (1-5) RKS Nepali 6 IG	Maths(1-6) BG	Account (3-6) HR Nepali 1,2 IG			HPE (3-6) SS Social 1,2 SN	English 1,2,6 NG Social 4,5 SN Nepali 3 IG			
X	Account (1-4) HR HPE 5,6 SS	Science 1,2,5,6 RKS English 3,4 SN	Maths (1-6) BG			Nepali (3-6) SG HPE 1,2	Social 1,4,5,6 UG English 2 SN Science 3 RKS			

The above arrangement, i.e., organising classes early in the morning solves the issue of the shortage of device in a family, and at the same time, the quality of network at home is not deteriorated since the videoconferencing tools will not be used at the same time by multiple family members who share the same network. Altogether, the total class hours allocated for secondary pupils was three hours and 20 minutes a day in SC6.

5.5.4   Online exams

The pandemic also changed the formal structure of an assessment or conducting a test. By and large, prior to the pandemic, any test would require the pupils to be in the exam hall for three hours and answer certain questions. Based on their performance on the test, they were

promoted to a next class. During the pandemic, schools adopted different modalities for the assessment which aligned with the policy guidelines. SC4 divided the entire assessment into two parts (Figure 5.3), and they gave 60 percent weighting to the formal assessment, and 40 percent weighting to the continuous assessment. The submission of homework by pupils was also a part of a continuous assessment system. SC4 had asked pupils to submit their homework to the teachers or school officials who would be available to collect them at different locations, and they also mentioned that failure to submit homework means the pupils result would not be published.

Figure 5.3 A notice sent by SC4 to its parents, teachers and pupils

Translation of the contents of Figure 5.3

Dear Parents, teachers and pupils

Re.: Notice

Due to the second wave of COVID 19, the educational activities have been halted. on these unforeseen circumstances, remaining healthy is a big thing. However, by being safe, continuing

pupil's learning by initiating the activities that we can conduct is today's need. Therefore, I would like to let you know that in the days ahead, the examination system will be as follows:

1. We would like to notify you that as in the academic year 2020/21, we are not able to conduct final exams, therefore, 60 percent marks for the final evaluation will be based on the pupil's performance on the first and second term and 40 percent will be based on continuous assessment and regular evaluation.
2. The pupils need to finish all the homework given by their teachers at different stages by May 11 and submit their completed work coming to the following place. While submitting their work, they have to be in a queue, use a face mask and maintain social distance. While submitting their work, they have to separate their work subject-wise. We will not publish the result of those pupils who do not submit homework.

Time: Morning 6:30 to 9 am

S. No.	Collection point Volunteering teachers and officials		Collection point Volunteering teachers and officials		Collection point Volunteering teachers and officials	
1	... place	Teacher 1 ABC Teacher 2 ABC	... place	Teacher 1 ABC Teacher 2 ABC	... place	Teacher 1 ABC Teacher 2 ABC
2	... place	Teacher 1 ABC Teacher 2 ABC	... place	Teacher 1 ABC Teacher 2 ABC	... place	Teacher 1 ABC Teacher 2 ABC
3	... place	Teacher 1 ABC Teacher 2 ABC	... place	Teacher 1 ABC Teacher 2 ABC	... place	Teacher 1 ABC Teacher 2 ABC
4	.... place	Teacher 1 ABC Teacher 2 ABC				

3. The result of the final exams will be published on the 3rd of May on Facebook and Messenger.
(Translated by the researcher)

The approach adopted by SC4 is beyond the regular approach of assessing pupils as they planned to evaluate pupils in terms of continuous assessment which includes their presence in online classrooms, their performances on the given tasks, etc.

SC2 developed a set of instructions for teachers to design questions for one and half hour online exams. They asked teachers to design questions on a Google form using their own Gmail account (Figure 5.4).

Figure 5.4 A set of Instructions for the teachers on how to design a question

Translation of the contents of Figure 5.4

Dear all teachers

Since this ... school is going to conduct online exams of class 4 to 10 on 1st October 2022, we would like to request you prepared the questions following the given guidelines.

1. Objective question, 20 questions: 20x1=20
2. Short answer question: Each question should target for maximum 4 bullet points, 10 questions:10x2=20
3. Open questions for creative answers: 1x10=10 or 2x5=10

A teacher has to create questions related to type 1 and 2 on a Google form using their own Gmail account and submit it to the administration on time. They will create questions themselves for their own subjects. This is to make sure that a teacher will get the answers to these questions in their own Gmail.

For the question of third type, a teacher should give it to a student by limiting the time and ask a student to submit answer to this question either in MS Teams chat box or in a Messenger. (If the answer to this question is short, it can be given through a Google form as well).

The total time to answer the questions of all these three categories is 1 hour and 30 minutes.

If anyone needs help to create a Google form, please contact ... (numbers).

A teacher of each subject has to provide the result to the student by 9th October and submit all the results to the school administration.

Time:
First subject: 10:00 to 11:30
Second subject: 02: 00- 3:30

ABC
Headteacher
19th September 2020

SC2 asked teachers to design three types of questions: 1. objective questions, such as multiple-choice questions, 2. short answer questions both on a Google form and 3. open-ended questions for creative answers, which should be given to pupils specifying time to complete them, so that the pupils submit their answers in MS Teams or Messenger by capturing the pictures of what they write on their notebook. In this case, their class Messenger group was used as a learning management system as the pupils were asked to submit their answers to open-ended questions in a Messenger group.

SC2 also developed a set of rules and instructions to guide pupils on how to appear in online exams. In online exams, SC2 wanted pupils' camera to be switched on throughout their exams so that the teachers of SC2 could monitor if pupils were writing answers without taking support of any other resources (such as notes and other reference books) that help to answer the given questions (see the set of instructions below).

Instructions for the online exams
1. Students must attend <u>online examination of 11/12 team</u> of MS TEAM at 6.50 am on the day of the exam
2. A quiet place should be selected for the exam and the mobile/laptop should be kept in such a way that the student and his copy can be seen clearly while the video is on.
3. All the necessary educational materials should be kept together in the examination. You can't go back later to take any.

4. Alternative arrangements (power bank/data) will have to be made as the lights may go out.
5. If the video is blocked for long time for any reason, the exam will be cancelled.
6. A thick copy should be used as the answer sheet and the answers of all the exams should be written on the same copy. This copy will have to be submitted to the school later.
7. Answers cannot be written randomly in the exam. The question will have to be answered continuously from beginning. If you do not get an answer to any question, you will have to write this question number and write no answer.
8. No more than 3 lines can be left between the two answers.
9. The pdf of answer sheet must be sent to respective subject teacher in MS TEAM chat/email within 10 minute after the end of the exam otherwise exam will be cancelled.

(Original in English)

The set of instructions also demonstrate that the approach that SC2 adopted was to be close to classical way of assessing the pupils as far as possible. Even during this difficult time, SC2 could not go beyond the very formal and structured assessment system. Instead, SC2 tried to replicate the onsite assessment practice even while adopting online means. SC2 reduced the number of hours for exams by half.

To sum up, during the pandemic, having adopted Tole education, teachers reached out to those pupils who could not join online education. Teachers helped pupils get engaged in learning by providing feedback on the tasks the pupils submitted to them. Television also helped pupils to continue learning as both local and national TV stations designed and televised programs to help learners during the pandemic. Online sessions were conducted by a majority of schools although in many cases they were merely substituting the physical classes as Puentedura (2009) claims that in such cases, the technological tools act as a direct substitute with no functional change. Continuous assessment systems which were rarely practised in Nepalese school education came into existence during the pandemic, and teachers attempted to replicate the classical way of assessment while conducting online exams.

5.6 Discussion

When looking at the pandemic educational practices through an activity theoretical lens, the following constellation of interacting activity systems, a unit of analysis (Figure 5.5) was identified. These interactive activity systems show that the policies or resources produced by the policy makers flow to schools (Section 3.5.1, p. 46). Thus, policies and resources produced by the Government of Nepal and public services served as rules and mediating tools in the management activity system. Those resources produced by the Government of Nepal mediated schools to produce their own institutional policies, and also they constrained the school's activities in relation to organizing teaching and learning during the pandemic. As the object of management activity system was managing resources to address the educational disruption, the school managers created institutional rules and guidelines that further acted as rules and tools for teachers' activity system. So, in this case, there is a flow of resources from the management activity to teaching activity. On the basis of institutional rules and other resources provided by management authorities, teachers participated in their activity system oriented towards their object which is engaging pupils in learning. Thus, they engaged in conducting tole teaching, online classes, online exams etc. Figure 5.5 also shows the power relations between different stakeholders of education who are interconnected and also at the same time independent when they participate in their activities.

Figure 5.5 Interactive activity systems (Adapted from Engeström, 2009, p. 307)
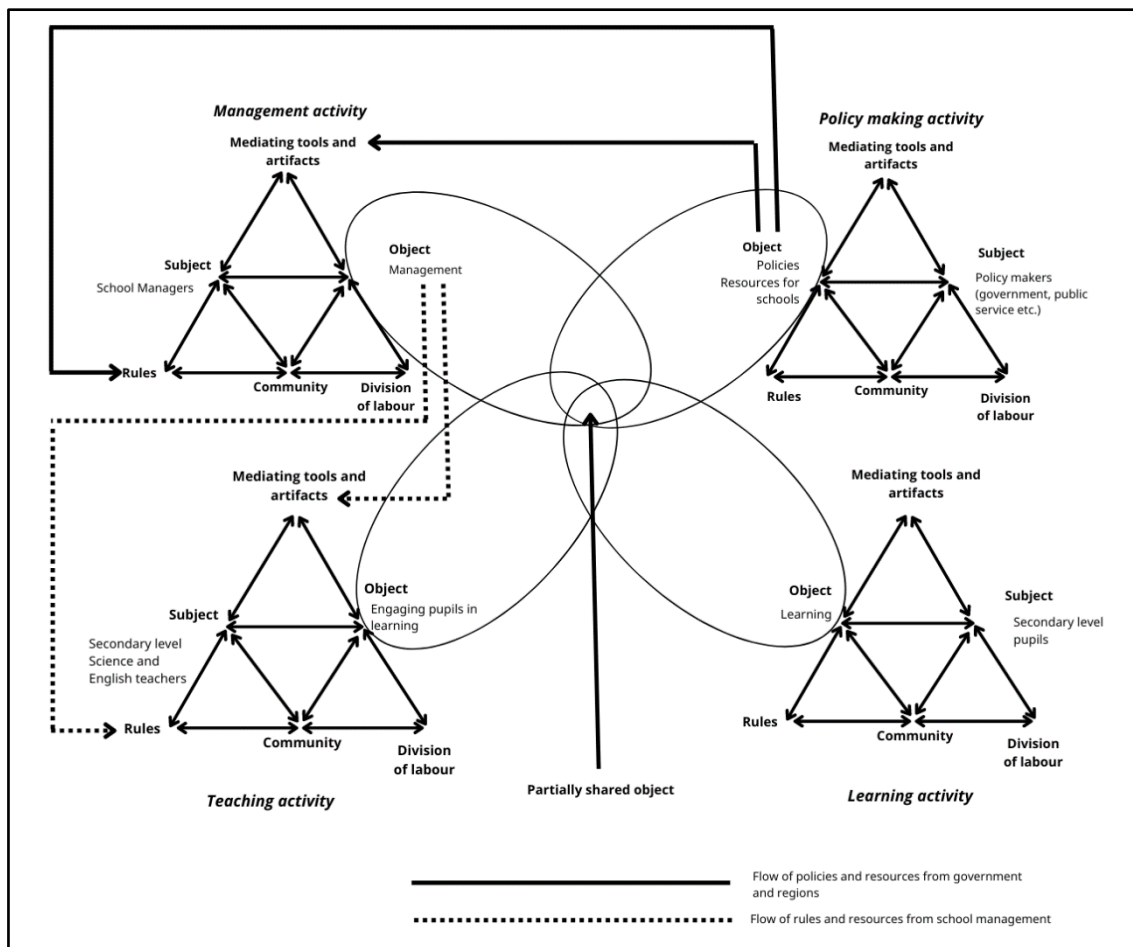
During the COVID-19 crisis situation, several policy documents were produced to address educational disruption by the Government of Nepal; however, before this period, such as during the period of civil war or 2015 earthquake, no such documents existed to resolve educational crises. During the pandemic, the documents such as, *Emergency Action Plan for School Education 2020*, *Student Learning Facilitation Guidelines 2020* and the *Framework for School Operation, 2020* helped to guide the educational practices. And educational institutions also developed their own contextually suitable strategies and approaches to continue teaching and learning during the pandemic. For example, Tole education was not openly stated in the policy documents (section 5.3); however, it was used by schools to continue teaching and learning. At the local level, Tole education was practiced customizing it to the institutions' own local realities. Rana's (2022) study also reveals that in Nepal, during the COVID-19 crisis

context, teachers walked to the specified area in the community where a cluster of pupils from their locality came to join the personalised learning activities designed by teachers. As discussed in section 5.5, only two out of six schools adopted Tole education. A large-scale phone-based survey in Nepal carried out by UNICEF (n.d.) claims that children being engaged in alternative in-person modalities such as mobile teachers and Tole Shiksya is only 0.6% of the total engagement of the pupils in different forms of learning, such as learning by radio, learning through online classes among others. This finding also shows the potential risk for those school children who have no access to digital devices and internet of being out of education during the crises, which can further exacerbate a digital divide (Dawadi et al., 2020) and breed social injustice in education.

Regarding managing learning via radio and television, the recommendations of both Guidelines and Plan seemed explicit (section 5.4); however, only a limited number of pupils in this study reported to have engaged in learning via radio and television. This indicative finding, however, based on a very small sample size aligns with the finding of a large-scale phone-based survey of UNICEF (n.d.) which claims that children accessing education programs through television broadcasts was 1.8% and radio broadcasts was 1.1% in Nepal during the pandemic, which shows an insignificant number of pupils getting engaged in learning through radio and TV. No pupils reported about the quality issue related to content televised, although Erümit (2021) claimed that during the pandemic, pupils reported that teachers were merely reading the slides in distance education mediated by TV.

Only the *Student Learning Facilitation Guidelines 2020* suggested explicitly about online teaching by using the resources produced at federal, provincial and local levels. In this study, compared to any other alternative forms, online teaching and learning is adopted by the majority of sample schools that are selected for this study though effectiveness of online teaching and learning is always questioned (Sharma, 2020). During COVID-19, online learning

got a boost in Nepal (S. Karki, 2020); however, the quality of technological devices to deliver education in a developing country such as Nepal is still an issue (Shrestha, 2016), and numerous students in Nepal do not have access to online education (Dahal, 2020; Mishra, 2021). Unicef (n.d.), through their survey reveals the risky situation of Nepal as 50 percent of private schools could connect with their pupils compared to only 27 percent of pupils of public schools. This UNESCO's data demonstrates the current digital divide, and at the same time also warrants the possible educational gap in public school and private school learners due to such a divide.

No policies discuss online exams clearly, instead the policy documents such as the guidelines states that a school can evaluate students based on project work, a parallel question or through any other useful methods or processes. In Nepal, during the pandemic, the secondary level board exams were postponed a number of times with a hope to conduct them physically by the GoN (NepalNews, 2021). However, as the COVID situation worsened, all board exams were based on internal evaluation conducted by all schools in Nepal.

5.7   Summary and conclusion

In the past 25 years or so, Nepal has confronted civil war (1996-2006) the 2015 earthquake, and the COVID-19 pandemic. These crisis situations disrupted education significantly. The impact of COVID-19 was huge as more than nine million children were affected due to school closure for about eight months. The Government of Nepal implemented and developed a series of policies, such as the *Emergency Action Plan for School Education 2020*, *Student Learning Facilitation Guidelines 2020* and the *Framework for School Operation 2020* to ensure the continuation of teaching and learning during the pandemic. The year 2020 in Nepal witnessed the formation of plans that addressed educational disruptions during the pandemic, and these plans have also laid a strong foundation to manage educational crises in future. There are some concerns about these plans as discussed above (Section 5.6); however, they

also helped to minimise the educational disruption. Before 2020, there were hardly any plans to address education during crises.

This chapter discussed Nepalese educational policies that were developed and implemented in crisis situations. The policy analysis helped explain the gap between educational goals and their implementation. The discussion of pandemic related policies set a background to discuss how alternative means such as Tole education, use of radio and TV and online teaching and learning were adopted to minimise educational disruption during the crisis situations. Overall, ICT use to continue teaching and learning was the most noticeable and one of the institutionally-prioritised educational practices during the pandemic even though the number of pupils that benefitted from this practice is low. The upcoming chapter will deal with the ICT use during the pandemic.

Chapter 6 ICT use during the pandemic

The previous chapter 5 discussed the Nepalese ICT in education policies developed to address the educational issues which arose during crises and different educational practices carried out in Nepal during the pandemic. Despite the difficulty of achieving the presence of most or all pupils in online classes, the majority of schools offered online classes during the pandemic with ICT playing a crucial role in the continuation of teaching and learning. This chapter deals with how ICT was used in online and onsite sessions during the pandemic and further investigates how ICT was used in English and science classes in private and public schools. To this end, this chapter analyses the sequences and actions of eight English and four science online and onsite sessions, mediating tools used in those sessions as well as rules and division of labour which mediated the teaching activity.

6.1 Setting the scene

In this chapter, each individual English and science teaching session conducted both online and onsite was segmented, and their activity sequences and actions were reviewed along with mediating tools and artefacts, rules and division of labour. The result of this analysis follows here. The codes SC1SCO1, SC1SCO2, SC2ECO2, SC2ECO3, SC3ECO1, SC3ECO2 and SC3ECO3 designate the classes run online in urban schools and SC5ECO1, SC5ECO2, SC6SCO1 and SC6SCO2 designate the classes that were run onsite in semi-urban schools during the pandemic. The objects, which are motives of an activity of each session (Section 3.1), are listed in the Table 6.1 below.

Table 6.1 Objects of each session

Sessions	Objects
SC1SCO1	Understanding the functions of nose and tongue
SC1SCO2	Discussion on questions related to eyes and ears and some gases (the latter one - a new topic)
SC2ECO2	Using prepositions of time and place in contexts
SC2ECO3	Using prepositions of time and direction in contexts
SC3ECO1	Paraphrasing a poem: 'Past and present' by Thomas Hood
SC3ECO2	Writing about one's past and present

SC3ECO3	Describing Jitiya festival[7]
SC3ECO4	Describing Jitiya festival
SC5ECO1	Doing listening exercises related to a language function - watching a movie
SC5ECO2	Understanding the poem 'The chimney sweeper' by William Blake
SC6SCO1	Discussing exam questions related to 'electricity'
SC6SCO2	Discussing exam questions related to 'electricity' and other exercises linked to other scientific contexts

When the subjects, science and English teachers participated in their object-oriented activities, i.e., taught each lesson oriented towards objects (Section 3.1, p. 28), several sequences within the activity emerged, and several actions were carried out by the subjects mediated by a number of tools and artefacts and also by rules and division of labour (Section 3.4.1, p. 42). The remainder of the section delineates the sequences that emerged when teachers taught each lesson, the actions they carried out within those sequences, the tools and artefacts, rules and division of labour that mediated activities in online and onsite classes.

6.2 Modelling online sessions in urban schools

Two science sessions, SC1SCO1 and SC1SCO2 conducted in SC1 and two English sessions, SC2ECO2 and SC2ECO3 conducted in SC2 and four other English sessions, SC3ECO1, SC3ECO2, SC3ECO3 and SC3ECO4, conducted in SC3 (Section 4.1.4, p. 55) are analysed here. In the following section, sequences, actions, mediating artefacts, rules and division of labour in online sessions are discussed categorizing them into English and science sessions and private and public schools.

6.2.1 Activity sequences and actions in online sessions

Altogether, 12 sequences and 25 actions within those sequences were identified in eight online sessions. Similar actions repeated within different sequences. For instance, in online English sessions, the action 'explanation of lesson related terms and concepts' was repeated in three different sequences such as in 'discussing previous lessons', 'teacher's presentation' and 'addressing a pupil's question'. There is no one-to-one relationship between activity sequences

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[7] Jitiya festival is a three-day-long Hindu festival observed by married women of Mithilaanchal and Tharu women of all castes in Nepal. Women takes fast for the wellbeing and long life of their sons.

and actions, and some actions are repeated more frequently in different activity sequences than others. Table 6.2 below presents the overview of sequences of sessions in the urban schools.

Table 6.2 Sequences in online sessions in urban schools

Sequences	Number of urban schools which had this sequence at least once	Total occurrences in online sessions
Greetings and socializing	3	5
Discussing how to use technological tools	1	2
Discussing previous lessons	3	5
Warm up exercises	1	1
Preparing to begin a lesson	1	2
Teacher's presentation	3	8
Discussion on a topic	1	1
Giving tasks based on the topic or content of the lesson	2	6
Addressing a pupil's questions	1	1
Eliciting pupils' responses	1	1
Giving feedback	1	1
Introduction to a new topic	1	2

The Table 6.2 shows the total number of sequences identified in online sessions. The number of schools in each row represents the total number of schools that had at least one sequence given in a row in the sessions carried out by a teacher in that school, and the total occurrences in online session refer to the number of times the sequence in a row appeared in total sessions. Many activity sequences such as, 'greetings and socializing' 'discussing previous lessons', 'teacher's presentation' and 'giving tasks based on the topic or content of the lesson' frequently occurred. Some other sequences 'discussing how to use technological tools', warm up exercises', 'preparing to begin a lesson' 'addressing a pupil's question' 'eliciting pupils' responses', 'giving feedback' and 'introduction to a new topic' were also present in online sessions. Online sessions held in urban schools incorporated a variety of sequences. The following section attends to activity sequences and actions in online sessions in relation to disciplines and type of schools.

Activity sequences and actions in English and science sessions

The sequences 'discussing how to use technological tools', 'preparing to begin a lesson', and 'introduction to a new topic' were only present in science classes while 'warm-up exercises', 'discussion on a topic', 'giving tasks based on the topic or content of the lesson', 'addressing a pupil's questions', 'eliciting pupils' responses' and 'giving feedback' sequences were only present in English classes. Table 6.3 provides an overview of the activity sequences in the science and English sessions observed for this study.

Table 6.3 Sequences (English and science teachers and total occurrences)

Sequences	Number of English teachers who used this sequence at least once	Total occurrences in English sessions	Number of science teachers who used this sequence at least once	Total occurrences in science sessions
Greetings and socializing	2	3	1	2
Discussing how to use technological tools	0	0	1	2
Discussing previous lessons	2	4	1	1
Warm up exercises	1	1	0	0
Preparing to begin a lesson	0	0	1	2
Teacher's presentation	1	5	1	3
Discussion on a topic	1	1	0	0
Giving tasks based on the topic or content of the lesson	1	6	0	0
Addressing a pupil's questions	1	1	0	0
Eliciting pupils' responses	1	1	0	0
Giving feedback	1	1	0	0
Introduction to a new topic	0	0	1	2

All English and science teachers gave presentations during their online sessions, and the occurrence of 'teacher's presentation' was more frequent both in English and science sessions. 'Giving tasks based on the topic or content of the lesson' is more frequent in English sessions. Both science and English teachers greeted and socialised with their pupils and discussed previous lessons during the beginning of the sessions. The teachers of English and science designed and participated in different sequences to carry out their object-oriented activities. The following section elaborates the actions that took place in some sequences. The selected sequences to be explicated below are the representative ones that comprises both types - only present in either English or science session, and present in both sessions.

Table 6.4 Activity sequences and actions in English and Science classrooms

Sequence (in bold) and actions	Number of English teachers who used this sequence and action at least once	Total occurrences in English sessions	Number of science teachers who used this sequence and action at least once	Total occurrences in science sessions
Greetings and socializing	**2**	**3**	**1**	**2**
Greetings and/or casual chatting	2	3	1	2
Waiting for pupils to join	2	5	1	2
Discussing technological issues	1	1	0	0
Discussing previous lessons	**2**	**4**	**1**	**1**
Briefly revising lessons taught the day before	2	3	1	2
Waiting for pupils to join	0	0	1	1
Preparing to set up technology	0	0	1	1
Sharing a screen	1	1	1	1
Introducing a topic	1	1	0	0
Asking a pupil or pupils questions	1	2	0	0
Explanation of lesson related terms and/or concepts	1	1	0	0
Warm up exercises	**1**	**1**	**0**	**0**
Sharing a screen	1	1	0	0
Using chat	1	3	0	0
Giving tasks to pupils	1	3	0	0
Asking a pupil or pupils questions	1	1	0	0
Teacher's presentation	**1**	**5**	**1**	**3**
Preparing to set up technology	1	1	0	0
Sharing a screen	1	1	0	0
Using PowerPoint presentation	1	4	1	4
Checking if the content presented legible or could be seen by Ss	1	3	0	0
Using pictures	1	2	1	1
Asking pupils to read	1	1	0	0
Asking to a pupil or pupils questions	1	6	0	0
Playing a video clip	1	2	0	0
Explanation of lesson related terms and/or concepts	2	19	1	18
Giving tasks based on the topic or content of the lesson	**1**	**6**	**0**	**0**
Sharing a screen	1	1	0	0
Explaining rubrics or giving instructions	1	2	0	0
Discussion on a topic	1	1	0	0
Using chat	1	4	0	0
Using PowerPoint presentation	1	2	0	0
Using pictures	1	1	0	0
Asking a pupil or pupils questions	2	6	0	0
Tracking time for pupils' task completion	1	2	0	0
Following up how pupils are doing tasks	1	8	0	0
Giving tasks to pupils	2	6	0	0
Attendance taking	1	1	0	0

The sequence 'greetings and socializing' was present in three English sessions, and both English

teachers, ET1 and ET3 allocated their time to greet and socialise (Table 6.4**Error! Reference s**

ource not found.). This sequence was also present in both science sessions. The English teacher, ET2 (Section 4.2, p. 68) waited for the pupils to join her online sessions more often than the teachers of science sessions. The English teacher, ET2 also discussed technological issues, such as the issue of a power cut which interrupted her previous session. She clarified what happened on her end in the previous session to the pupils during socializing.

In the 'discussing how to use technological tools' sequence in science sessions, ST1, a science teacher discussed how pupils could use technological tools; however, English teachers did not discuss it in any of the sessions that were observed. The science teacher, ST1 found that the clarity of the images of the homework that the pupils submitted to her was poor (The pupils had to capture their handwritten work using their device camera and upload it in the Google classroom). Thus, she discussed how they could submit their work in her classroom (Excerpt 6.1).

Excerpt 6.1: Science session, SC1SC01

Sequence	Transcription	Action Description	Mediating tools and artefacts
Discussing how to use technological tools (CTC[8] 00:03:39.524 – 00:06:00.327)	ST1: '[9]Anupa, the one I have sent to you with my comments?'[10] Pupil: 'Yes ma'am' ST1: 'It was in the Google classroom, did you find it?' Pupil: 'Yes, found it, I found it too' ST1: 'Really?' Pupil: xxx ST1: 'Sorry?' Pupil: 'The comments you had written?' ST1: 'Yes, did you understand them?' Pupil 'Yes, we got them' ST1 'I found the document you have sent is a bit blurry, Anupa. I couldn't understand that and couldn't go through your work	ST1 discusses how her pupils can take pictures of their tasks using mobile and send them to her. (TC: 00:03:39.524 – 00:06:00.327)	A webcam and mic used by the teacher, and a mic used by students (TC: 00:03:39.524 – 00:06:00.327)

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[8] 'CTC' refers to the common time code for a sequence

[9] A pseudonym used for a pupil

[10] The quotes in single quote marks seen in the transcription of classroom observation were in Nepali and they were translated by the author.

	properly'. Pupil: 'Oh, okay, ma'am.' ST1: 'I have also shared slides there, so please read them, okay? ' Pupil: 'Okay ma'am (Student A and B), ma'am xxx' ST1: 'Which one?' Pupil: xxx ST1: 'Which one, I could not understand what you say.' Pupil: 'of unit 17 - no, no, unit 16.' ...'As you told my work is blurred when I sent you the pictures of my work, do I need to send that again or not?' ST1: 'No need to send that. Now on, when you send your homework, you have to make sure the pictures that you capture of your work are clear, make sure the pictures that you capture of your work are clear, okay?' Pupil: 'Okay ma'am' (Student A and B) ST1: 'There should be a proper light. You need to check the light effect when you take picture from your mobile.'		

In the above excerpt (6.1), ST1 describes how pupils can take pictures of their tasks when they have to take pictures of their work and submit them to ST1.

'Discussing previous lessons' is one of the sequences that occurs in both science and English sessions (Table 6.4). Teachers of science revised the lessons taught the day before less frequently than the teachers of English. After discussing previous lessons briefly, in science sessions, ST1 also waited for pupils and prepared to set up her technology by checking with pupils if they could see the slide that ST1 was showing. English teachers did not check with pupils if the slides they showed to the pupils were seen by them. In both English and science sessions, both teachers shared their screen to begin a lesson. While sharing a slide, ET1 also introduced a topic, posed questions to pupils and explained lesson related terms and or concepts.

In a 'warm-up exercise' which only occurred in SC3ECO1, a teacher, ET2 shared her screen, used chat to give tasks to pupils, and posed questions to a pupil or pupils (Table 6.4). ET2 designed warm-up exercises in Mentimeter, an Interactive presentation software intended to engage learners. ET2 used the survey tool in Mentimeter that helped engage students in the survey task that she had designed. She gave the Mentimeter link to pupils from Microsoft Teams chat option, asked them to respond to the survey questions which they could see in Mentimeter. When the majority of them answered, she displayed their responses on the screen and discussed them. This activity sequence was designed to engage the learners in the task the teacher prepared for this session.

In other sessions, such as SC3ECO2 and SC3ECO4, through chat available in MS Teams, ET2 provided questions to pupils in real time and got their responses. The pupils wrote responses in their notebooks, captured them as images and uploaded them in a chat. No pupils submitted their assignments by typing the text on their devices, instead they submitted their assignment as a picture as the teachers instructed them to do so. The following excerpt 6.2 from classroom observation explains how ET2 instructed the pupils for the task to be completed in real time after she had given a task in the chat. The object of SC3ECO2 was 'writing about pupil's past and present', the grammar exercise.

Excerpt 6.2: English session, SC3ECO2

Transcription		Action Description
ET2:	I have assigned you one task, once you see there in the chat box. See that. Now, following the similar structure, you are going to write, okay? I forgot to mention there, I am sorry, in about 150 words, (she is typing something on her device) okay? You please do it. Recall and write about your past in comparison to present that how to include, what sort of things to include here is - include about your childhood, how it used to be like.	The teacher giving a task in a chat box (TC 00:05:08.730 – 00:06:51.420)
ET2:	Okay, did you get what to write?	
Pupils:	Yes ma'am.	
ET2:	Please, once you start, you write and then you will have to upload the pictures here. The majors of the work you have done and then like in the past, I will give you feedback and then others will also learn from your writing. Let's see who will be the first one to upload.	

ET2 after giving a task on past and present, she asked them to submit by capturing the picture and submit them to her using a chat option.

'Teacher's presentation' is frequent in both English and science sessions (Table 6.4). In other words, both teachers of English and science lectured more frequently in their sessions. 'Explanation of lesson related terms and/or concepts' was the most frequent actions in both English and science classes. For instance, ET1 in her session, explains the use of different prepositions in the following way (Excerpt 6.3).

Excerpt 6.3: English session, SC2ECO3

Transcription		Action Description	Mediating tools and artefacts
ET1:	Actually, not only on Christmas, we have to say at Christmas but on Christmas day. Okay, that one is a different. Yesterday, I already told here. But here is on Christmas. Sorry, for that. And then on Friday, So this one is the description. Okay, let me present first, I have not present here.	ET1 explains the difference between at Christmas and on Christmas day and also says that 'on Christmas' which is seen on the slide is not correct. TC 00:02:55.942 – 00:03:47.590	A mic used and PowerPoint slides shown by sharing a screen by the teacher. (TC 00:02:38.111 – 00:03:50.466)

The action that was also constantly occurring in English sessions was 'asking a pupil or pupils questions'. Some actions such as 'preparing to set up technology', 'sharing a screen' and 'checking if the content presented is legible or could be seen by students' were only present in English sessions. The actions, advance preparation of English teachers seem organised as they shared their screens and checked whether they could be seen by pupils before starting their lessons. Both English and science teachers used PowerPoint slides to present in their classrooms.

Only English teacher, ET1, used videos in the classrooms. While delivering sessions through MS Teams, ET1 used videos twice during her classrooms to teach a grammatical concept, such as types of prepositions. She used short-animated video clips approximately two to six minutes long that were available on YouTube to teach preposition of place and time. She mostly used PowerPoint slides that had pictures related to prepositions.

Teachers of English provided pupils with tasks repeatedly as this sequence occurred six times in English sessions (Table 6.4). The following excerpt (6.4) illustrates how ET1 gives tasks based on the content to the pupils.

Excerpt 6.4: English session, SC2EC03

Sequence	Transcription		Action Description	Mediating tools and artefacts
Giving tasks based on the topic or content of the lesson (CTC 00:38:57.511 - 00:44:11.300)	ET1:	Let's look at here, the topic - preposition of movements. Everybody, here are some pictures and then some words, some group of the words - which one is the preposition of movements are given here and what you have to do. You have to write down these words in the correct box looking at the picture and the arrow that actually where does this, let's say this	ET1 gives a task such as 'Fill in the blanks' related to preposition of movement. (TC 00:38:58.500 - 00:39:33.900)	A mic used and PowerPoint slide shown by sharing a screen by the teacher (PPT slide - pictures related to some prepositions of movement and a list of prepositions of movement which pupils have to relate to the picture.(TC

	'along' in which box this 'along' is the suitable place. Just you have to put there and I already told I will keep this one in a MS Team and then please find out this one and write in this question answer. Oh sorry, not question answer, fill in the blanks. Okay everybody, please do this one. Un, we do not have a time. That's why, un, I did not talk much here. Okay, um,			00:38:59.084 – 00:39:57.292)

In the science sessions analysed and observed here, ST1 did not give task to the pupils based on content or topic. The English teacher, ET2 also used chat often while providing tasks to the pupils. Questions related to the lessons were asked in English classes, and those questions were answered by teachers in the sessions. ET2 was also following how the pupils were doing during the session by asking some general questions such as what the pupils were doing at the particular stage and so on.

English sessions included a variety of sequences and actions within those sequences compared to science sessions in online classrooms. Besides lecturing, science teachers conducting online sessions discussed previous lessons, designed warm-up exercises and engaged pupils in tasks based on the topic or content of the lesson.

Activity sequences and actions in public and private schools

Both science and English sessions in public schools, SC1SCO1, SC1SCO2, SC2ECO2 and SC2ECO3, and the sessions in a private school, SC3ECO1, SC3ECO2, SC3ECO3 and SC3ECO4 had a variety of sequences and actions.

The sequences 'teacher's presentation' and 'giving tasks based on the topic or content of the lesson' and 'greetings and socializing' were present in both schools. Only the public school

teachers discussed how to use technological tools, prepared to begin a lesson and introduced a new topic in the middle of a session. Likewise, only the private schools used warm up exercises, discussed on a topic, addressed a pupil's questions elicited pupils' responses and gave feedback. The following section delineates the actions carried out in some of the sequences which can characterise the differences between sequences that were seen in private and public schools.

'Discussing previous lessons' was frequent in the online sessions in both public and private schools. The teachers at both schools briefly revised lessons and began the new lessons. While discussing previous lessons, the public school teachers also shared their screen. Both public and private school teachers waited for the pupils to join even after discussing previous lessons.

The following excerpts 6.5 and 6.6 details how both public school and private school teachers discussed previous lessons in their sessions.

Excerpt 6.5: Science session, SC1SCO1

Sequence	Transcription		Action Description	Mediating tools and artefacts
Discussing previous lessons (CTC 00:06:30.784 – 00:06:54.770	Pupil:	'Ma'am, in human digestive system, describe the digestion of food that occurs in human stomach.'	One of the pupils asks about human digestive system that they discussed in the previous lesson. (TC 00:06:30.784 – 00:06:54.770)	A webcam and mic used by the teacher, and a mic used by students (TC 00:06:30.784 – 00:06:54.770)
	ST1:	Did you read that, did you read that?'		
	Pupil:	'Yes, ma'am?'		
	ST1:	'Did you read that or not?'		
	Pupil:	'I read that unit, but this is the exercise which I did not know.'		
	ST1:	'Ye, okay, I will help to do that later.'	ST1 waits for students to join the session. (TC 00:06:55.000 – 00:08:18.852)	
	A des:	One of the pupils asks about human digestive system that they discussed in the previous lesson. (TC 00:06:30.784 – 00:06:54.770)		

Excerpt 6.6: English session, SC3EC04

Sequence	Transcription		Action Description	Mediating tools and artefacts
Discussing previous lessons (CTC 00:04:15.964 - 00:04:43.119)	ET2:	So once just recall what did you learn yesterday? You read it and we were about to discuss on that but we could not do that.	ET2 asks pupils to recall what they learnt the day before. The day before they were learning about Jitiya Festival.(TC 00:04:15.964 - 00:04:43.119)	A mic used by the teacher. (TC 00:04:15.984 - 00:04:43.142))
	Pupil:	Ma'am about that festival?		
	ET2:	Yes, yes.	ET2 waits for students to join the session. (TC: 00:04:43.443 - 00:05:29.191)	

After discussing the content, human digestive system and Jitiya festival, the lessons taught in the previous science and English classes respectively, in both sessions, ST1 and ET2 waited for nearly two minutes for students to join their sessions.

'Warm up exercises' were only used in the sessions conducted at the private school, SC3. No other schools used warm up exercises during the sessions. Only public schools played videos in their sessions to engage learners. The sequence 'teacher's presentation' was frequent in public schools. It suggests that the instruction in public schools was more lecture-based, for example, the teachers in private schools explained lesson related terms and/or concepts constantly, compared to a private school teachers.

Public school teachers, for example, ST1 used numerous pictures, such as pictures of an eye, ear, gases, etc. in her class, and ET1 used pictures of a cat at different places in reference to an object to teach preposition. It may be that this use of pictures aided the clarification of the concepts being taught. When teachers gave tasks to pupils in online sessions, the private school teacher, ET2 shared her screen to make learners see the task, explained rubrics or gave instructions and used chat available in their video conferencing platform. Contrary to this, public school teachers, ST1 and ET1, used their PowerPoint slides and pictures on the slides to

provide a task to the learners. ET2 followed up how pupils were doing when they were given exercises by asking whether they have started the task or not, whether they have completed the task or not and so on. While ET2 was giving tasks to pupils, she was also taking their attendance.

In summary, science and English teachers in private and public schools designed and participated in a variety of sequences, and those sequences had a number of actions intended to engage learners as described above. There are some common sequences such as 'teachers' presentation' and actions such as, 'explanation of lesson related terms and/or concepts' when compared between science and English sessions and between the sessions held in private and public. However, at the same time, the sequences also sharply differ as many sequences are present either only in English or in science sessions, and either only in private or in public schools.

6.2.2   Mediating tools and artefacts in online sessions in urban schools

Having conducted online sessions, the teachers in urban schools used a wide variety of technologies to optimise pupils' learning.

Use of a cursor and laser during PowerPoint presentation, GIF, Mentimeter and chat on a video conferencing platform in the online sessions occurred frequently. Webcam and microphone use is also regular which is due to the fact that teachers had to use them constantly while conducting online sessions. The following section discusses what tools or artefacts mediated the activity in English and science sessions and public and private schools.

Mediating tools and artefacts used in English and science sessions

As the nature of the courses, such as science as a technical discipline differ from English as a non-technical discipline, different mediating tools and artefacts were used in English and science sessions. The following table (Table 6.5) shows the extent each mediating tool and

artefact were used in each discipline during the pandemic by English and science teachers. ST1 used Google classroom, and ET1 and ET2 used Microsoft Teams to run online classes (Section 4.3.1, Table 4.6, p. 76).

Table 6.5 Mediating tools and artefacts (Science and English teachers and average occurrences)

Mediating tools and artefacts	Number of English teachers who used this mediating artefact and tool at least once	Total occurrences in English sessions	Number of science teachers who used this mediating artefact and tool at least once	Total occurrences in science sessions
Content in a table	1	1	0	0
Myth related to Teej	1	1	0	0
Poem	1	1	0	0
Tasks	2	8	0	0
Cell phones	1	1	0	0
Chat in VCT	1	7	0	0
Cursor during PPT presentation	0	0	1	8
GIF	0	0	1	3
Laser pointer	0	0	1	7
Mentimeter	1	1	0	0
Microphone	2	32	1	9
Pictures	0	4	1	5
PowerPoint Slides	1	10	1	5
Videos	1	3	0	0
Webcam	2	18	1	9

It is apparent (Table 6.5) that teachers of English used a variety of ICT tools such as Mentimeter, video clips, audio recordings, PowerPoint slides and chat while participating in their object-oriented activity whereas a science teacher, ST1 used only a tool such as PowerPoint slides. However, ST1 used PowerPoint slides creatively, for example, she highlighted texts using multiple colours, embedded pictures and graphics interchange format (GIF) such as contraction and expansion of an eye and the pictures of different parts of an eye, an ear and a nose in the PowerPoint presentation. A GIF is a combination of image sequences that are played in a quick succession. The other point worth noting is that English teachers constantly used tasks, which are the logically organised actions oriented towards a goal. They engaged pupils in a writing task using the structure for the habitual past, a matching task based on a lesson content and so on. The science teacher, ST1 did not use tasks in the sessions that were observed and analysed for this study.

While participating in the object-oriented activity, i.e., teaching the lesson related to nose and tongue, and discussing the exercises related to eyes and ears and some gases, ST1 also used a cursor and laser pointer available in PowerPoint to direct the learners to the texts or figures being displayed on a screen. The following excerpt (6.7) from classroom observation shows how she explained the content using a laser pointer. The excerpt is accompanied by the figure (Figure 6.1) from her class, which shows the laser pointer being used.

Excerpt 6.7: Science session, SC1SC01

Transcription	Action Description
ST1: What is here? In this part, there is mucus membrane. When mucus membrane is swollen, it blocks the smell. As it cannot go further, what happens? We just sense a little bit. What happens during the time of cold, this gets swollen, and it obstructs the smells.'	ST1 points out a hair-like projection in both pictures given on the slide with the help of a red laser pointer. (TC 00:22:29.623 – 00:22:43.800)
Pupil(s): 'It stops.'	
ST1: For this region, we cannot know during other times.	
Pupil(s): It can't	
ST1: 'Compared to normal times, when we are suffering from cold, we smell less.' Due to this, smell does not reach inside the olfactory nerves, and we cannot detect it. So, we cannot smell the things and do not...	
ST1: 'Here is mucus membrane. Here is mucus. Look at here.	

(Quotes in single inverted commas are translated by the researcher)

Figure 6.1 ST1 uses a laser pointer
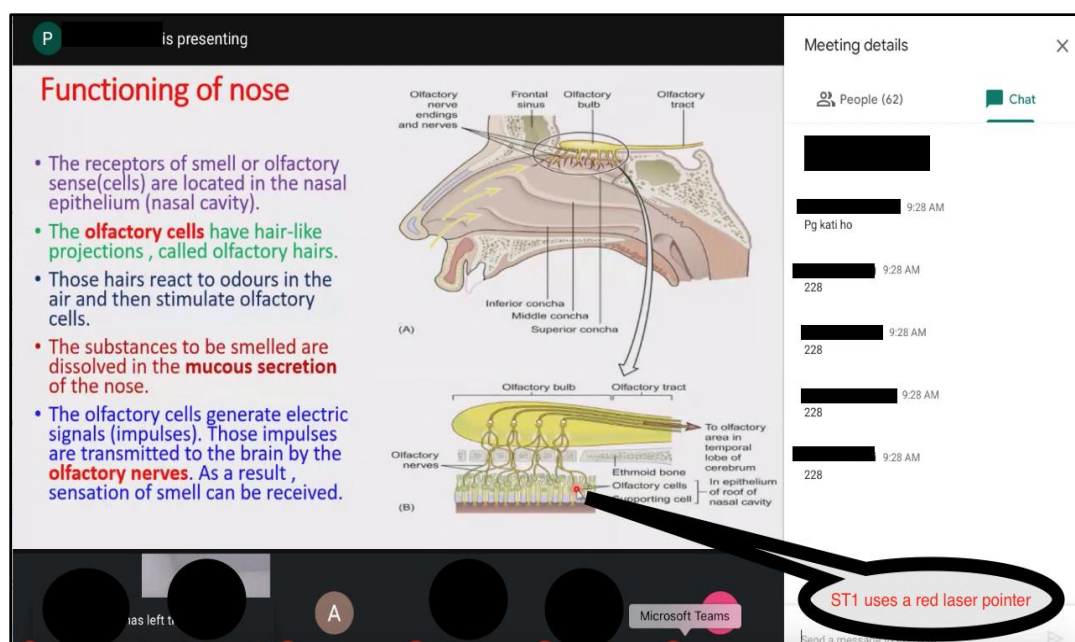
The English teacher, ET1 never used a pointer and cursor while presenting. Rather, they talked through the slides. English teachers used a variety of ICT tools in their sessions. The following interview with ET2 (Excerpt 6.8) also corroborates that they used a variety of ICT tools and artefacts which was observed in English sessions.

Excerpt 6.8: Interview with ET2, SC3ET2I

```
ET2:     Sometimes  I  ask  them,  sometimes  through  PowerPoint
         presentation, I ask them - do the things like share what
         they  have  learnt  and  sometimes,  through  MS  forms  or
         Google  forms  and  even  through  Mentimeter,  so  different
         technologies we are using online,...
```
   (Interview in English)

Even though the pupil, S9, mentions in excerpt 6.9 below that the science teacher used a white board application, this was not seen in the sessions that the researcher observed. One thing which is worth highlighting in the following excerpt is that teachers would turn on their camera immediately when they feel that the pupils do not understand their explanation while presenting the content in the slides.

Excerpt 6.9: Focus Group Discussion, SFGD2

```
S9:      Oh, you mean ours? Our online classes started from 21
         April, and teachers would teach (xxx) using a link by
         downloading Whiteboard application. Sir, we would have 6
         periods, from 9 am in the morning to 3 pm ...

         During COVID, teachers would use PowerPoint presentation
         slides to teach the content of English and science. Our
         teacher  would  make  us  practice  exercises  from  the
         practice book. And even in science, there will be
         whiteboard presentation, and they would also show us the
         video lectures that were available on YouTube. If they
         failed to explain, they would turn on camera and explain
         live, and on other occasions, they would explain using
         slides. At this point of time, our courses are nearly
         completed.
```
      (Translated by the researcher)

While teaching a lesson 'Jitiya festival, ET2 used Teej Myth[11] since she found a connection between celebrating Teej with celebrating Jitiya festival in Nepal. Therefore, she asked the pupils how Teej is connected to Jitiya festival. As ET2 used Teej myth as a tool, ET2 went beyond using concrete tool or artefacts, and used an ideal tool to explain the concepts. A science teacher mostly used the concrete materials, such as pictures to explain the concepts.

English teachers used eight times Nepali terms in their sessions during lesson delivery, whereas a science teacher, ST1 used approximately 85 percent Nepali language in each session. In science sessions, mostly some scientific concepts and some definitions were stated in English, and those concepts and definitions were explained in Nepali language. For instance, in the session, SC1SCO2, ST1 used PowerPoint slides in English (Figure 6.2) whereas she explained almost all contents in Nepali. It shows that Nepali was the dominant language used to teach science.

---

[11] Myth related to Teej festival - According to Hindu mythology, Goddess Parvati was a great admirer of Lord Shiva and she was interested in marrying him. Goddess Parvati observed fasts and prayed Lord Shiva for 108 births and finally Lord Shiva was inspired by her devotion and accepted to marry her.

Figure 6.2 A science teacher displaying her slide in a Google Meet
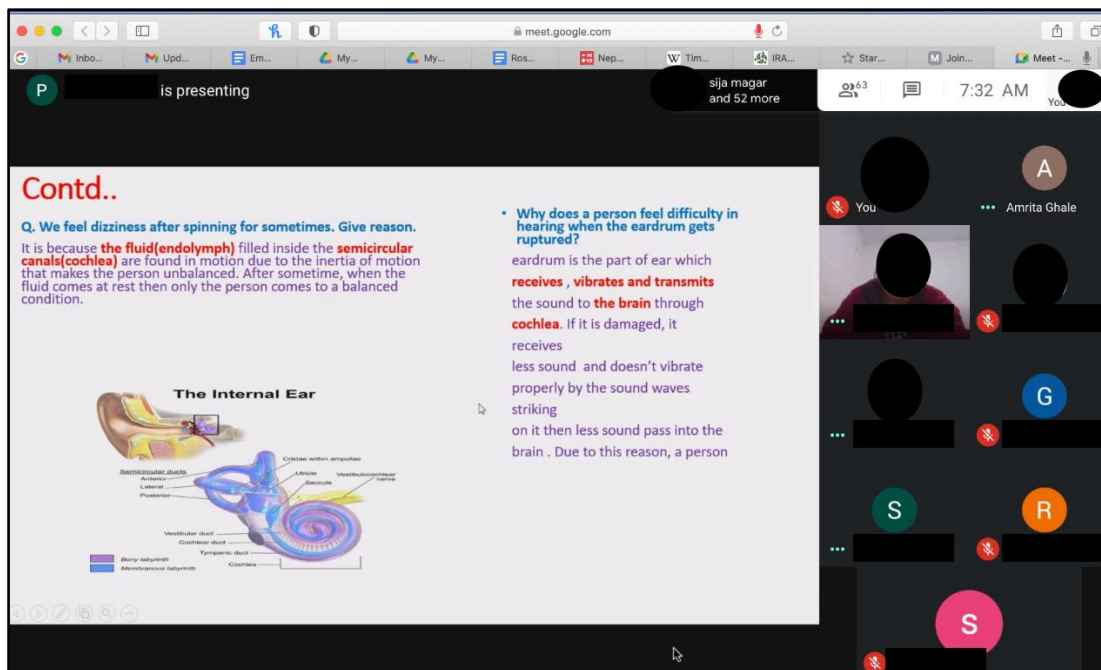
The other tools used by teachers which are not mentioned in Table 6.5 are power supply and internet connection, the devices they used such as laptops or desktop computers for teaching, teaching methods such as communicative language teaching in case of English sessions and lecture methods in case of science sessions and teachers' digital skills that mediated them to participate in the teaching activity.

To sum up, English teachers used several mediating tools and/or artefacts, such as Mentimeter, PowerPoint slides and video recordings in their sessions, whereas PowerPoint slides were used throughout the sessions in science sessions, and those slides included plenty of figures and colourful texts.

Mediating tools and artefacts used in public and private schools

The comparison of the use of mediating tools and artefacts used in private and public schools provides a unique picture as there is no significant contrast in using mediating tools and artefacts in online sessions run in public and private schools situated in urban areas during the pandemic.

Only one public school teacher used tasks once whereas a private school teacher used tasks frequently. A private school teacher, ET2 used Mentimeter, chat in a video conferencing platform, webcam and microphone while taking online classes. In a similar vein, teachers from public schools also used PowerPoint slides, videos, webcams and microphones while delivering lessons. It is worth noting that ET2, the private school teacher did not use PowerPoint slides while delivering lessons, instead she used a microphone and webcam to explain contents as in her regular classes, which explains why the webcam use is frequent in the sessions of ET2. Using a microphone is still less frequent in ET2's class as she engaged the pupils in different tasks, such as writing about pupils' past using 'used to' structure, a reading task, matching items based on the lesson, 'Jitiya festival' and so on. Teachers at public schools used a cursor and laser pointer during the presentation, used GIFs, videos, audios and so on. They used pictures a lot on their slides. Pictures were helpful in clarifying the concepts they were dealing with in their sessions.

Tools used for a whole class

Besides several tools used in English and science sessions by the teachers, the interview with a school manager, SM1 also revealed that the Messenger group they created for each class in SC4 became a useful tool to disseminate information to the students. He shared the anecdote related to a Deepawali event[12] they organised to mark school's anniversary for which he invited to join the pupils via the text on a class-wide Messenger group.

Excerpt 6.10: Interview with a school manager, SC4SM1

> SM1:   ... a few days ago, there was one Deepawali event on the
>   occasion of our school's anniversary. We had set a
>   program to organise Deepawali at five places in the
>   community by specifying 5 centers. On the final day of
>   school's anniversary, the children's club specified the
>   centers but the students' turn over was low. As I
>   noticed it, when I posted a message to come and join the
>   event on such and such place, on a Class 10 Messenger
>   group, within 20 minutes, the students turn over

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[12] the event in which candles and other lights are lit to celebrate the event

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                     increases. It shows that they have been using it. When I
                     checked how many of them checked the message, I found
                     that 20 of them had seen within 5 minutes. ... Hence, I
                     also feel that Messenger is also important. So I use it
                     during such occasions. Not only me, other teachers also
                     use it.
```

(Translated by the researcher)

The above excerpt (6.10) shows the significance of Messenger groups to disseminate information to pupils in an easy way. Public schools, such as SC1, SC2, SC4 used class-wide Messenger group to send general information to pupils. In SC3, a pupil created a Messenger group for their class in which a teacher had joined. It is also found that at times, teachers also sent some reading materials to pupils via those groups.

6.2.3   Rules in online sessions

Many rules guided the teachers' activity system. Because the pandemic was new, teachers created several rules to manage online classes. For example, in the following classroom observation excerpt (6.11), ET2 tells some pupils that they should change the profile pictures as they are supposed to have the profile pictures in school uniforms.

Excerpt 6.11: English session, SC3ECO2

Transcription
ET2:   Nabin, Nitin, un, you are supposed to change your profile picture you know that. Sorry to disturb you. Pupils: Okay ma'am.

This is also supported by institutional policy of SC3. The institutional policy lists a comprehensive dos and don'ts in which they ask the pupils to use a profile picture in school uniform (see point number 5.)

1. **Set-up an adequate working environment**: Make sure you have good lighting so your teachers can see your face clearly; face an open window or put a lamp next to your laptop. **Dress up well – formal school uniform** and properly stationed at the study table and not slouching or moving around.

2. **Check your background** for anything you don't want to be visible in the video, or blur it if possible. Use standard [School's name] background, such as classroom picture in MST. Minimise background noise; turn off the TVs & audios, and other disturbing gadgets. In the case of Pre-Primary students, it is advised that one of the parents joins with her/him.

   ...

5. **Attend your online classes regularly** just as you would do your physical class. Renaming your devices with your full name and grade, e.g., **Ramita Silwal, Grade 10C**, is a must. Your **profile picture** must be **you in School uniform.** No other picture should be used for your profile.

The school, SC3, also has a similar set of rules for teachers. Teachers were asked to check the links to make sure they work, to clear the browser before they screenshare a video and so on when they prepare to begin online classes. The dos and don'ts for the teachers are also very comprehensive. The following are some of the rules created by this school for the teachers.

b) Check your background for anything you don't want to be visible in the video, or blur it if possible. Use standard [School's] background, such as classroom picture in MST.

c) Have a practice student who will log in and check links to make sure they work. Make sure you clear your web browser (cookies/history) before you do a screen share video. Don't let your students see you SWEAT! Technology can be challenging!

In other classes, some rules were introduced by the teachers. For example, in the science class that was conducted using MS Teams, ST1 asked students to turn off their microphones before she began a class and turn them on only when they would ask questions (Excerpt 6.12). It was to make sure that there will not be an interruption from learners during her delivery, and also this is a common rule that is practised by the online participants. As learners and teachers were using online platforms such as Microsoft Teams for the first time during the pandemic, such rules created by teachers were found useful to manage sessions.

Excerpt 6.12: Science session, SC1SC01

Sequence	Transcription
Preparing to begin a lesson (TC 00:08:40.500 – 00:10:11.300)	ST1: 'Okay, now, let's start the class, okay, you are altogether 60.' ST1: 'Okay, switch off the microphones that are turned on, okay. Only switch them on when you ask questions.' Pupil(s): 'Okay ma'am' (Student A and B)

In an interview, ET1 shares rules that they had created to check whether the learners are actually in the class. During the initial days, they wanted all the pupils to turn on the camera. However, it was found that during the latter days of pandemic, this rule was not followed by both a teacher and pupils. It was found that all pupils and also a teacher switched off the camera during their sessions.

ET2 in an interview shared that they modified some institutional rules during their classroom teaching, and they linked the pupils' activities to the assessment, as a result pupils would abide by the rules (Excerpt 6.12). Assessment comes as a key phenomenon to motivate them to get engaged in the activities as seen in the following excerpt (6.13).

Excerpt 6.13: Interview with English teacher, ET2I

```
ET2:      Some rules we even modify in the classes because if we
          just say you have to turn on the camera, maybe they do
          not do. And if we say that okay, today these many
          students only turn on the camera, so they are getting one
          point for turning on the camera. And these, these, these,
          they were wearing the school uniform, they will get extra
          one point and next, many will wear the school uniform and
          turn on the camera. There [These] are the rules, some we
          modified. If we do not modify that way no, if we just say
          you turn, you turn on your video, you turn on your this,
          and they right in the chat, ma'am, due to technical
          glitches, I cannot turn on my microphone or video, and
          this type of comments they write. So we modify the rules,
          we have the rules set from schools side also from teacher
          side also.
          ... So we make the rules and always we, we end up with
          the mark … Certain marks allocated for this particular
          things, we say and for the sake of marks, they do that.
          And this is a kind - this is really, you know helping us
          to hook the students.
     (Original in English)
```

This is also confirmed by SM2. They could hook pupils up with the marking scheme by informing pupils that there are some marks allocated for the participation in classroom activities. The motivation was generated to learners for their participation bringing an assessment scheme to the fore which is also a classic approach to push the pupils to

participate in the teaching and learning activities. ET2 also shared that they modified a regular

way of assessment which is based on a fully paper pencil test (Excerpt 6.14). She states,

Excerpt 6.14: Interview with English teacher, ET2I

```
ET2:   ... in this online classes, we have modified, instead of
       going for 75 full marks pape - un, written paper. We have
       gone for 50 Marks and 25 marks for continual assessment. We
       assess them on their regularity, punctuality, their
       submission of work, again regularity, punctuality (xxx)
       whether they are regular to the classes or not, they are
       regular to some submit their work or not whether they turn
       on the camera. If they don't turn on the camera, you know
       they may be doing other things there, like instead of
       listening to the teacher, they may be playing there or they
       may just login and go somewhere else, so there can be such
       chances. Just to avoid those possibility we ask them to turn
       on the camera, and then like previously I said if we don't
       say marks, they will not do. For the sake of marks, they do
       everything the teachers asked. Um, we do that (xxx)...
```
(Original in English)

ET2 explains that 75 full marks paper has been reduced to 50 marks paper, so that they could

use 25 marks for continuous assessment. An element of continuous assessment, partly based

on federal policy guidelines was introduced. Student Learning Facilitation Guidelines

2020 states that the teachers could evaluate the learners based on the activities that they

were involved in during the pandemic. Nonetheless, there were no substantial changes in the

assessment system as teachers are still attached to the formal assessment which has 50

percent weighting. In fact, during the pandemic, conducting tests or exams instead of

evaluating pupils based on their regular participation in different online activities was a

difficult task. (Section 5.5, Online exams).

During the interview, SM1, the head teacher of SC4 shared that they had created rules for

online sessions such as a) pupils had to enter within a specific time, b) the pupils from other

schools are not allowed to enter the class, c) a teacher had to turn on the camera and they

should also ask the students to turn on their camera in the beginning and after checking each

one of them, they would be asked to switch off the camera and so on. However, during the

classroom observation, it was found that the rule such as c) was not followed by the teacher and students. What was observed in sessions is that pupils would greet a teacher once they have joined but would not turn on their videos.

The rules were also set for parents to make the parents cooperate with their children. Kong (2018) claims that parents should be effective facilitators at home, and they also need to monitor the students for online learning. Teachers had adjusted their class timings, such as changing the times of instruction to make teaching sessions as feasible as possible during the pandemic (Excerpt 6.15).

Excerpt 6.15: Interview with science teacher trainer, STTI

```
STT:  ... we had shifted the day school to the morning shift.
      Parents had to give their phones to their children from six
      to half eight. Parents would take it at 8:30 and go to the
      office and in the evening, at half five, parents should give
      their cell phones to their children. And we would teach from
      half five to half eight in the evening ... Also we had to
      think that all the classes should not be conducted at the
      same time as there was a possibility that siblings could
      rely on the same phone to join online classes ...
```
Translated by the author

The above excerpt (6.15) of an interview with the science teacher trainer points out that they wanted equal cooperation from parents particularly to provide digital devices to their children. In this case, the teacher wished that parents provided their cell phones to pupils as many public school pupils did not have their own cell phones to join online classes.

To sum up, the locally developed institutional rules and the rules promptly and organically developed by teachers in their classrooms helped them manage their online classes. Teachers exercised their agency and modified the institutional rules based on their own classroom teaching and learning contexts when required. Teachers linked the online classroom activities to an assessment system by allocating certain marks, basically to motivate or positively pressurise pupils in participating in given tasks.

6.2.4   Division of labour in online sessions

Teachers and pupils often assisted each other during the online sessions. This context was new to all teachers, yet they tried to help each other with their own knowledge and expertise to run online sessions. For instance, ET2 got disconnected in her session, SC3ECO2 due to a sudden power cut in her region. She had taken this session for nearly 11 minutes. Students waited for a teacher to arrive for nearly 10 more minutes, and after that one of the ET2's colleagues entered the virtual room and informed them that ET2 would not be able to continue the class and ET2 would organize another class to compensate for it any other day. The following excerpt (6.16) shows the activity description and timecode.

Excerpt 6.16: English session, SC3ECO2

Action Description
ET2 got disconnected. (TC 00:10:55.287 - 00:21:30.700) ET2's colleague enters the room and informs that there was a power cut in her area as a result she could not re-join the class, and she would take the compensation class later on which she would inform the students.

It shows the relationship between teachers of SC3 and how they assisted each other. The colleague of ET2 supported ET2 to inform the students about the issue that she was facing.

Teachers also helped pupils during out of class hours. During an interview, one of the teachers, ET2 also shared that she allowed the pupils to chat using Messenger, Skype or even MS Teams to ask questions to her. For this, she would fix the time to give her a call and she would answer their questions via those calls.

Pupils in the sessions would help each other in different ways. It is also worth noting that pupils would help each other via Messenger. At times, there were power cuts, or they did not have a fair internet connection, in that case, they would share the contents in a Messenger group (Excerpts 6.17 & 6.18). They would also make a Messenger call if they needed clarity on some contents.

Excerpt 6.17: Student Focus Group Discussion 2, SFGD2

```
S9:    Even friends would clarify those things which we did not
       learn on that day using via Messenger call.
```
Translated by the author

Excerpt 6.18: Student Focus Group Discussion 2, SFGD2

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S10:   I would learn the contents that were shared by my friends in
       Messenger when I could not join online classes or when there
       was no electricity on my end. They would help me by putting
       contents in Messenger [group].
```
Translated by the author

The finding pertaining to use of Messenger application by pupils for their engagement in their

studies is also confirmed by the parents (Excerpt 6.19). P3 reports that before the online

classes started, her daughter and her daughter's friend would share contents in the Messenger

group they had created during the pandemic and learn from each other's sharing.

Excerpt 6.19: Interview with Parent 3, SC6P3I

```
R:     You mean there was no radio? Umm, how did your eldest
       daughter study when there was no online sessions from April
       to September?

P3:    She managed time by herself and studied. Between her
       breakfast and lunch, she would study for three hours.

I:     How? ... I want to know how she studied. For example, did
       she use textbooks, or did she take help of TV because she
       did not go to school then, right? At that time how did she
       learn, or did she learn by making a call to her friends?

P3:    No, their friends would collaborate and put contents in the
       Messenger group. But in the beginning, during the initial
       phase of lockdown, they did not do this a lot. She would
       read books by herself. And later after 2 or 3 months of
       lockdown, they studied by sharing what they know with each
       other using by using Messenger group chat.

I:     Umm, when they were sharing their learnings using
       Messenger, were the teachers as well there in Messenger or
       there were only the pupils?

P2:    No, only their friends were there.
```
Translated by the author

The horizontal relationship among students is seen when ST1 was teaching about a nose.

When she was showing an image of the external parts of the nose and some description of a

nose on the slide and explaining it, one of the students asked the page number of the textbook

where she could find this content that the teacher was dealing with (Figure 6.3). She asked the

question *'Pg Kati ho'* in Nepali, which means 'What is the page number' in English in a chat. ST1 did not tell this pupil the page number, instead she continued explaining the subject matter, but meanwhile, other four pupils answered in the chat as seen on the right-hand side in Figure 6.3. In this case, her classmates were helping her to find the page number of the textbook where she could get the content being delivered.

Figure 6.3 One of the students is asking what the page number in the textbook is in the chat
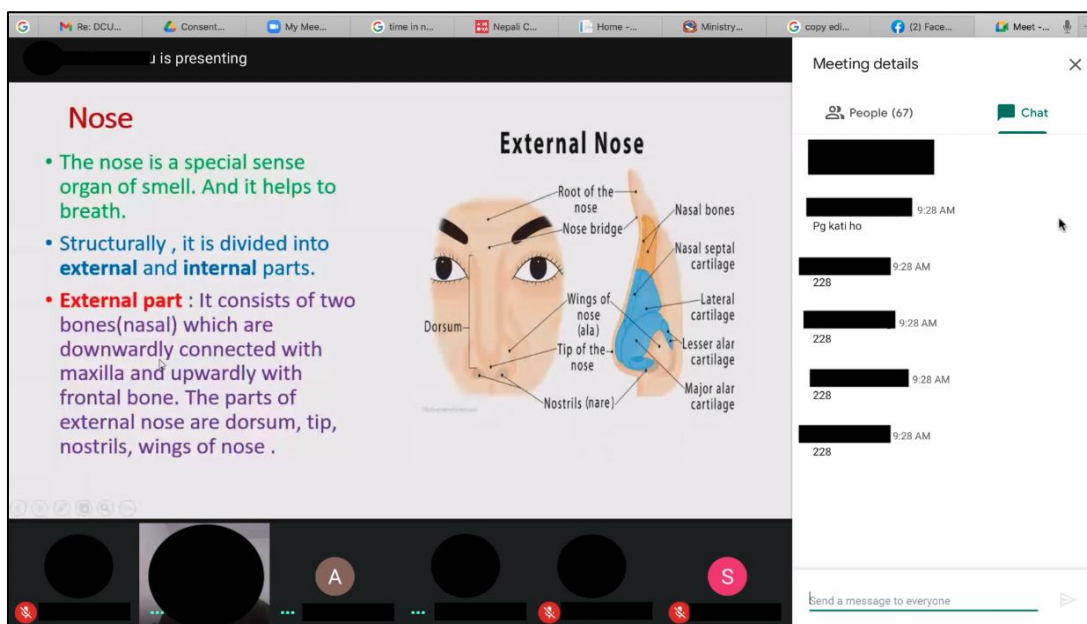
In summary, teachers helped each other the way they could, and pupils also supported each other during online classes which depicts the horizontal relationship. Also, teachers asked questions to pupils during online sessions, which demonstrates their classroom interaction.

6.3   Modelling onsite classes in semi-urban schools

SC5ECO1 and SC5ECO2 are the English onsite sessions in a public school, and SC6SCO1 and SC6SCO2 are the science onsite sessions in a private school. Both SC5 and SC6, public and private schools respectively are in semi-urban areas. The local educational unit where SC5 and SC6 were located had decided that a school could run onsite classes depending upon their own circumstances. The lockdown was no longer imposed at the regions. The researcher faced

difficulty to observe and analyse onsite classes (Section 4.3.1, p. 74) as he observed the sessions live streamed via Messenger by research participants' colleagues. In the case of ET3's session, the researcher observed only those segments of the sessions when ET3 was engaging students in the activities in a computer lab. So what goes before that could not be observed. ET3 engaged pupils in listening comprehension related to a language function in one session and explained the poem 'The Chimney Sweeper' in another session. ST2, a private school science teacher, discussed some important questions related to electricity and other scientific concepts to make pupils prepare for their exams.

6.3.1   Activity sequences and actions in onsite sessions

Two sequences and 13 actions were identified in the semi-urban onsite sessions. ET3, a public school English teacher, used digital technologies in his sessions whereas ST2, a science teacher, did not use digital technologies in his sessions. The sequences identified in the onsite classes were 'teachers' presentation' and 'giving a task based on the topic or content of the lesson' which are delineated below. The English teacher is from a public school and the science teacher is from a private school; therefore, both English and science teachers, and private and public schools distinctions are combined and presented below.

Table 6.6 Sequences and actions in semi urban schools

Sequence (in bold) and actions	Number of English teachers who had this sequence and action at least once	Total occurrences in English sessions	Number of science teachers who had this sequence and action at least once	Total occurrences in science sessions
Teacher's presentation	**1**	**2**	**1**	**2**
Broadcasting a screen	1	1	0	0
Using PowerPoint presentation	1	1	0	0
Asking pupils to read	1	1	0	0
Asking a pupil or pupils questions	1	2	1	6
Playing a video recording	1	1	0	0
Explanation of lesson related terms and or concepts	1	7	1	9
Playing audio recording for listening comprehension	1	2	0	0
Giving tasks based on the topic or content of the lesson	**1**	**4**	**1**	**2**

Sequence (in bold) and actions	Number of English teachers who had this sequence and action at least once	Total occurrences in English sessions	Number of science teachers who had this sequence and action at least once	Total occurrences in science sessions
Explaining rubrics or giving instructions	1	7	1	1
Using pictures/figures	0	0	1	1
Asking a pupil or pupils questions	1	1	0	0
Observing pupils doing exercises	1	1	0	0
Tracking time for pupils' task completion	1	2	0	0
Giving feedback on pupil's work	1	1	0	0
Reading the text given in a book	0	0	1	1

In English onsite classes, ET3 asked pupils to use computers, and the pupils looked at PowerPoint slides on their screens which were centrally controlled and broadcast by the teacher. Both ET3 and ST2 also posed questions related to lessons to pupils in their sessions (Table 6.6).

The above Table 6.6 shows that both teachers posed questions to pupils and they also frequently explained lesson related terms and concepts. As ET3 used technology in his sessions, ET3 took the pupils to a computer lab, used audio clips produced by the Curriculum Development Center, Nepal and engaged the pupils in listening exercises. ET3 would tell the pupils that they had a certain amount of time to complete the work. ET3 also used a video clip that described a poem 'The Chimney Sweeper'. ET3 used PowerPoint slides which the pupils could see on their monitors (Excerpt 6.20).

Excerpt 6.20: English session, SC5ECO2

Transcription	
ET3:	Again, you can see, who are these children? Maybe chimney sweeper, maybe not only the chimney sweeper. Yeah, they are the street children, you know. Street children. Have you- have you seen such children in your locality as well? Around the town, around the city, at hotel, you know, this small child, they are working at hotel, in bus, means of vehicles, in different vehicles, small babies [children] are used and somewhere you can see small baby [child] begging carrying sacks on their back and begging there. Why do- why do these babies [children], these children do that job? Why do they do that job?
Pupil(s):	They are very poor xxx
ET3:	So, yes, maybe they are very poor. Or maybe, they do not have their xxx. Parentsless are orphans, you know. Orphan, maybe, they are orphans. Or maybe their parents, you know, them. Their parents, you know, them. They do not, un, send their ... school. As a result, for their hand-to-mouth, to solve their hand-to-mouth problem, r, their livelihood, you know, most of the xxx may involve in such kind of things. (TC 00:01:25.411-00:03:31.176)

ET3 tried to link what pupils are learning to their own contexts by asking if pupils had seen street children in their locality. The teachers used pictures to illustrate the concept and to make the ideas they are disseminating to pupils clear.

In science sessions, ST2 discussed possible exam questions related to electricity, weight, nuclear energy, nuclear fuel and so on when he was revising the lessons and preparing pupils to take exams. The following excerpt (6.21) shows how ST2 explains the role of a transformer while using electric appliances that need different voltages.

Excerpt 6.21: Science session, SC6ECO2

Transcription	Action description	Mediating tools and artefacts
ST2: In our home, we have the different kinds of electric appliance, such as a radio. Radio needs how much? Maybe the 8 volt or maybe the 3 volt or maybe the 5 volt as well as our TV needs maybe the 40 volt, maybe the 60 volt so on, understood or not? Hun? According to the what, different, different electrical appliances that needs the different, different voltage so that according to the electric appliance and we have to make we have to change this 200 volt into the required value so that, for that purpose, now we have to take the help of the transformer. Understood or not? So what is the transformer? Why is the transformer necessary? When the question asked and answer is.	ST2 writes values of voltage on the board and explains different voltage required for different types of electric appliances. (TC 00:00:11.000 – 00:02:35.000)	Texts on the board and a marker (TC 00:00:11.323 – 00:02:05.562)

ET3 also used video and audio recordings in his sessions. The following excerpt (6.22) illustrates the way ET3 used audio recordings to engage pupils in listening comprehension.

Excerpt 6.22: English session, SC5ECO1

Sequence	Transcription	Action description	Mediating tools and artefacts
Teacher's presentation (TC 00:00:37.123 – 00:01:31.950) Giving pupils tasks (CTC 00:01:37.090 – 00:05:42.360)	ET3: Now you have a time, 5 mins time to complete the first exercise. On the basis of your listening conversation, then we will just listen, you know. So, please do the exercise. Question is one a side and write the answer in another side. ET3: The first question is what time are the people in the conversation planning to watch the movie? Just write time, something there. What-what you listen there and second question says what should Bandana do before going to the movie? Write just a word or a phrase. How many people are going to watch the movie altogether? Just write the numbers how many. Whom did Bandana request for the permission to watch the movie? Maybe un, you need to refer to somebody's name or un libraries. Who told Bandana not to wander after the movie? Okay? Un, the questions are there on your screen. Just write answer, just write answer. yes, yes, one word or one phrase answer. Very fast. If you confuse with some numbers. No problem. You will get a chance to listen once more, okay?	Pupils listen to the audio recording about the language function – watching a movie. (TC 00:00:36.850 – 00:01:31.974) ET3 tells the pupils that they have 5 mins time to complete the first exercise. (TC 00:01:37.031 – 00:02:01.540)	Questions that pupils can see on their computer screen shared by the teacher (centrally controlled) (TC 00:00:37.440 – 00:03:55.190)

The above classroom recording segment illustrates the way ET3 engaged pupils in a listening

comprehension exercise which was related to language function 'watching a movie'. Each

student saw listening comprehension questions at their desktops and after hearing the audio recordings, they had to write answers in their notebooks. Hence, computers were used as only a display device at this point. It only replaced the multimedia projector. Instead of having content projected on one big display, in this case, the same content was projected on their individual computer screen. It was the very minimal use of ICT by ET3.

In the sequence, 'giving tasks based on content or a topic', both English and science teachers explained rubrics or gave instructions, and only SC5 used figures while giving a task. ET3 also asked questions, observed pupils when they were doing exercises, tracked time for pupil's task completion and gave immediate feedback on pupil's work. While discussing exercises, ET3 read the text given in a textbook (Table 6.6).

The following excerpt (6.23) shows how ET3 explained rubrics and gave instruction. ET3 emphasised what pupils should do in listening exercises.

Excerpt 6.23: English session, SC5EC01

Sequence	Transcription		Action description
Giving listening exercise (CTC 00:00:08.984 – 00:00:33.340)	ET3:	You have questions. And after listening to the conversation, you should write the answer. Think that we should not write the complete answer here. Just one word or one phrase is okay for that. Okay? Shall I play the audio recording?	ET3 says that they need to read silently, and they should answer one word or one phrase after listening to an audio. (TC 00:00:08.970 – 00:00:33.037)
	Pupil(s):	xxx	
	ET3:	Okay then let's see. Let me play the audio recording.	

While observing pupils when they were doing exercises, ET3, the public school teacher, would go around the classes and observe how they were doing. Eliciting pupils' responses and giving immediate feedback on pupil's work was also seen in ET3's class.

The analysis of sequences and actions which are present in both online and onsite modes show that sessions run in online mode include a plethora of sequences and actions as discussed above (Section 6.2). The sessions in urban areas brought variety to a lesson delivery and

engaged pupils in tasks. The analysis of some sections of the onsite sessions show that the teachers mostly spent time on their presentation.

6.3.2   Mediating tools and artefacts in onsite sessions

ET3 used technology in both of his sessions whereas ST1 did not use technology while teaching. Pictures or figures were used frequently in both private and public schools. All other artefacts and tools such as PowerPoint Slides, videos, etc. were used by either school. Audio recordings were also frequently used. The following section delineates the mediating artefacts or tools used in total sessions conducted by SC1 and ET3.

Mediating tools and artefacts used in English and science sessions or public and private schools

ST2, a science teacher from a private school, used a book, marker and regular teaching materials. He drew some figures on the white board to illustrate concepts, such as a figure of an electric circuit, transmission wires and so on. He also wrote texts on a whiteboard to clarify while he was presenting. While ET3, an English teacher from a public school, used digital tools such as audio recordings to engage learners in listening comprehension, PowerPoint slides and videos during his lesson delivery. The following table (

Table 6.7) shows the tools or artefacts used in English and science sessions by ET3 and ST2.

Table 6.7 Mediating artefacts and tools (English and science sessions and average occurrences)

Mediating tools and artefacts	Number of English teachers who used this mediating artefact and tool at least once	Total occurrences	Number of science teachers who used this mediating artefact and tool at least once	Total occurrences
Book	0	0	1	2
Content in a table	1	1	0	0
Marker	0	0	1	1
Poem	1	1	0	0
Tasks	1	2	0	0
Audio Recording	1	4	0	0
Computers	1	1	0	0

Pictures/ figures	1	1	1	3
PowerPoint Slides	1	1	0	0
Videos	1	1	0	0
Texts on a board	0	0	1	2

ET3 took pupils to the room where computers were installed. During the listening exercises, although the pupils were using computers, they had to do the exercises on their notebooks. The following excerpt (6.24) shows how ET3 engaged the pupils in the tasks he had given.

Excerpt 6.24: English Session, SC5ECO1

Sequence	Transcription	Action description	Mediating tools and artefacts
Giving pupils tasks (CTC 00:07:04.803 – 00:09:56.970)	ET3: Now do the second question as well. Write the answer of the second question,(xxx) okay? Bandana suggests, Bandana's father suggested that she should confirm whether a mother had any such and such.(xxx) arrow over there or match. Bandana informed her mother that she had a dot dot dot. You need to write a word there. Bandana's best friends are Simona, Dolma and next person. Name of the next person, you need to write there. Her mother allowed her to ... call her friends in her home. Un, Bandana's friends are curious to ... on mother, Okay, so on the basis of your, un, if you listen. On the basis of the conversation that you've listened, you can write the answer. You can do the answer.	ET3 asks pupils to do the second question. He reads out the questions. (TC 00:07:04.848 – 00:08:08.350)	Computers for all the pupils and questions (TC 00:07:04.761 – 00:08:08.230)

Table 6.7 are the digital skills of teachers, for example, digital skills of ET3 which mediated ET3's activity of using technology. Similarly, teaching methods, such as the lecture method adopted by ST2 and communicative language teaching used by ET3 and languages both English and Nepali which teachers used during their participation in the activity.

ET3 did not use technology to the extent that the teachers of online sessions did. There is a wide disparity between technology use for instruction in semi-urban and urban classes as indicated by technology use in online and onsite classes. It can also be explained by the teachers' limited access to technology in those areas (Section 4.1.4, p. 55). Semi-urban schools have less ICT resources compared to the availability and access to resources in urban schools.

6.3.3 Rules in onsite sessions

In case of onsite sessions, both in SC1 and SC5, pupils put on facemasks and attended the sessions. Both onsite teachers, ET3 and ST2 did not use facemasks while teaching. During the session, pupils listened to a teacher's lectures unless they were asked a question. The teachers' activity was also guided by the regular paper pencil test as both teachers were frequently mentioning about the test format when they were discussing exercises and how some questions should be tackled in the exams.

6.3.4 Division of labour in onsite sessions

In onsite sessions, both teachers, ET3 and ST2 got support from fellow teachers and school managers. Pupils also cooperated with them during their sessions. Mostly, ET3's pupils remained interactive.

In case of SC5, ET3 also got support from the school (Excerpt 6.25). ET3 got a laptop which he could use for instructional purposes, and also to help ET3's colleagues when they wanted to learn how to use some webtools that ET3 is familiar with.

Excerpt 6.25: Teacher Focus Group Discussion, TFGD

> ET3:   The school has also supported laptops for three: a head
>   teacher, I and the other one who is ICT literate. This means
>   we have to teach other teachers and use it for school's
>   purpose and also take care of it.

Overall, pupils cooperated well in both sessions as they would remain quiet when required during sessions and took part in an interaction when they were asked. Teachers also received support from their colleagues to resolve the issues that appeared in online sessions.

6.4   Discussion

This section presents the discussion of the findings presented in this chapter. Sections 6.3 has provided a firm background for modelling teaching activity systems both online and onsite. Teaching activity systems are modelled in the following ways.

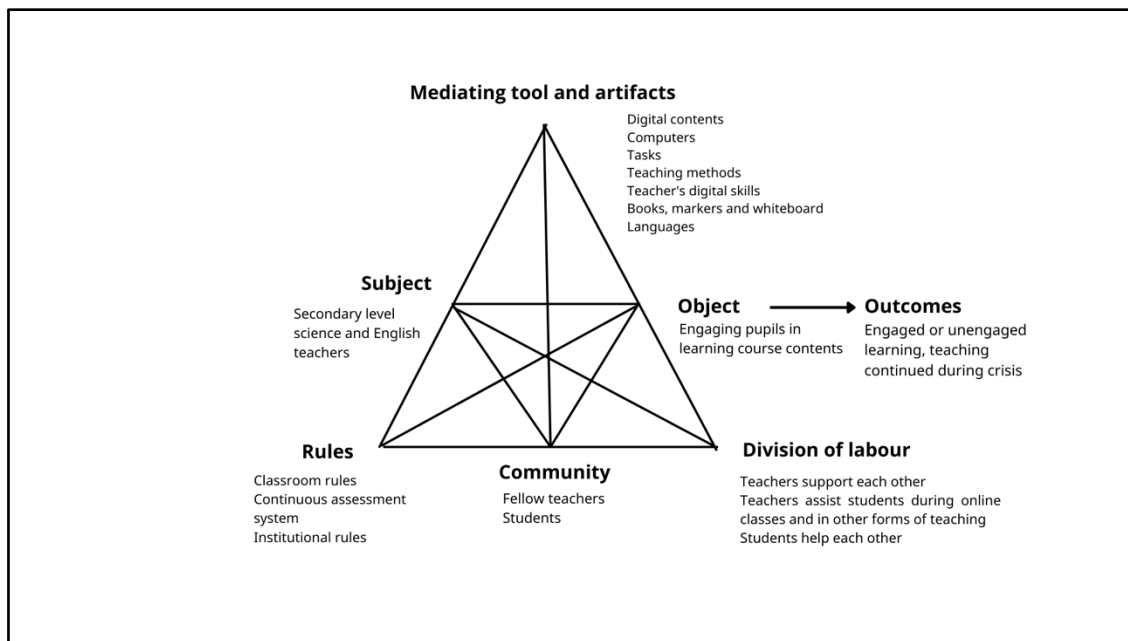### 6.4.1   Teaching activity system (TAS)

The subject of the teachers' activity system is secondary level science and English teachers, and their object is engaging pupils in learning course content during the pandemic (Figure 6.4). Teacher's object-oriented activity is mediated by video conferencing platforms such as Zoom, Google Meets and MS Teams, digital contents, such as videos and PowerPoint slides, digital devices such as mobiles and computers, power supply and internet connection, tasks, teaching methods, their ICT skills and languages they used to deliver lessons. Teaching activity is guided by classroom and institutional rules and assessment system as discussed in Section 6.2.3. Teachers at the same school support each other while participating in an activity, and teachers also help pupils during learning. The former one depicts horizontal relationship and the latter one demonstrates the vertical relationship. The outcome in TAS is that as pupils got engaged in their studies, they learnt subject matters directed by the curriculum, which is an expected outcome. An unexpected outcome is that pupils used technologies for fun and to get entertainment, which triggered systemic tensions to emerge (Section 7.1.1).

Figure 6.4 Teaching activity system - online
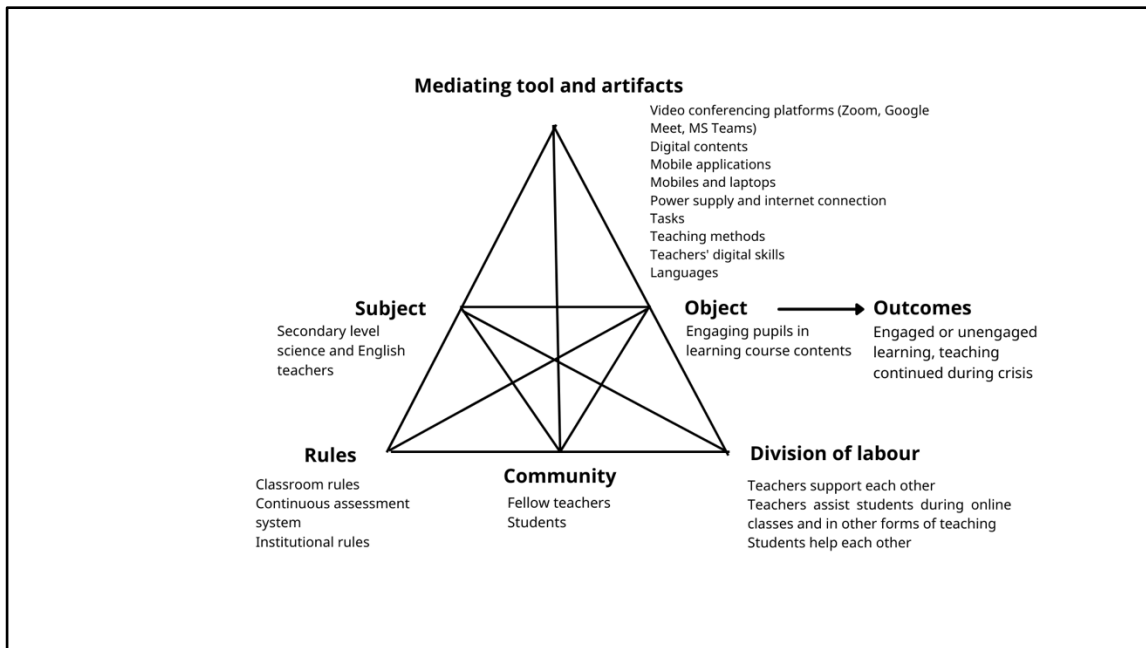
In case of an onsite teaching activity system (Figure 6.5), the tools that mediated the activity

are books, markers, whiteboards, teaching methods that teachers used, digital contents, tasks,

PowerPoint, audio and video materials, computers and teachers' ICT skills to handle

technology. They are the visible mediators whereas the "less visible social mediators of

activity" (Engeström, 2008, p. 27) are the deep social structure of the activity embedded in the

nature of the rules, community and division of labour (Section 3.1). Because teachers were

from the semi-urban area, the colleagues they were working with were not very competent to

support each other to have technology used for teaching. Consequently, they had to wait for

the directive (rules) from a local authority that permits teachers to run onsite classes. Also,

their school could not create a rule to conduct online classes as pupils studying in those areas

were from disadvantaged groups (Section 4.1.4, p. 55). In this case, the social mediators such

as limited support from their colleagues (division of labour), the rules (a local government's

directive), etc. mediated their activity (Section 5.5.1, p. 98).

Figure 6.5 Teaching activity system - onsite

6.4.2 Zooming into the sessions

When teaching activity system is decomposed (Section 4.3.3) by looking into each individual session that has their own objects, multiple sequences and chains of actions within those sequences mediated by different tools and artefacts are observed. 'Giving tasks based on the topic or content of the lesson' and 'teachers' presentation' are common sequences in both online and onsite sessions and 'explanation of lesson related terms and/or concepts' is a frequent mediating action in both online and onsite classrooms. Overall, 'giving tasks based on the topic or content of the lesson' is a common sub-activity in both English and science sessions. During this sub-activity, 'explaining rubrics or giving instructions', 'asking questions to pupil or pupils', 'using pictures' for discussion are the actions carried out by teachers. Explaining the concepts by a teacher is found as a frequently occurring action which is followed by asking a pupil or pupils questions. It demonstrates that even during the pandemic, even though the mode of instruction was online in the majority of schools observed in this study, explaining the concepts or lesson related terms was never lessened. Teachers have plenty of opportunities to use digital artefacts that can help explain the concepts or lesson

related terms (Tausan & Stannard, 2018). Teachers did not minimise or stop explaining the concepts or lesson related terms in online sessions even though they could not see what the pupils were doing in their sessions. Teachers from urban schools asked a lot of questions to pupils and explained the lesson related terms often compared to a teacher from semi-urban schools. In online sessions, teachers equally tried to make pupils as engaged as possible in their sessions maintaining teacher-learner interaction to a great extent as limited engagement is an issue.

'Revision of a lesson', which is one of the components in lesson delivery, was also not uniform in all sessions. It was frequent in online English sessions, and in particular, public schools discussed around the previous lessons a lot. Less revision in the sessions during the pandemic can also be explained by the fact that teachers had to wait for the pupils for a long time to join their sessions, and this long wait lessened the time they had for teaching, which pushed teachers towards the immediate delivery of a lesson instead of engaging them in revising the previous lesson. As there was less revision in the sessions, it could be possible that pupils might have struggled occasionally to link to what they were learning then with the lessons taught the day earlier, consequently, teachers can witness silences due to pupils' cognitive overload (Stickler, 2019).

The most used mediating tools are webcam and microphone as they were the fundamental tools in virtual conference platforms that teachers used to run online classes. In this study, webcam and microphones were counted each time in each sub-activity/activity sequence. Regarding mediating artefacts, only teachers in public schools - both online and onsite have used a mediating tool, PowerPoint slides which helped them present their content effectively as teachers were showing pictures in a slide, such as a picture of internal parts of ears in science sessions to describe internal parts of the ears and a picture of a cat sitting at different positions in different places in English sessions to explain prepositions of place. In English

online sessions, videos and application such as Mentimeter was used whereas even in onsite English session, pupils were engaged using audio and visual materials. Laser pointer and cursors were used in science online sessions to direct the learners while presenting. It shows that teachers used different mediating tools that they could access and use to engage pupils in the lessons being taught during the pandemic. The teacher of science sessions in urban schools used digital tools creatively perceiving the useful functionalities available in the tools. Overall, the teachers at urban schools, both public and private used technology effectively to ensure learners' engagement in the course delivery. This finding, however minimal, questions the common narrative that prevails in parental discourse in Nepal that private schools are better in every respect that includes use of technology. When it comes to the use of technology for teaching and learning between private and public schools in a semi-urban area, public school sessions incorporated technology use.

One of the striking contrasts is that urban schools running online classes used technology copiously to optimise learning during their sessions whereas in the onsite science sessions, a lecture-based approach was used most of the time to discuss exercises when the teacher was revising the lessons. The less use of technology in science sessions in a semi-urban school is also due to limited availability of ICT resources at their schools (Section, p. 55). Rana's (2022) study also confirms that the access to technology in semi-urban areas in Nepal is very limited. Even in English onsite sessions, the way technology was used was minimal as pupils did not get an opportunity to use computers for learning. Instead, the computers were taken as display boards as content would be broadcasted by the teacher to their monitors. SC5, a public school in a semi-urban area has a few computers installed in a lab to teach computer science courses whereas public schools in urban areas, such as SC1 and SC2 have advanced ICT labs where interested teachers can take their pupils and deliver lessons. Even if urban schools were running online classes during the pandemic, and the computer labs based at those schools may not have helped them run classes during the pandemic directly, the use of ICT materials by

teachers at urban schools before the pandemic might have helped them to be familiar with ICT tools. Hence, the teachers at urban public schools were found engrossed in using ICT in their sessions. It also reveals the big urban-semi urban divide in using technology in pedagogy during the pandemic and its possible impact on pupil's learning as pupils of semi-urban schools were not engaged in the lessons mediated by the technology compared to the way ICT mediated learning took place in urban schools. Dawadi et al. (2020) argue that digital learning introduces inequality in access to education in Nepal which is due to the unequal distribution of technology in urban and rural areas although use of technology was a necessity to continue teaching and learning during the pandemic (Espino-Díaz et al., 2020).

Regarding the medium of instruction, the sessions of SC1 used both English and Nepali as pupils selecting both English and Nepali as mediums of instruction were merged in SC1 during the pandemic, whereas the sessions in SC6 used Nepali dominantly even though SC6 claims to have English as a medium of instruction. This indicates that while teaching a technical subject such as science, teachers were not sticking with one language ascribed as a medium of instruction. They switched to English and Nepali as per their comfort to explain scientific concepts. Regarding the use of Nepali in English sessions, the use of Nepali was sporadically occurring both in public and private and urban and semi-urban schools. This result can also be extended further to argue that English as a medium of instruction is just a catchy slogan used by private and public schools to attract pupils at their institutions; however, teachers of technical subjects such as science use mixed languages in their sessions.

One of the novel findings is the use of Messenger Group by schools during the pandemic. Three out of six schools had created a class-wide Messenger group which was used to disseminate educational information. In the Messenger group, school managers shared the information, such as a lockdown order circulated by the Chief District Officer or a notice of their school for all the teachers, pupils and parents about the schedule to collect homework

given to the pupils and so on. The Messenger group became a useful tool during the pandemic both to provide information and other learning resources. As parents, learners, teachers and educational managers were familiar with a Messenger group, it stood out as one of the useful educational tools even though it is designed for social networking purposes. It is also congruent with the findings of Laudari (2019) who found out that before the pandemic Nepalese teachers used social networking sites such as Messenger group for educational purposes in Nepal.

Overall, what emerges from the results reported here is that teachers from urban schools whether private or public conducted sessions having a variety of sequences and actions mediated by different tools and artefacts. Teachers from urban schools seemed to be more confident in using digital technologies in their sessions during the pandemic whereas teachers at semi-urban schools running onsite sessions used technology minimally and the resources available at their schools were also very limited.

6.5   Summary and conclusion

This chapter explored the sequences and actions in each English and science session and the mediating tools used by English and science teachers. The majority of sessions had several sequences and actions that created variety to a lesson delivery. 'Teachers' presentation' was a common sequence that was found in all sessions whereas 'explanation of lesson related terms and/or concepts' was a common action. There was no one-to-one relation between actions and sequences as many similar actions were carried out by a teacher in different sequences. For instance, an English teacher explained lesson related terms and/or concepts while discussing previous lessons, during his presentation of the content and at the time playing a video.

Teachers at urban schools used ICT tools more confidently compared to the teachers at semi-urban schools. Both English and science teachers at urban schools in general were found to be technologically fluent as they used a variety of tools effectively to run their sessions, whereas the teachers at semi-urban schools were not found to be competent in using ICT for teaching and learning compared to the teachers in urban schools. It could be also due to the unequal access to digital resources in urban and semi-urban schools.

Teachers faced several disruptions when they used technology in their sessions due to their limited technological skills and access to better resources. As a result, several systemic tensions emerged within the teacher's activity system or between the activity systems of teachers and pupils. Many of those systemic tensions led to new action possibilities of technologies i.e., ICT affordances that were acted upon by teachers. The upcoming chapter discusses such systemic tensions and ICT affordances acted or not acted upon by teachers.

Chapter 7 Emerging contradictions and affordances

Chapter six discussed ICT use during the pandemic to address the issue of educational disruption, and in the course of using ICT, a number of systemic tensions, i.e., contradictions, emerged in English and science sessions. Teachers who conducted English and science sessions online acted upon ICT action potentials, i.e., ICT affordances also to resolve some of the emerging contradictions. This chapter discusses the analysis of contradictions and affordances observed in English and science sessions. The interview and focus group discussions data fleshes out the systemic tensions and the affordances acted or not acted upon by teachers.

7.1 Emerging contradictions in English and science sessions

Contradictions in English and science sessions are manifested by breakdowns, disruptions, focus shifts, inter alia (Section 3.1). These contradictions may emerge at the same node or different nodes within an activity system or at different nodes across activity systems. The unit of analysis is the interacting activity systems (Section 5.6, p. 113). The primary activity system is the teaching activity system (TAS) modelled in Section 6.4. Learning activity system is one of the interacting systems that shares the object with teaching activity system. As some of the contradictions identified in this section are between teaching activity system and learning activity system, the latter one is modelled here (Figure 7.1).

Figure 7.1 Learning activity system
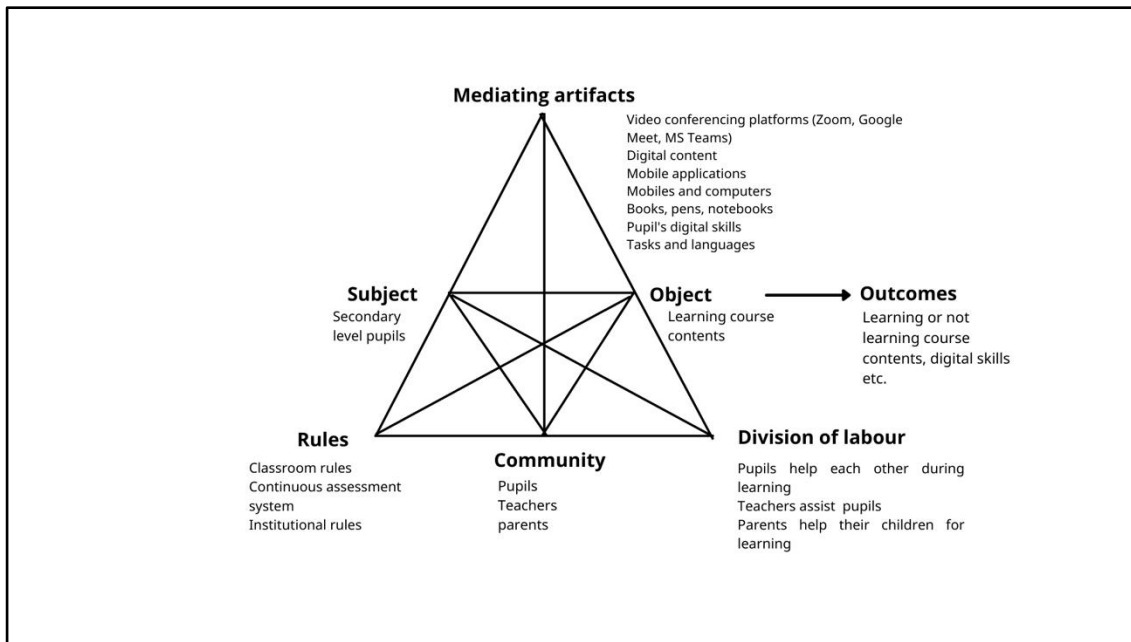
The secondary level pupils are the subjects of learning activity system. They participate in this activity to learn course contents. Their activity is mediated by video conferencing platforms they use, such as Zoom, Google Meets, MS Teams, digital tools, such as mobile phones and computers, books, pens, notebooks they used to study, tasks given to them, languages and their ICT skills. The learning activity system is constrained by classroom rules set by teachers, institutional rules and continuous assessment systems. The community members are their own classmates, their parents and teachers. They have a horizonal relationship with their classmates as they support each other and a vertical relationship with teachers as teachers exercises their power at times during the sessions. For instance, teachers instruct pupils how they should send their assignments to teachers during sessions. As an outcome of this activity, pupils could either engage or not engage in learning course contents, learn or not learn ICT skills while attending classes etc.

The following section deals with systemic tensions categorised into five themes along with the levels of contradictions. Based on where these contradictions emerge, they are categorised as primary, secondary, tertiary and quaternary contradictions (Section 3.1, p. 34).

7.1.1   Contradictions: A thematic division

Section 7.1 gave a brief overview of manifestations of contradictions which emerged in the science and English classrooms which formed a part of this study. All contradictions are categorised under five different themes viz., i) power cuts ii) poor internet connection iii) limited digital skills of teachers iv) lack of learners' engagement and v) institutional and classroom rules, which are discussed below along with their levels.

Power cuts

Power cuts was one of issues faced by teachers. Power cuts further led to the communication breakdown as there was no internet connection for teachers, as a result they could not continue teaching. Teachers often got disconnected both in science (Excerpt 7.1) and English sessions (Excerpt 6.15) due to power cuts in their area and/or no connection on the teacher's end. Excerpt 7.3 below reveals a technological breakdown in a science session. After 40 minutes of instruction, ST1 was suddenly disconnected. Pupils patiently waited for nearly eight minutes from 40 minutes 47 seconds to 48 minutes 44 seconds for her to arrive in the session. After seven minutes of waiting, two pupils informed their fellow classmates that they could leave the session as these pupils got this information from ST1. These two pupils got the information through their class-wide Messenger group. Gradually, they started leaving the session.

Excerpt 7.1: Science session, SC1SCO2

Action description	Mediating tools and artefacts
ST1 explains about inflammable gas and the features of hydrogen gas in Nepali. (TC 00:38:14.553- 00:40:47.381) ST1 gets disconnected, and students await her to arrive. Eventually, they all leave the class. (TC 00:40:47.381 - 00:48:44.818)	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide – colourful texts and a graphical representation of hydrogen gas), and mic used by students (TC 00:36:45.243 – 00:40:46.648)

The above case illustrates a technological breakdown because the teacher lost an internet connection. This breakdown, the silence in the science session, SC1SCO2 is what Stickler (2018) calls the 'technical silence'. The problem of breakdowns due to power cuts, which would further interrupt an internet connection is also reported in a teachers' focus group discussion (Excerpt 7.2).

Excerpt 7.2: Teachers' focus group discussion, TFGD

```
ST1:      And, the other issue is that we could not play videos
          that we have made [collected]. Some days ago, as ST2
          said, the problem related to failure to play video was
          quite high. And with children, there was a problem of
          internet, and the other problem is power cuts. At times,
          in the middle of a class, power was cut, and we had to
          re-join in the middle and we would lose time. These were
          the problems we faced.
[Translated by the researcher]
```

The above excerpt (7.2) highlights that frequent power cuts remained one of the issues in their online sessions. As a result, both teachers and pupils often had to re-join during the sessions. The issue of power cuts which the teacher faced often was also highlighted by a local policy maker, PM3, during the individual interview as shown in the following excerpt (7.3). PM3 is a policy maker working in one of the municipalities in a semi-urban area.

Excerpt 7.3: Interview with a policy maker 3, EUBMPM3I

```
PM3:      The other thing is the electricity flow at our place. It
          is very irregular. There will be power cuts and
          resumption. In certain circumstances, [due to
          fluctuation in voltage] the equipment [we use] may
          blast. That's it! Electricity is another problem.
[Translated by the researcher]
```

The focus group discussion and classroom observation data corroborate that English and science sessions had frequent breakdowns due to frequent power cuts during their sessions. Secondary contradictions emerge owing to power cuts, which further led to no internet connection for teachers' (Excerpts 7.1 and 6.15) and this led to disruptions in teaching activity as shown in Figure 7.2.

Figure 7.2 Contradictions between object and mediating tools and artefacts in the TAS
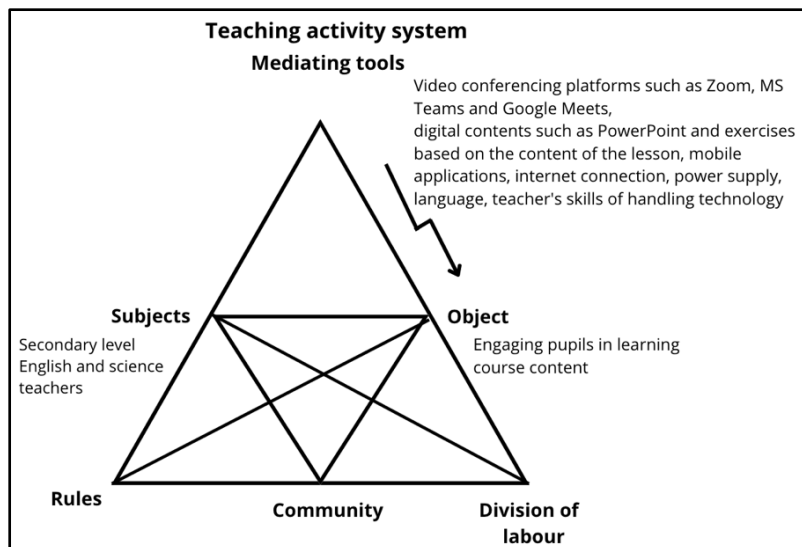

Figure 7.2Figure 7.3 demonstrates the secondary contradiction that exists between mediating tool i.e., no power supply and object, i.e., engaging pupils in learning course content of TAS. Secondary level English and science teachers faced difficulty in engaging pupils learning course content due to frequent power cuts they faced.

Poor Internet connection

Contradictions in TAS emerged due to the poor internet connection. Disturbances in science and English sessions were very frequent owing to the poor internet connection. The following excerpt 7.4 is one of the examples of the disturbance caused by unreliable internet in an English session. In this case, ET1 was playing a video that explains 'prepositions of place' in her session SC2ECO2.

Excerpt 7.4: English Session, SC2ECO2

Action description
ET1 plays a video related to 'preposition of place' but the learners cannot see anything. Only after some time, the picture appears in the clip. (TC 00:13:07.676 – 00:13:43.705)
The video voice over and a picture that appears in the video is not matching. (TC 00:14:38.852 – 00:18:07.920)
The video voice over and a picture that appears in the video do not match. (TC 00:18:10.280 – 00:18:39.288)

Excerpt 7.4 details how the flow in the activity was disturbed in the English session when ET1 tried to play a video. At first, the learners reported that they could not see anything when ET1 played a video, and secondly, from 14 minutes and 38 seconds to 18 minutes and 39 seconds, for about four minutes, the audio and video frame did not synchronise at all. The voice in the video was played without interruption, whereas the video frames having pictures appeared only after some time. This was due to the slow internet on the teacher's end, which she acknowledged in her session after the video was played. This disruption made it more difficult for pupils to understand the content of the video, as it did not help the pupils to process the information related to prepositions of place. Later, after the video was over, the teacher explained the prepositions of place again using a picture.

Pupils equally highlighted the connection issue that teachers often faced due to which pupils had difficulty to hear them. For example, S8 in a focus group discussion, SFGD2 points out, *'at times because internet was poor on teachers' end, we could not understand what teachers were saying, and at times even those slides were not clear [translated by the researcher]'.*

The contradiction between mediating tools i.e., poor internet connection, and an object in TAS i.e., engaging pupils in learning the content (prepositions of place) is a secondary contradiction. Poor internet connection did not help the teacher adequately in engaging pupils in learning prepositions of place, which invited disruptions in TAS.

Contradictions also existed due to poor internet connection or no internet connection on a pupils' end. This contradiction occurs between the object of TAS and mediating tool of LAS as internet connection mediated a pupil's object-oriented activity. The following excerpt (7.5) illustrates how the contradiction emerged across teaching and learning activity systems. The object of the English session (Excerpt 7.6) is teaching grammar exercises. Within the activity,, ET2 assigned a task to pupils via chat, which was to write a description of the pupils' childhood in comparison to the present day in about 150 words.

Excerpt 7.5: English session, TFGD

Transcription	Action description
Pupil: xxx in chat. It's not opening at all. ET2: Sorry? Pupil: The chat is not working. I cannot open the chat box. ET2: Maybe due to slow internet. You could see the question there, no? You read the question, did you? Pupil: I just read the question. I recalled and write it. After that there is no other messages. ET2: Un, you will have to wait. I am reconnecting at the dot. Your messages may be slow to receive. Pupil: I just missed writing ma'am. I didn't think you have written ET2: I did not write except the question because I, I, I'm expecting the answers now. Un, no problem. You wait, maybe it will appear to you in a while or you will have to, you know re-join sometimes that also works. Pupil: Okay ma'am	A pupil informs the teacher that she could not open the chat box and chat is not working. (TC 00:19:35.235 – 00:21:00.500)

One of the pupils reports that she could not open the chat box. The chat was not working for her, as a result, she could not submit her answer to the teacher to get the teacher's feedback. Finally, she read aloud her writing to the teacher and the other pupils in the group. In this case, when the teacher's activity system is taken as a primary activity system, the contradiction is between teachers' object i.e., teaching grammar exercises and meditating tool of learning activity system i.e., slow internet connection which did not allow the pupil to submit her work and get feedback (Figure 7.3).

Figure 7.3 Contradiction between meditating tool of learning activity system and object of teaching activity system
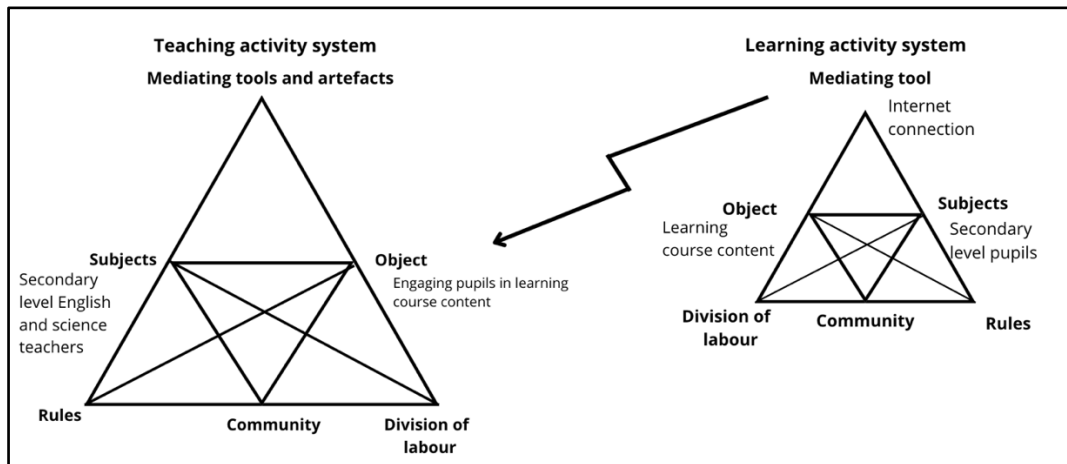
In Figure 7.3, the lightning arrow shows the quaternary contradiction as it occurs across activity systems between mediating tool of LAS and object of TAS.

In a focus group discussion (Excerpt 7.6) and interview (Excerpt 7.7), participants acknowledge the slow internet connection or no internet connection for some pupils and its impact on taking part in learning.

Excerpt 7.6: Student focus group discussion 2, SFGD2

```
S9:      The first problem is that when everyone starts using the
         internet, there would be a load to the server. Main
         thing is that, therefore, the server would be down at
         times, at times (xxx). It's not possible to have a good
         connection of internet at everyone's home. There will be
         slow Internet in some homes. And we would face the issue
         related to slow internet often.
[Translated by the researcher]
```

Excerpt 7.7: Interview with a parent, SC1P1I

```
P1:      At that time as well, sometimes, Wi-Fi was not up and
         running. At that time as well, NTC [Nepal Telecom) used
         to give Internet package. NPR 20 (nearly 17 cent) for
         one hour. It was a service for the economy budget
         [package]. When our server was down, we provided the
         internet to our kids through data.
I:       How many times did you help your kids by making them use
         data?
P1:      If I calculate all, it will be nearly for a week. It's
         adding both my daughter's and son's use. In some cases,
         they also missed the classes. When I was not there, they
         would not join and the reason for that as they would say
```

```
                    is there was no internet and also sometimes because
                    there was no power.
    I:              How many times did they miss classes due to power cut?
    P1:             I think they may have missed 3/4 times due to power cut.
    I:              Oh okay.
    P1:             Due to electricity.
    [Translated by the researcher]
```

In Excerpt 7.6, a pupil (S9) refers to the issue related to the poor internet connectivity which is occurring because the internet is used by a maximum number of people at this pupil's home during the pandemic. In Excerpt 7.7, P1 states how her daughter often faced difficulty due to poor or no Internet connection and, consequently, she missed some of the sessions. The slow internet connections on pupils' end brought disruptions in teaching, thus creating systemic tension.

Limited digital skills of teachers

Teachers' limited skills in handling technology also triggered some contradictions in the teaching activity system. Teachers' digital skills was one of the mediating tools to enable teachers to take part in an object-oriented activity (Section 6.4, p. 154). The following excerpt (7.8) details the difficulty that teachers face while handling Mentimeter, the interactive presentation software. ET2 faced difficulty in SC3ECO1 when ET2 was trying to engage pupils in warm-up exercises which they designed using Mentimeter. The teacher wanted to present the open-ended question so that the pupils could see it in their devices and get engaged in a writing task.

Excerpt 7.8, SC3ECO1, English session

Transcription	Action description	Mediating tools and artefacts
ET2: Can you see the second question as well? Pupil: No ma'am, no ma'am! Pupils: Ma'am, it is saying - 'the question is not open for voting. Please wait the presenter to open it.' (Student A) Yes, ma'am, my also say (Student B) ET2: Which one? The first one Pupil: When we open the (xxx) in the chat ET2: Okay then, let me do this then, wait.	ET2 tries to show another question using Mentimeter but she failed to show the second question. (TC 00:07:26.762 – 00:08:01.121 She pastes the link to the chat box again, but she does not click on 'present' option; therefore, she cannot show the second question. (TC 00:08:01.121– 00:08:15.588)	A webcam and mic used, Mentimeter dashboard shown by the teacher (TC 00:07:27.594 – 00:07:34.130)

Since Mentimeter was integrated into MS Teams, a constellation of nested spaces emerged such as, 1) the virtual space in MS Teams, 2) another virtual space in Mentimeter and 3) the physical space where pupils were situated while attending the English session. On one hand, the nested online spaces might lead to having an impact on moving across spaces, and on the other hand, the limited technological skill of a teacher can make it difficult for them to move between those spaces and act on some functionalities. For example, in the above excerpt (7.8), pupils were complaining that they could not see the question for some time on their devices, and ET2 struggled to show the question on Mentimeter. She could not transition to the second question from the first question smoothly on Mentimeter. As an immediate response to this situation, the teacher deleted the first question in her Mentimeter dashboard, only retained the second question and shared the Mentimeter link in the MS Teams Chat.

The teacher's immediate action can also be well-explained by looking at the temporal development of the teachers' activity. Before COVID-19, this teacher never used Web Tools such as MS Teams and Mentimeter, nor had she taken any online classes when the school was closed during the previous crisis following the 2015 earthquake in Nepal (Section School 3

(SC3)). The lack of ICT skill in teachers is also pointed out by SM1, a school manager in the

interview (Excerpt 7.7).

Excerpt 7.7: Interview with a school manager 1, SC4SM1

```
SM1:        For example, some teachers don't have skills to teach by
            sharing the mobile screen and some teachers don't have
            proper skills [to handle technology]. Some teachers
            don't attend classes as per their schedule [in Zoom].
            There is a [class] schedule, and they keep saying they
            are coming to attend. Another problem is that they
            create a new Zoom link and send the old Zoom link [to
            the pupils], and when they host Zoom meet, they use the
            new Zoom link. [This leads] students to be in old Zoom
            meeting (laughs) and teachers in a new Zoom meeting.
            [Hence], a teacher and students never meet. This also
            happened.
```
   [Translated by the researcher]

SM1 accentuates teachers' lack of ICT skills and the way it impacted online sessions during the

pandemic. Teachers faced difficulty in running online sessions in the early days of the

pandemic. This point is also highlighted by a parent (P2) in the following Excerpt 7.8 below.

Excerpt 7.8: Interview with a parent, SC3P2I

```
P2:         Pupils also juggled so much in [MS] Teams or Zoom, they
            [the teachers] told sometimes here and sometimes there
            creating multiple groups. While creating groups in
            Teams, there's possibility to create different groups –
            should be from calendar. Class is held in one place and
            students keep searching at another place. So, they keep
            searching. It took some time for a teacher to figure it
            out.
```
   [Translated by the researcher]

Teachers' digital skills are the tools that mediate the object-oriented activity in TAS (Section

6.4, p. 154). The object was to engage pupils in warm up exercises. It is the contradiction

occurring between the teachers' mediating tool and object, thus it is a secondary contradiction

(Figure 7.3).

Lack of learners' engagement

Contradictions also emerged due to lack of learners' engagement in online sessions. Lack of

learners' engagement is manifested by disruptions or disturbances. For example, disturbances

in the teaching activity system is seen due to `pupils' presence in two nested spaces at the same time when they joined the sessions. The two spaces were a) virtual i.e., in a video conference managed by the tools they used and b) physical i.e., at home with family members. The following excerpt (7.9) illustrates the nature of disturbances due to pupil's presence in nested spaces while joining an online session. It is one of the pupils attending the English session SC1SCO2, and this pupil happened to take part in a conversation with one of their family members in the middle of the session.

Excerpt 7.9: English session, SC1SCO2

Transcription	Action description	Mediating tools and artefacts
Pupil: 'Hello Nani[13], don't take [food] yourself and eat it, okay! Or else I will tell [mom or dad].' ST1: What has happened? (some pupils and a teacher laugh at this remark)	One of the students says to her family member something related to food (which is not related to a topic), maybe she was not aware that her microphone was on. There was a laughter for some time. (TC 00:07:51.214 – 00:08:00.567)	A webcam, mic and cursor used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide – GIF of an eye, pictures of eyes with labels and the colourful texts), and a mic used by students. (TC 00:07:58.944 – 00:08:24.555)

Excerpt 7.9 is a typical example of how online classes can often be disturbed. In the above case, a pupil did not realise that her microphone was on as she was not taking part in classroom interaction then. Hence, she talked to her small sister about food during the session. When this conversation was overheard by the other pupils, it caused laughter in the session. There is an interruption in the session which is because she was in nested spaces. The interruption was due to her participation in a conversation with her sister in the physical space, which disrupted the classroom delivery taking place virtually for a brief period of time. The pupil did not realise she had caused this interruption until she finished talking to her family member and got a response from her teacher and her friends. It is an example of 'virtual corpsing' which is seen as an interruption in the flow of an activity that is happening virtually

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[13] The word in Nepali used to address a young girl.

(Marsh, 2001; Nocchi, 2017). Marsh (2001) calls virtual corpsing as a shift in user's attention from the mediated to the real world (Section 3.1, p 28). The example of virtual corpsing suggests that there can be different types of interruptions during online classes in the background or on the pupils' end. Excerpt 7.10 gives another example of an interruption of a similar nature. In the English session, SC2ECO2, ET1 had just started the class, and meanwhile, she was discussing the previous lesson related to prepositions. After three minutes and 34 seconds, the audio of a movie was heard in the session. Some pupils who heard the audio laughed at certain dialogues. These actions interrupted in a session. ET1 had to stop what she was doing, i.e., discussing the lesson she taught them in the previous session, and she had to deal with the new emerging situation, which is a deviation from the normal scripted course of event (Engeström, 2008a) (Section 3.1, p. 28) At first, she asked the pupil to mute his microphone. When the pupil did not respond, other pupils who were attending the same session asked the teacher to mute his microphone. And she said that she was muting his microphone. In the meantime, she was also asking the pupil as to what he was doing.

Excerpt 7.10: English session, SC2ECO2

Transcription	Action description	Mediating tools and artefacts
ET1: Mute, mute microphone, (xxx)[What are you]doing there? ... Paudel? Pupil: Ma'am, 'please remove Suraj' ET1: Okay, okay, I am just doing, wait a minute. Okay un, huh (laughs gently) sometimes it happens. Maybe he is watching TV. Suyash Paudel? Hello Suyash, are you watching TV or you are studying the class or you are studying right now? What are you doing there? Unh? ... Hello Suyash? He is looking at us but not responding. Hello, Suyash? What happened? Are you watching TV? Still no response here. Okay let it.	One of the students is watching a Hindi movie and the audio of the movie is audible to everyone present in a session. (TC 00:03:35.207 – 00:06:12.428) A des: ET1 is interrogating with a student who was watching a movie.	A mic used by the teacher and pupils (TC 00:03:35.207 – 00:06:12.428) (A pupil who was watching a movie turned on the camera in the middle)

This episode (Excerpt 7.10) demonstrates the disruption caused in the English session. In both excerpts (7.9 and 7.10), the contradictions are between division of labour of LAS and object of

TLS. In both cases there is a lack of cooperation by pupils to teachers. In the first case, the pupil could have switched off their microphone as she was not speaking then or she could have been in a quiet place while attending the session or she could have concentrated on the session instead of observing unrelated things around her while taking a session but she made a spontaneous remark related to food. In the second case, the pupil should have attended the session instead of watching a movie during the session.

Pupils also did not respond often when they were called by their teachers which shows limited engagement of the pupils. The following excerpt (7.11) illustrates the manifestation of a breakdown in an English session SC3ECO2. The object of the session was describing the Jitiya festival. In this example, ET2 selected pupils to answer the question she had asked. However, none of the pupils she selected answered her question. She had asked them to read the text from their textbook related to the Jitiya festival (Footnote [7]), and say a sentence related to it. She also asked the pupils whom she had selected to raise their hand or write on the chat what had happened on their end. But there was no response from them.

Excerpt 7.11: English session, SC3ECO2

Transcription	Action description
ET2: You're going to speak only one sentence about the text. And then you are not going to repeat what your friend has spoken. ET2: Okay, fine. So let me start from just beginning. Anup Shrestha, Anup Shrestha? Anup Shrestha? Anup, where are you? Hello Anup, where are you? He is not responding. Are you list [ening] - please, raise your hand. Anup Shrestha? What happened? Please write what happened? He is not responding. I know most of yours [your] microphone doesn't work when it's needed. When you need to turn it on, it doesn't work, I know that. ET2: As Anup is not responding, so Priyam Pokhrel. Priyam Pokhrel? Priyam? Priyam Pokhrel? Priyam Pokhrel? He is not responding either. Very good boy! Sandeep Pandit? Sandeep Pandit? Hello Sandeep? Sandeep Pandit? See, how are your friends? Anupa Gautam?	ET2 explains how the task should be done. (TC 00:05:25.870 – 00:06:13.440) ET2 starts calling a pupil to respond to her query but there was no response from the pupils. (TC 00:06:13.648 – 00:07:38.210)

This episode (Excerpt 7.11) signifies a breakdown in communication. MS Teams participants' list indicates that pupils who were called by the teacher were present in the session. As the pupils did not speak to the teacher, the reason for the silence could not be identified.

Breakdowns in online sessions were also reported in a teachers' focus group discussion (Excerpts 7.12 & 7.13). For instance,

Excerpt 7.12: Teachers' Focus Group Discussion, TFGD

```
ET1:     As ST1 said, just before that the problem emerged on
         student's end. ST1 already said about the problem
         related to pupils [some pupils didn't speak when
         teachers wanted them to take part during interaction.
         The pupils were present, but they would not speak, and
         later they would say there was a connection issue]. I
         shouldn't repeat it again because the problems we faced
         was - some students felt asleep, some did not respond
         when we called them, there were a lot of issues. That is
         what I felt.
```
[Translated by the researcher]

Excerpt 7.13: Teachers focus group discussion, TFGD

```
ST1:     When we are having interaction, some children would not
         speak. They were in the class/session but did not use to
         interact. Because they would not respond when we would
         call them, we did not know whether they were in the
         class or they had a problem of poor network. Based on
         the condition of Nepal, we had to agree that it could be
         because of some issues.
```
[Translated by the researcher]

As observed in an English session (Excerpt 7.11), teachers shared that the problem they faced was that pupils did not respond to the queries they made in their sessions. Teachers explained that the pupils used to remain quiet when teachers tried to interact with pupils. They raised the issue of lack of engagement in their sessions.

All the episodes above (Excerpts 7.9, 7.10 and 7.11) demonstrate that some contradictions emerged between division of labour in LAS and object of TAS. Thus, the contradictions that emerged in these three episodes are quaternary contradictions as shown in Figure 7.4

Figure 7.4 Contradiction between object of teaching activity system and division of labour of learning activity system
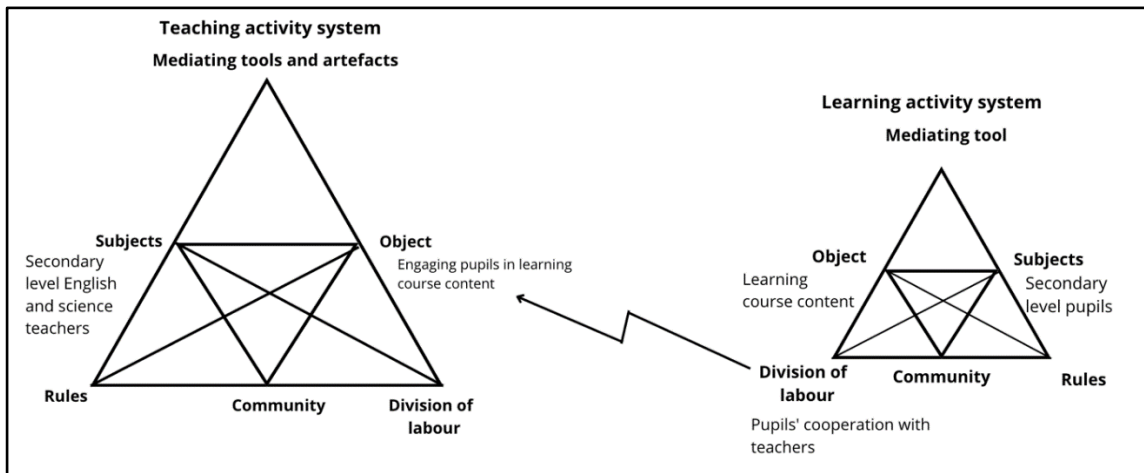
The lightening arrow in Figure 7.4 shows that the pupils' lack of cooperation with teachers as seen in Excerpts 7.9, 7.10 and 7.11 is the manifestation of the systemic tension between these interacting systems. Teachers could not engage pupils as they wanted due to limited cooperation from the pupils.

Institutional and classroom rules

The rules formed by institutions and classroom rules also prompted systemic tensions in teacher's activity system and interacting system of TAS and LAS. Institutional rules and classroom rules in activity systems constrain the object-oriented activity. At times, these rules also play some roles for disruptions to emerge in the activity system. For example, Excerpt 7.14 indicates the rule created for a classroom prompted disruption in TAS. The session SC3EC01's object was paraphrasing the poem 'Past and present' by Thomas Hood. After explaining the poem, ET2 gave pupils a matching exercise, i.e., to match words used in the poem with their meanings. Meanwhile, she also started taking attendance of pupils. The action of taking attendance caused disruption in one of the sequences, i.e., involving students in doing the given exercises.

Excerpt 7.14: English session, SC3EC01

Transcription	Action description	Mediating tools and artefacts
ET2: Classwork, classwork, un, because you are checking time. Let's do this one and then. Can you see the screen. This is simple classwork. Okay let me xxx ET2: Ignore this one okay 'hhgdff' whatever is there. Because if I delete it, it comes forward, Yi. Adjust side. Do it in copy. Quickly. Match the following words with their meanings. Robin, Laburnum, Lilac, Peeping, Borne away, Swallow, Fir, Heaven	ET2 shows the task on her screen. The task is to match words with their meanings related to the poem. (TC 00:35:51.653 – 00:35:55.790) ET2 asks the pupils to ignore the meaningless group of letters that she has typed in the 'Notes' application that she has used. She shows how the text shifts if she deletes. (TC 00:36:12.402 – 00:36:54.364) ET2 is taking attendance of the pupils. (TC 00:37:16.071 – ...)	A webcam and mic used, and a matching task on Notes shown on the screen by the teacher (TC 00:35:51.091 – 00:37:15.454)A webcam and mic used, and a matching task on Notes shown on the screen by the teacher. (TC 00:36:12.402 – 00:36:54.364)

Excerpt 7.14 shows that ET2 started taking attendance from 37 minutes 16 seconds in a session, and at the same time, she was also engaging pupils in the activity as explained above. While taking attendance, often, she checked with pupils by calling pupils names loudly to find if they were present in her session.

In a regular onsite session, taking attendance is not compulsory if it is not the first session in a school, as pupils will be on the same school premises throughout the day. In online sessions, this new rule to take attendance, which appeared as one of the actions, brought disruption in the regular flow of teaching. Taking attendance by the teacher was required to make sure pupils were present in the session regularly, and at the same time, she also had to engage pupils in learning course content, and this triggered a contradiction between rules and object of TAS as shown in the following Figure 7.5.

Figure 7.5 Contradiction between rules and object in TAS
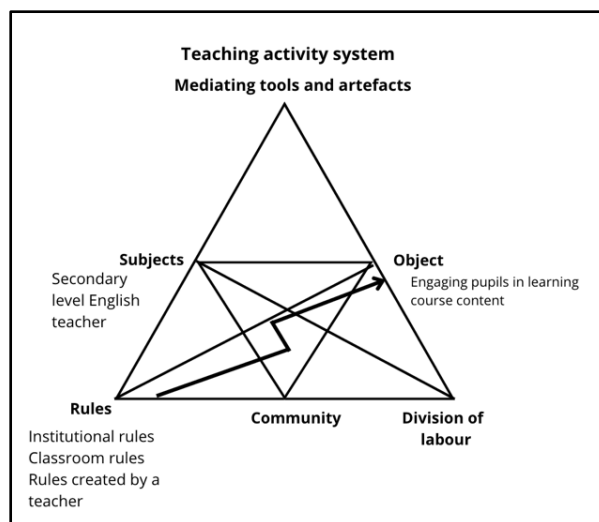
The lightening arrow in Figure 7.5 shows the contradiction between rules created for classroom and the object of TAS. This is the secondary contradiction as the systemic tension occurs between two nodes of TAS. As the teacher had to take attendance in their sessions, she took attendance of pupils while giving a task to them. She could not check their presence quietly as in onsite classes. Instead, she had to call pupils' names, which consequently disturbed the flow in engaging pupils in learning as pupils also had to listen to the teacher and respond when the pupils' names were called out.

Another contradiction that emerged was between rules in TAS and the division of labour in LAS in one of the ET2's English sessions. After ET2 assigns a writing task related to grammar - writing about their past using 'used to' structure to pupils, all of a sudden, she reminds two pupils to change their profile pictures (Excerpt 7.15).

Excerpt 7.15, English session, SC3ECO2

Transcription	Action description	Mediating tools and artefacts
ET2: Nabin, Nitin, un, you are supposed to change your profile picture you know that. Sorry to disturb you. Pupil: Okay ma'am ET2: Telling you, okay? Not only them others are also there and right now I cannot see all.	ET2 names two pupils and mentions that they have to change the profile pictures. (TC 00:17:49.113 – 00:17:59.100)	A webcam and mic used by the teacher. (TC 00:17:49.113 – 00:17:59.100)

Uploading a proper profile picture in pupil's MS Teams account is the institutional rule, which is also the rule applied to each session (Section 6.2.3, p. 138). Learners were supposed to abide by this rule and upload their profile pictures. As they have not done so, their roles provoked a systemic tension between rules of TAS and pupil's division of labour as shown in Figure 7.6 below.

Figure 7.6 Contradiction between rules of TAS and division of labour of LAS
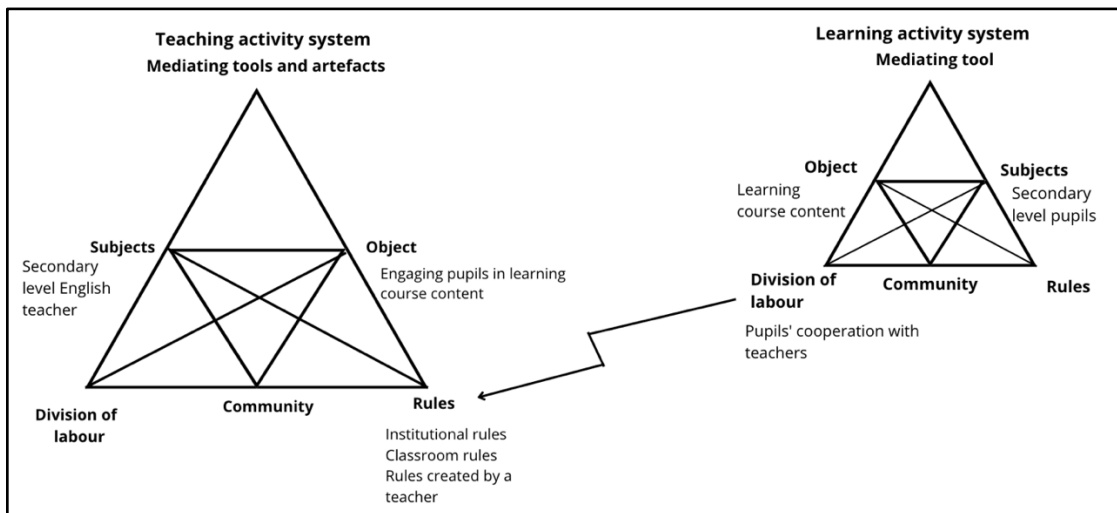
In Figure 7.6, the lightning arrow demonstrates the quaternary contradiction between the rules of TAS and division of labour of LAS. As students did not abide by the institutional rules which is also the rule for the classroom, it triggered the conflict between two interacting activity systems.

In summary, power cuts, poor internet connection, limited digital skills of teachers, lack of learners' engagement and institutional and classroom rules were the five themes that show the manifestation of contradictions that emerged in online sessions. Secondary contradictions emerged between mediating tools and object, and also between rules and object in the teaching activity system. Quaternary contradictions in the study emerged between object of TAS and division of labour of LAS and between the object of TAS and mediating tools of LAS.

7.2   Affordances of technology for teaching and learning

Contradictions often lead to the design and implementation of new initiatives, which are action possibilities acted upon by the educational stakeholders such as teachers (Section 3.3, p. 39). The action possibilities that the ICT environment offered which teachers acted upon are the affordances of technology for teaching and learning (Section 2.2.1, p. 19). This section discusses the action possibilities of ICT, i.e., ICT affordances that teachers acted upon while running sessions during the pandemic.

In English and science online sessions, mainly two types of ICT affordances were acted upon - technological and educational. Technological affordances are the properties of ICT that subjects could use for their specific purposes in teaching and learning contexts and educational affordances of ICT are the action possibilities that ICT tools or artefacts offer to a teacher to achieve the educational outcomes in teaching and learning contexts (Section 2.2.2, p. 22). The remainder of the section discusses technological and educational affordances acted upon or not by teachers in English and science sessions.

7.2.1   Technological affordances

Teachers in English and science sessions acted upon several technological affordances. To run the sessions, ST2 used Google Meet, and ET1 and ET2 used MS Teams as video conferencing platforms, which were the early versions available during December 2020. These video conferencing software underwent a rapid development having several changes in their functionalities. Hence, there were several design affordances added during those initial months.

All teachers except ET2 and ST2 used PowerPoint slides in their sessions. It was only ET2 who used the Mentimeter, and Notes application available on Mac. When compared with the

designed affordances of some tools (Table 7.1), which were used by teachers in their sessions, teachers have used a few designed affordances of the web tools they used.

Table 7.1 Designed affordances of some of the tools used by English and science teachers

Tools	Designed technological affordances	Teachers having access	Affordances acted upon by teachers
Google Meet	sharing a screen, turning on and off a camera, turning on and off a microphone, changing a background/ applying visual effect, whiteboarding, raising a hand, turning on captions, chatting and admitting guests	ST1	sharing a screen, turning on and off a camera and admitting guests
MS Teams	sharing a screen, turning on and off a camera, turning on and off a microphone, changing a background, raising a hand, turning on captions, chatting, creating assignments and admitting guests	ET1	sharing a screen, turning on and off a camera, turning on and off a microphone,
		ET2	sharing a screen, turning on and off a camera, turning on and off a microphone, changing a background, chatting
Microsoft PowerPoint	using pictures in slides, hyperlinking, using different colours, fonts and font size, animating the content in a slide, adding transition and using laser pointer while presenting	ST1	using pictures in slides, using different colours, fonts and font size, the content in a slide, and using laser pointer while presenting
		ET1	using pictures in slides, using different colours, fonts and font size
Mentimeter	Live polling, creating a word cloud, asking multiple-choice questions, asking open-ended questions, tracking time and presenting	ET2	Live polling, asking multiple-choice questions, asking open-ended questions, tracking time
Notes (in Mac)	Writing a text, creating a list, creating a table, locking a note, taking a photo, scanning a document, adding a sketch and sharing a note and	ET2	Writing a text

Table 7.1 shows that while using Google Meet, ST1 shared her screen and turned on the camera and microphone, but she did not use any other functionalities of Google Meet. Likewise, when ET1 used MS Teams, she shared her screen, turned on her microphone but did not use any other functionalities of MS Teams whereas ET2 turned on her camera and microphone, shared a screen and used chat to pass the link of the tasks and to send some questions to the pupils. ET2 also used one of the backgrounds available in MS Teams, which made her appear as if she was in a very bright room while delivering a session. Regarding Microsoft PowerPoint, ST1 used it very effectively as not only did she use pictures, GIF and

colourful fonts in her PowerPoint slides, but she also used a laser pointer and cursor frequently to direct learners to the texts and pictures.

The following table (Table 7.2) presents frequencies of different types of technological affordances acted upon by English and science teachers.

Table 7.2 Frequencies of technological affordances acted upon by science and English teachers

Technological affordances	English	Science
Directing learners to the figures or texts while screen sharing	0	10
Sharing a screen	6	2
Using Mentimeter to collect learners' ideas and opinions	1	0
Tracking time in Mentimeter	2	0
Using chat	7	0
Zooming the text	1	0
Using Notes to provide a matching task	1	0
Changing background in virtual conferencing platform	3	0

Table 7.2 reveals that different types of technological affordances such as, using chat, using Mentimeter to collect learners' ideas and opinions, using Notes to provide a matching task were acted upon by English teachers whereas the science teacher directed learners to the figures or texts by using a cursor or laser pointer while sharing PowerPoint slides.

The way ST1 used PowerPoint helped her to engage pupils during her lecture as she was also pointing out often what she was talking about then (Excerpt 7.16). In this case, she was also resolving the quaternary contradiction which is between her object engaging pupils in learning the content and lack of students' co-operation or their less engagement in lessons - pupil's division of labour. The object of this science session was 'understanding the functions of a nose and a tongue' (Excerpt 7.16). During the explanation of a nose and its functions, ST1 in this session used a laser pointer available in PowerPoint and pointed out different parts of a nose (Section 6.2.2, p. 131).

Excerpt 7.16: Science session, SC1SC01

| Transcription	Action description
ST1: 'I have shown that part. Okay, this is the part shown here. About this, the main function is to smell which is from this part. We know the smell from this part.' So it is called the olfactory region. This part is called the olfactory region. This part.	ST1 uses a laser pointer available in PowerPoint slides. (TC 00:15:26.100 - 00:15:26.200) ST1 uses a laser pointer to point out different parts of a nose and explains their functions. (TC 00:15:26.100 - 00:15:26.200) ST1 explains internal parts of the nose by pointing each part through a red laser pointer. (TC 00:19:23.500 - 00:20:16.700)

ET1 used pictures in PowerPoint slides and different fonts, but she did not present the slides using a pointer to guide leaners on what she was talking about. ET2 was not found using PowerPoint slides during the classes that were observed. She used Mentimeter application in which she asked multiple choice and open-ended questions, tracked time, showed bar-graphs and their answers in the boxes and she also used Notes available on Mac to give matching task to the pupils. The following excerpt 7.17 shows the way ET2 acted upon 'tracking time' when she used Mentimeter.

Excerpt 7.17: English session, SC3EC01

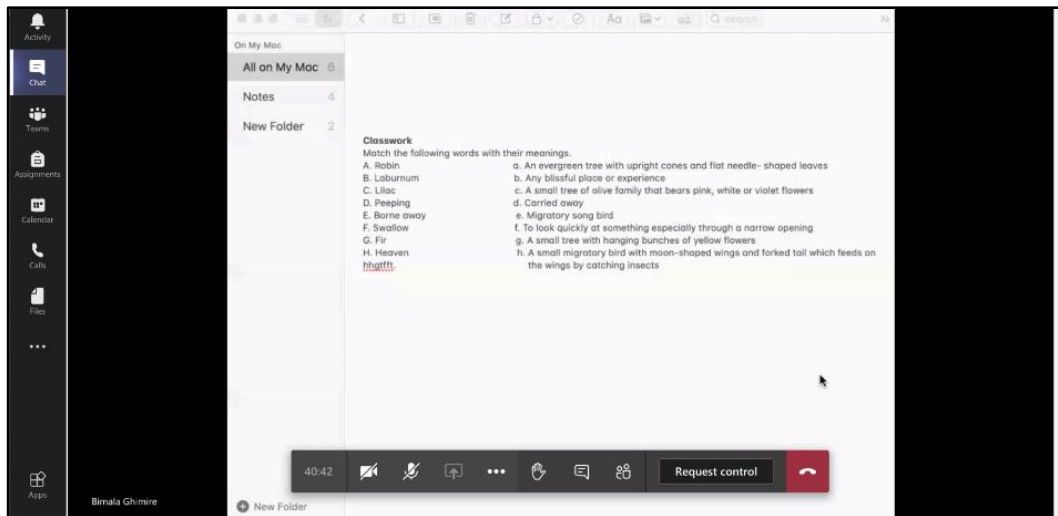| Transcription	Action description	Mediating tools and artefacts
ET2: I think I will have to start the countdown. You've only one minute, okay? Pupil(s): Okay ma'am ET2: 17 responses out of how many students? Out of 34 students. Not 34, 33. It's including me, 34. ET2: So the maximum vote was there for nostalgic tone, right? Now let me ask you one question.	ET2 tracks time by starting the countdown available in Mentimeter (TC 00:06:48.973 – 00:06:53.364)	A webcam and micused, bar diagram shown by the teacher (TC 00:05:56.499 – 00:06:13.307) A webcam and mic used, bar diagram and timer shown by the teacher, and mic used by a pupil (TC 00:06:13.576 – 00:06:22.097) A webcam and mic used, bar diagram and timer shown by the teacher, and mic used by a student (TC 00:06:22.621 – 00:07:24.538)

There are also instances of teachers failing to realise technological affordances when they need to do so during their sessions. For instance, in ET2's session, SC3ECO1, during a warm-up exercise, she tried to present the second question in Mentimeter after discussing the first survey question, but she failed to do so. She did not realise that there is a 'present' option at the top right-hand side in Mentimeter (Figure 7.7). Had she clicked on the 'present' option, she could have presented the second question easily. Instead of clicking on the 'present' option, she clicked on the 'share' option, and she got a link and shared that link in the chat. This lack of knowledge in handling technology brought disruption in the activity, as a result, a secondary contradiction emerged which is between her object and ICT skills as a mediating tool (Excerpt 7.17). To resolve this contradiction, she acted upon different technological affordances that is deleting the artefact from the list of artefacts she created in Mentimeter. She deleted the first question in Mentimeter (Figure 7.7), and gave the link of a second question to pupils. Finally, she managed to collect answers from the pupils and show the pupils their answers.

Figure 7.7 'Present' option in Mentimeter
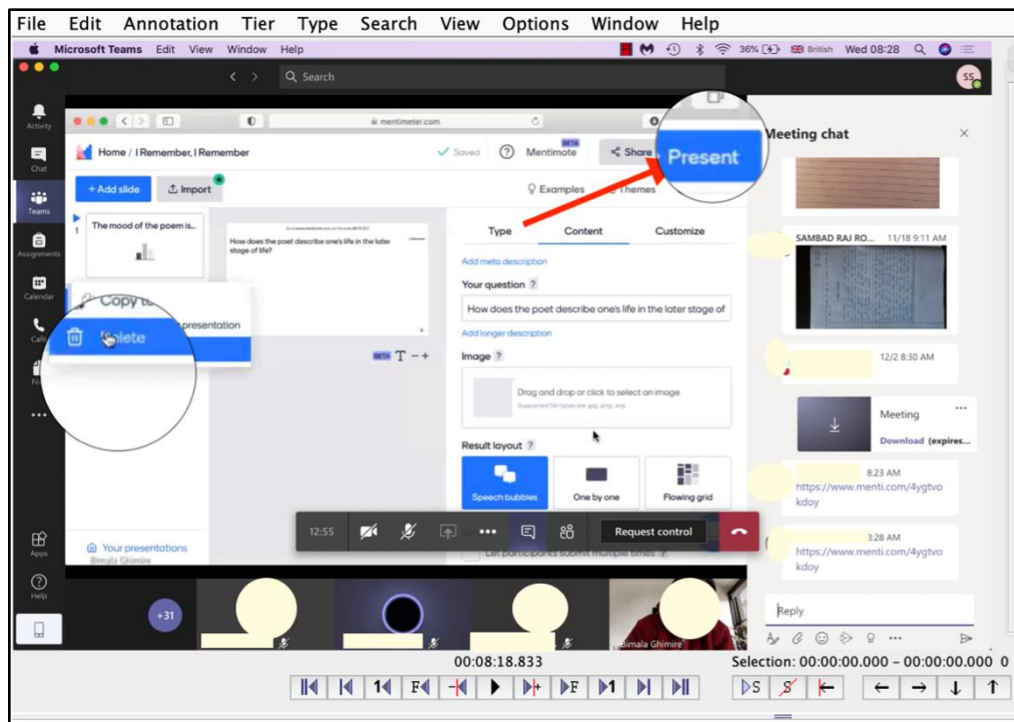
ET2 also used 'Notes' application available on Mac to give a matching task to the pupils during the session. She had typed questions for the matching task in 'Notes' application available in Mac. She displayed the matching question on her screen (Figure 7.8). To make the second dangling line align with the first one at the end in the second column, she inserted a group of letters, which is meaningless and gave spaces. She told the pupils to ignore a group of meaningless letters she had typed. She showed how the section of her writing shifts when she deletes those letters. In fact, she failed to act upon the designed affordances of displaying the text in a table, which could help her address the alignment issue.

Figure 7.8 A matching task given by ET2 using Notes application

The following excerpt (7.18) illustrates her failure to realise the designed affordances of inserting a table to tackle the alignment issue.

Excerpt 7.18: English classroom, SC3ECO1

Transcription	Action description	Mediating tools and artefacts
ET2: ... Can you see the screen? This is simple classwork. Okay let me xxx ET2: Ignore this one okay 'hhgdff' whatever is there. Because if I delete it, it comes forward. Yi! Adjust side. Do it in copy. Quickly. Match the following words with their meanings. Robin, Laburnum, Lilac, Peeping, Borne away, Swallow, Fir, Heaven.	ET2 shows the task on her screen. The task is to match words with their meanings related to the poem. (TC 00:35:51.653 – 00:35:55.790) ET2 asks the pupils to ignore the meaningless group of letters that she has typed in the 'Notes' application that she has used. She shows how the text shifts if she deletes. (TC 00:36:12.402 – 00:36:54.364)	A webcam and mic used, and a matching task on Notes shown on the screen by the teacher (TC 00:35:51.091 – 00:37:15.454)

To sum up, during the pandemic, despite teachers being new users of the tools such as Microsoft Teams, Google Meet, Mentimeter and so on, they acted upon limited technological affordances of the tools that they could access. They also acted upon the technological affordances to resolve contradictions especially, to deal with lack of learners' engagement.

Some educational affordances of ICT emerged with the realization of technological affordances which are discussed in the Section below.

7.2.2 Educational affordances

The three educational affordances that were acted upon by the teachers of English and science are a) bringing variety to lesson delivery, b) clarifying terms and concepts of a lesson and c) engaging learners in the tasks. By using ICT, teachers used a multiplicity of modes such as visuals, movement, colour, speech and text which contribute to meaning and thus brings variety to lesson delivery (Section 2.1). Also having acted upon the technological affordances, i.e., possibility to create a number of different sequences within the lesson triggered by technology, teachers brought variety to lesson delivery. Teachers clarified terms and concepts and engaged learners by designing and implementing tasks (Section 6.2.2, p. 131) to optimise learning. The following table (Table 7.3) presents the frequencies of each educational affordance in English and science sessions.

Table 7.3 Frequencies of educational affordances in English and science session

Educational affordances	English	Science
Bringing variety to a lesson delivery	10	6
Clarifying terms and concepts	7	3
Engaging learners in the tasks	9	0
Total	26	9

Table 7.3 shows that the teachers in English sessions acted upon all three affordances frequently compared to science teachers. The striking difference between English and science sessions is that science teachers did not use tasks to engage learners (Section 6.2.2, p. 131). To bring variety to lesson delivery, teachers played a video, showed pictures and GIF and presented PowerPoint slides and to clarify lesson related terms and concepts, and to engage learners in the tasks, they used PowerPoint slides, applications such as Mentimeter, Notes available in Mac, chat available in a video conferencing platform and audio recordings.

Chapter 7 Emerging contradictions and affordances

Excerpt 7.19 shows that ET1 used a video while teaching prepositions of time in her session, SC2ECO2. The text, sound and moving images in the video helped to bring variety to deliver content related to preposition of time. Another facet is that after showing a two-minute short video on prepositions of time that explained where to use 'in', 'at' and 'on', she asked a question to pupils to recapitulate what they learnt from the video. There was an interaction between teacher and pupil for some time as pupils were reflecting on what they learnt from the video, and finally she explained the preposition of time. These sub-activities indicate that playing a video related to a lesson triggered to have several sub-activities. ET1 could have simply lectured on it, but when she played a video, it helped her to present content using multiple modes to help them make meaning and have a number of sub-activities associated with playing a video.

Excerpt 7.19: English classroom, SC2ECO2

Sequence	Transcription	Action description	Mediating Tools and artefacts
Playing a video clip (CTC 00:37:24.311 – 00:39:31.643)	ET1: Okay, right now, have just watched that the small video related with the prepositions of time. So now, could you please tell me, un, or let's say just remember the slide or this video and tell me that the preposition of use of 'in'. Where actually we use 'in'? Right now, we are not talking about place, we are talking about time, okay?	ET1 shows a video clip related to preposition of time. (TC 00:37:23.969 – 00:39:31.588)	A video that explains preposition of time. (TC 00:37:23.969 – 00:39:31.588)

Likewise, the following Excerpt 7.20 below shows how SC1 used a GIF of an eye in the PowerPoint slide which helped her to engage learners by bringing variety to a lesson delivery.

Excerpt 7.20: Science session, SC1SCO2

Transcription		Action description	Mediating tools and artefacts
ST1:	'Please tell me what is happening,'	ST1 discusses a question	A webcam and mic used, and
Pupil(s):	'Small and big (student A), the black part is getting smaller and	why seats are not seen as	a PowerPoint slide shown

	bigger (student B), the black eyeball is contracting and (Student C)' ST1: 'Which one is contracting and expanding?' Pupil(s): xxx ST1: 'What do we call for the middle part of the eye? Just a second.'	soon as we enter a dark room from a bright area. (TC 00:06:29.833 – 00:07:20.666)	by sharing a screen by the teacher (PPT slide – GIF of an eye and colourful texts), and a mic used by students (TC 00:06:28.277 – 00:06:51.108)

SC1 used a GIF of an eye (Figure 7.9) that was contracting and expanding at a certain interval in a slide. As there was a movement in the eye, she could ask pupils what was happening in the eye and explain how a pupil of an eye contracts and expands. In this case, a multiplicity of modes such as visuals, movement, colour, speech and text helped the learners to decipher meaning. While explaining contraction and expansion of a pupil, the use of GIF in PowerPoint further helped to make a lesson more interesting.

Figure 7.9 A PowerPoint slide used by ST1 in a science session
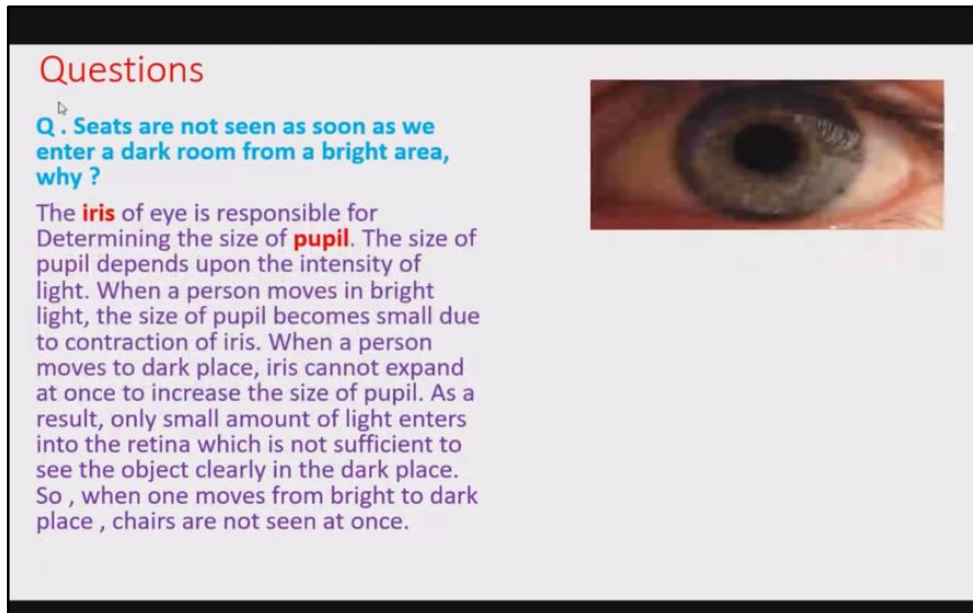
ST2 in the teachers' focus group discussion and ET2 in the interview also agree that the use of technological artefacts or tools in sessions helped them bring variety to a lesson delivery, as seen in the following Excerpts 7.21 and 7.22.

Excerpt 7.21: Teachers' focus group discussion, TFGD

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ST2:      The other thing is that, for example, when we showed
          them short YouTube video clips that other teachers have
          prepared while teaching the same poem, it brought
          variety to the classroom.
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[Translated by the researcher]

Excerpt 7.22: Interview with English teacher, SC3ET2I

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ET2:      Un, so this technology that I have used or what I learnt
          and what I have been using in my classes actually have
          helped me modify my lessons, okay? Like, sometimes, I
          simply have the discussion through the chat box and just
          to collect their responses. Sometimes I ask them,
          sometimes through PowerPoint presentation, I ask them,
          do the things like shared what they have learnt and
          sometimes through MS forms or Google forms and even
          through Mentimeter, so different technologies we are
          using online, yes?
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[Interview conducted in English]

Teachers clarified terms and concepts related to their lessons using ICT in their sessions. For instance, in Excerpt 7.23, ET1 used a picture of a cat sitting in different positions at different places and explained prepositions of place. The picture that she showed to pupils helped her to clarify the concept related to prepositions of place.

Excerpt 7.23: English session, SC2ECO2

Transcription	Mediating tools and artefacts
ET2: Okay, so everybody, let's look at here. The preposition of place, and then related with the preposition there are some pictures, everybody? So, I hope, un, through these pictures, you can get the idea of this preposition of places here, okay? We are not talking about the time and then we are not talking about movements, and we are talking about only the place here. And then look at here where these - actually these cats are here and then the position of the cats also just shown here through that the box and then the cat here. And the prepositions also. Look at here 'at', 'on', 'in', 'from', 'above', 'below', 'over', 'under', 'beside' and 'next to'. And then look at the first, look at in that the first picture, where is the cat? The cat is in the box. And in the second picture on the box.	A mic used by a teacher and students, and a picture of a cat sitting in different positions at different positions in reference to a box (TC 00:20:43.400 – 00:23:31.600)

Similarly, in a science session, ST1 showed the picture of a tongue segmented in terms of different taste buds, and she explained the positions of different taste buds to pupils. The

picture of a tongue locating different taste buds helped her to clarify where taste buds are located in a tongue. Meanwhile, it also helped her to engage learners in a session which is seen in the Excerpt 7.24. The pupil asked a critical question in a session which helped pupils get further clarification. So, the pupils were not only passive listeners, teachers also ensured their presence in a session.

Excerpt 7.24: Science classroom, SC1SC01

Transcription	Action description	Mediating tools and artefacts
Pupil: 'Can't the part of a tongue that has sweet taste buds detect whatever sour we eat?' ST1: 'Yes, we feel that we know from all parts, but we know first from this part. When we eat, the food gets wet and liquid flows all over.' ST1: 'How do they (the test receptor) know, where it goes? Bitter is in this part, sour is at back, salty is in this part and sweet here.'	A pupil asks a question if the sweet receptor can sense the sour taste. (TC 00:46:15.678 – 00:46:22.278) ST1 shows the division of a tongue in a figure with the cursor. (TC 00:46:22.469 – 00:47:15.568) ST1 explains where different test receptors are by showing a picture of a tongue which is connected to the brain through nerves. (TC 00:47:23.196 – 00:49:32.262)	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- A picture that has a tongue through nerves and some colourful texts) (TC 00:47:26.500 – 00:49:30.900)

In SC1SCO1, Excerpt 7.24 above, the pupil asked a question to ST1 whether a part of a tongue having sweet tastebuds can taste sour things. The pupil asked this question after ST1 showed a picture of a tongue to the pupils. ST1 further explained about taste buds to pupils by showing a division of a tongue with the help of a cursor. To this end, she has acted on technological affordances.

ET1 in teachers' focus group discussion (Excerpt 7.25) also confirms that the use of ICT helps them to explain the ideas they are delivering in a session, which further helps pupils understand the terms or concepts.

Excerpt 7.25: Teachers' focus group discussion, TFGD

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ET1:      I had used [ICT] during lock down. Now at this time,
          when I teach in the same way, it is easy for me to make
          pupils understand by using projector - by using ICT. I
          also feel that the use of ICT in teaching is good. I
          found the use of ICT is useful to take classes.
     [Translated by the researcher]
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Teachers could engage pupils in the tasks related to their lessons using ICT in their sessions. As mentioned in section 7.1.1, the problems teachers often faced were that pupils did not actively engage in online sessions; therefore, contradictions emerged between object and pupil's division of labour. To resolve this contradiction, teachers acted upon both educational and technological affordances. Teachers used different tools to bring variety to lessons and designed tasks using ICT to engage pupils. The following Excerpt 7.26 shows the task that ET2 designed in a Mentimeter to engage pupils.

Excerpt 7.26: English session, SC3EC01

Transcription	Action description	Mediating tools and artefacts
Pupil(s): Ma'am, we will [do we need to write] long answer or short answer? ET2: It's up to you. How does the poet describe once life in the later stage of life? Later stage of life, you understood what does it mean, yes?	ET2 reads the question 'How does the poet describe once life in the later stage of life?' (TC 00:09:16:613 – 00:09:22.254) ET2 reads aloud some of the answers of pupils that she sees on her screen but it is not clearly audible and the pupils cannot see the answers. (TC 10:54.264 – 00:11:05.830) One of the pupils mentions that she was absent for some days therefore she doesn't know which poem was that. In response, ET2 states that she could simply read answers of her friends. (TC 0011:06.548 -00:11:19.268) ET2 shows students' answers in Mentimeter, and also she reads their answers. (TC 00:14:17.072 - 00:17:02.841)	A webcam and mic used, white background shown by the teacher and mic used by pupils (TC 00:09:01.270 – 00:14:16.615) A webcam and mic used, and students' responses on Mentimeter shown on screen by the teacher (TC 00:14:17.096 – 00:17:02.772)

ET2 designed two tasks in Mentimeter - a) a survey and b) an open-ended question. Excerpt 7.26 shows that ET2 asked open-ended question related to the poem 'Past and Present', which is the object of the activity, and she collected responses from the pupils. After collecting pupils' responses, she summarised the poem using their texts, which were seen by pupils on the teacher's screen as she had shared her screen.

To sum up, having realised technological affordances, both science and English teachers conducting online sessions acted upon educational affordances of ICT. They used ICT to bring variety to their sessions by incorporating a multiplicity of modes such as audio, graphics, movement and textual to construct meaning and also at the same time, used ICT as a trigger to design and carry out a variety of sequences within a lesson. By acting on technological potentials, they clarified lesson related terms and/or concepts and engaged pupils in lesson related tasks.

7.3   Discussion

What emerges from the results reported here is that during the pandemic in secondary level online classes in a developing country such as Nepal, contradictions emerged in the teaching activity system due to power cuts, slow or poor internet connection, limited digital skills of teachers, lack of learners' engagement and institutional and classroom rules.

Power cuts prompted a complete breakdown in online classes in the form of a technical silence (Stickler, 2019). Since internet connection rely on power, when the power was cut, online classes would undergo a complete disruption. There was equally an issue of poor internet connection which both teachers and pupils faced, as a result, it also triggered contradictions between object and mediating tool of TAS, and object of TAS and mediating tool of LAS. Teachers had to work in very limited and difficult circumstances during the pandemic. They had limited resources, such as the internet connection they were using was unstable. Often

teachers encountered disruptions in their sessions. Yet, they had to continue teaching. The study by Rana (2022) confirms that poor internet connection in Nepal impacted online teaching during the pandemic. Poor Internet connection and irregular power supply on which they had to rely on was out of their control; therefore, to resolve this systemic tension if there was a breakdown, they would leave the class and continue the lesson in another class.

A number of contradictions emerged between division of labour in LAS and the object of TAS. Learners' less engagement in sessions was one of the overarching systemic tensions that emerged while teachers were participating in the teaching activity during the pandemic (Section 2.1.2). The issue of low engagement was also found in a study carried out by Sahlberg (2021) who reports that only 43 percent of teachers in a nationwide survey in Australia had confidence that their pupils were positively engaged with learning from home during the pandemic, and a similar case was found by Ewing and Cooper (2021) who report that lack of learners' engagement was a major contextual challenge. During classroom observation, the students did not respond to teachers often which corroborates the studies of McPherson and Pearce (2022), Chen (2022) and Willermark and Islind (2022) (Section 2.2.3, p. 25). Because pupils were less engaged in their sessions (Excerpts 7.9, 7.10 & 7.11), teachers acted upon several technological and educational affordances of ICT. For example, teachers designed warm-up exercises, showed videos that used a multiplicity of modes, used PowerPoints using colourful fonts, pictures and GIFs to engage pupils. To resolve the systemic tension, they went beyond the regular way of instruction, i.e., they did not rely on merely lecturing what usually happens in classrooms in Nepal or used only PowerPoint slides to present their content, but also learnt the use of new application such as Mentimeter or acted upon the designed affordances such as using colourful fonts, embedding pictures in PowerPoint slides and used laser while presenting which they hardly did before the pandemic (Section 4.1.4). In this case, the emerging systemic tension triggered them to accomplish expansive transformation as teachers reconceptualised the object i.e., gaining ICT skills to handle new tools and use those

tools in their sessions. The expansive transformation can be better explained by the following Figure 7.10.

Figure 7.10 Expansive transformation in teacher activity system (Adapted from Sannino et al, 2009, p. 151)
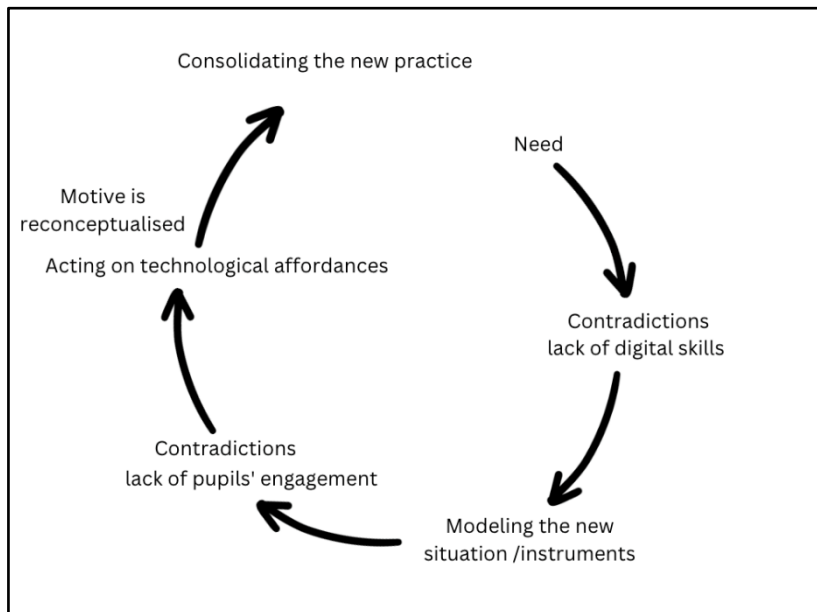

Figure 7.10 explains the expansive transformation that occurred in the teacher activity system (Section 3.1 and Section 3.3). As there was a need for the teacher to address educational disruption by continuing teaching and learning during the pandemic, this need motivated to search for an object (Sannino et al., 2009). Their object was to engaging pupils in learning. However, the contradiction emerged due to lack of teachers' digital skills. With support from school managers, colleagues and professional associations (Section 6.2.4), they gained some skills and conducted online classes. Even though they conducted online sessions, again, the issue they faced was that pupils did not get engaged as expected. The systemic tension once again emerged in the activity. To resolve this contradiction, they acted on technological affordances, such as using PowerPoint presentations and directing them to the slides using laser pointers, using Mentimeter and so on. This made them reconceptualize the motive of their activity, which is wider use of ICT tools or learning the use of new web tools to use in

their sessions. This whole cycle consolidated the new practice, i.e., use of ICT in teaching and learning and conducting online classes.

No doubt teachers did not take full advantage of technology while using technology during the pandemic as Hodges et al. (2020) argue that no teachers transitioning to online teaching during the crisis contexts such as COVID-19 period will be designing a session to take full advantage of affordances of online format. However, the way the teachers acted upon technological affordances which triggered educational affordances to be realised became useful to optimise pupil's learning.

7.4   Summary and conclusion

This chapter discussed the systemic tensions and the affordances acted upon by teachers in science and English online classrooms during the pandemic. Contradictions emerged owing to power cuts, poor or unreliable internet connection, lack of teachers' digital skills, lack of learners' engagement and institutional and classroom rules. They triggered breakdowns and disruptions or disturbances in online English and science sessions. Regarding the levels of contradictions, quaternary contradictions between division of labour in LAS and object in TAS and secondary contradictions between mediating tools and object, and rules and object in TAS were found. The secondary contradiction such as lack of ICT skill vs engaging pupils in learning content triggered teachers to achieve expansive transformation as they reconceptualised object i.e., gaining new digital skills to embrace the possibilities to maximise learners' presence in their sessions. They learnt the use of new tools during the pandemic to use them in their sessions.

Contradictions such as the ones related to pupils' low engagement also led teachers to act on technological affordances and when the teachers realised technological affordances, they also

acted on educational affordances, such as they brought variety to lessons and clarified terms

or concepts related to lessons.

Chapter 8 Discussion and Conclusion

This thesis explored the use of ICT in Nepalese secondary schools by English and science teachers during the COVID-19 pandemic, the ICT affordances that emerged and the extent to which they were acted upon by teachers. Policy implications for the integration of ICT in education in crisis and post crisis contexts are also considered.

Activity theory and the theory of affordances guided this study in investigating the emerging contradictions in the teachers' activity system and affordances that teachers acted upon. First, this chapter presents a summary of the thesis. Second, it discusses the empirical analysis of the findings taking each research question in turn. Third, it explains challenges that the researcher faced while carrying out this research as well as limitations of this study. Finally, it deals with the future directions and implications of this study.

8.1 Summary

Chapter Two reviews the literature related to ICT in education, and it discusses further the case of ICT use in developing countries. Since this study investigated the use of ICT in crisis contexts, particularly during the pandemic, this chapter examines ICT in education in crisis contexts highlighting the studies that were conducted during the pandemic to explore the use of ICT. While using ICT during crises, educational stakeholders, such as teachers try new initiatives to resolve the systemic tensions that emerge in their activity. Having done so, they realise the affordances of ICT. As this study investigates the affordances of ICT use during this crisis period, this chapter defines affordances, discusses the taxonomies of affordances, and reviews the literature related to affordances of ICT during the pandemic.

Chapter Three discusses activity theory, a socio-cultural and socio-historical lens through which activities are explored. The main aim of this chapter is to discuss what activity theory is and how this theory guides this study. Having introduced the four generations of activity

theory, the principles of activity theory are then discussed. The chapter reviews studies that explore technology mediated environments using activity theory as well as the methodological challenges associated with this work. The implications for the design of this piece of research are also considered. To conclude, the researchers' non-interventionist position is discussed.

Chapter four presents the research contexts in which this study was carried out and the methods this study used. This chapter introduces Nepal as a broader research context and the selected districts where this study was based. This chapter gives the detailed profiles of the six participating schools. The section that follows discusses the research participants namely teachers, pupils, parents, school managers, teacher trainers and policymakers. The remainder of the chapter explains the methods by which the different types of data were collected. The challenges that the researcher encountered while collecting data are highlighted and the way in which the data was coded, analysed and interpreted is explained. The data includes classroom observation, interview and focus group discussion data. The classroom observation was segmented, annotated and transcribed and then coded using NVivo by identifying the common patterns in the data. Classroom observation data was treated as the primary data whereas the data collected through interviews and focus group discussions fleshed out the analysis with more details.

Chapter Five consists primarily of policy analysis and evaluation of practices during the COVID-19 pandemic designed to address the educational disruption. First, the background is set by discussing ICT in education policies in Nepal. Given the background on ICT in education policies in Nepal, crises and their impact on education and how the educational policies responded during the major crises were explicated in detail. Typically, how the educational policies in Nepal responded to the recent COVID-19 crisis situation and what educational practices were carried out by the selected schools were discussed. At the same time, the ways in which those educational practices were linked to the educational policies that were developed by the

government in Nepal was also analysed. This chapter provides a broader picture of the educational policies that were developed during the pandemic and how they guided the educational practices in Nepal.

Chapter Six discusses the findings related to ICT use by secondary school science and English teachers in Nepal during the pandemic. To do this, each science and English session was broken down into sequences within each session and the different actions carried out in those sequences were identified. Sessions in urban schools were conducted onsite, and sessions in semi-urban schools were conducted online. Therefore, the sequences which the teachers designed and participated in, the actions which they carried out, the mediating tools that they used, and the rules and division of labour that guided their activity systems are described based on whether they took place in online or onsite classes. As the participating schools included both public and private schools, a similar analysis by school type (i.e., private or public schools) was also carried out.

Chapter seven investigates the systemic tensions or contradictions that existed in activity system in online classes and how some of these systemic tensions led to the realisation of action potentials of technology in teaching during the pandemic. This chapter, based on classroom observation data, categorises contradictions identified under five different themes viz., power cuts, poor internet connection, limited digital skills of teachers and institutional and classroom rules. Further, the technological and educational affordances realised by teachers during their sessions were discussed. The affordances which were acted upon to resolve some of the contradictions are also discussed in this chapter.

The final chapter (Chapter eight) summarises the study by discussing each research question categorically. It explicates the challenges that the researcher faced during the study period as well as limitations of this study. In addition, based on what is done in this research, it presents

the possible directions for future researchers who may wish to explore and expand the area related to affordances of ICT in education.

8.2   Research questions

The literature review shows that ICT plays an instrumental role to mitigate educational disruptions during crises (Anderson, 2020; Dahya, 2016; Espino-Díaz et al., 2020; Tausan & Stannard, 2018; Unwin et al., 2017) and recently, the use of ICT has increased during crises (Dahya, 2016; Espino-Díaz et al., 2020; Pacheco, 2021; Williamson et al., 2020). When a crisis like the one triggered by the COVID-19 pandemic affects education, several stakeholders attempt to mitigate the impact of the crisis on education (Ewing & Cooper, 2021; Sahlberg, 2021) (Section 2.1.2). In developing countries contexts, although the wider availability and access to ICT resources is still a question (Rana, 2022; Shrestha, 2016), educational institutions attempt to mitigate the educational disruptions using ICT during crises, such as during the COVID-19 pandemic (Chapter 6). In this context and against this background, this research explores the following research questions.

Research question 1: How did secondary school Nepalese teachers use ICT in education during the COVID-19 pandemic?

Research question 2: What ICT affordances emerged and to what extent were they acted upon by secondary level teachers during this crisis period?

Research question 3: What are the policy implications for the integration of ICT in education in crisis and post-crisis contexts?

8.2.1   Question 1

Secondary school Nepalese teachers tried numerous educational practices involving ICT use during the pandemic. Guided by The *Emergency Action Plan for School Education, 2020* and

Students Facilitation Learning Guidelines 2020 to reach out to those pupils who did not have access to internet connections or digital devices, the federal and local governments televised and aired programs to help pupils continue learning during the pandemic. In addition, in semi-urban areas, as a part of Tole teaching (Rana, 2022), teachers visited local villages, asked pupils of a specific area to assemble at a designated place where all pupils could come to submit their work based on the radio or television programs they had viewed. This way, teachers assisted the pupils to continue learning during the pandemic. Once they could conduct onsite classes, following the local government's decision as COVID cases dropped, they used the technology available at their schools at times taking the pupils to a computer laboratory when there was no technology available in their classrooms.

Many schools conducted online classes during the pandemic as guided by educational policies such as *Students Facilitation Learning Guidelines 2020* (Section 5.3). Teachers were new to handling video conferencing platforms, such as MS Teams and Google Meet, yet they learnt the functionalities of these tools from their colleagues and also from their professional networks and used those platforms which is the evidence of expansive transformation (Section 7.3). Besides these tools, they used applications such as Microsoft PowerPoint, Mentimeter, Notes application and so on. In online classes, teachers used PowerPoint slides a lot. They used colourful fonts and, embedded pictures and videos in the PowerPoint slides. Like in onsite sessions, even in online sessions, the technology use was very limited. For instance, teachers used video conferencing platforms to substitute physical classes by hardly using other functionalities available in video conferencing platforms.

Even though access to and availability of resources is still an issue in Nepal, during the pandemic, teachers attempted to engage pupils in online learning (Anderson, 2020; R. K. Karki, 2020; Sharma, 2020) (Section 2.1.2). During online classes, they could have a variety of sequences such as greetings and socializing, discussing how to use technological tools,

discussing previous lessons, warm up exercises, preparing to begin a lesson, teacher's presentation, discussion on a topic, giving tasks based on the topic or content of the lesson, addressing a pupil's questions, eliciting learners' responses, giving feedback and introduction to a new topic. They also had a series of actions within those sequences. As these sequences were in online sessions, all these sequences included the use of technology.

Schools and teachers created rules to encourage learners to participate in their sessions. For instance, teachers allocated marks for pupils' participation in online classes so that pupils would fully engage in online sessions. These marks were included in the final evaluation. The teachers also required pupils to upload proper pictures on their online profiles as part of their online netiquette. The teachers assisted each other in learning how to use tools and also supported one another during online classes. Thus, the relationship they had with each other is horizontal as they collaborated with each other (6.2.4, p. 143).

Technology was also used to conduct online exams during the pandemic. Teachers followed a set of instructions developed by their institutions and they conducted online exams. There were: 1) exams based on continuous assessment and 2) exams that closely replicated the classical way of conducting exams. In the latter case, the teachers asked the pupils to turn on their camera, sit in front of the computers, write answers, capture their written work and submit it to the teachers. This practice reveals the fact that the institutions still wanted to administer the test in a manner as close as possible to normal settings. Even though institutions were given flexibility to evaluate the pupils' performances based on the criteria that are locally suitable by the educational guidelines that were developed during the pandemic, the institutions still tried to follow the classical way of assessing.

In onsite sessions, technology was used in a very limited way. For instance, pupils were never given an opportunity to type their answers on the computers they were using. Pupils only used computers to see the contents that teachers broadcast. The use of technology in onsite

sessions demonstrates that the use of technological tools is simply substituting the use of white boards or chart papers to display contents during teaching. Thus, their approach came close to substituting the physical sessions with technological tools (Puentedura, 2009). One thing to note is that when using computers in onsite sessions, teachers could show some graphics to the students and play audio-visual materials.

8.2.2   Question 2

During the COVID-19 pandemic, when teachers attempted to engage learners in online teaching, they also faced several challenges, such as frequent power cuts, unreliable internet connection, low engagement of pupils and their own limited digital skills. These issues appeared as systemic tensions in their teaching activity system. Some of these issues also led them to act on action potentials of technology to resolve the systemic tensions, i.e., contradictions that emerged in their activity systems. For example, when they found that pupils were not engaged in their classrooms, they tried to engage them by developing some exercises using a digital tool such as Mentimeter that they had never used before. Similarly, teachers used videos, pictures and colourful texts on their slides to engage pupils in their sessions.

Teachers acted upon technological and educational affordances while using ICT during their online sessions. Acting on technological affordances, teachers directed learners to the figures or texts while screen sharing, zoomed in the texts (made the text appear large), changed background in a virtual conferencing platform, used notes to provide a matching task, tracked time, used chat and used Mentimeter to collect learners' ideas and opinions. Given the designed affordances of the technologies the participating teachers used, they only acted upon very limited affordances. Their limited realisation of affordances can be explained by the nature of the preparation that teachers had in course of engaging pupils during the pandemic as Hodges et al. (2020) claim that during the pandemic, a full-fledged lesson was not focused

rather the focus was to mitigate the learning loss. The realisation of technological affordances led teachers to act upon educational affordances (Kirschner et al., 2004), for example teachers brought variety to a lesson delivery, clarified terms and concepts of a lesson and engaged pupils in learning.

Teachers used a multiplicity of modes such as visuals, audios, texts, movements and so on while using technology such as PowerPoint and videos in their sessions. Such modes helped them bring variety to their presentation during their lesson delivery (Jewitt, 2006; Walker & White, 2013). Also, they could have a variety of sequences in a session by using digital tools and artefacts.

Teachers clarified terms and concepts related to a lesson that they were delivering very easily. They acted on educational affordances by realising technological affordances, such as playing a video, using a picture, running a tool such as Mentimeter and so on. Due to the use of technology, teachers were able to explain concepts linked to their lessons to pupils with comfort. As they acted on technological affordances, they could act upon educational affordances such as bringing variety to a lesson, clarifying lesson-related terms and concepts and engaging pupils in lessons.

8.2.3   Question 3

Crisis and post-crisis contexts are interrelated when it comes to the preparations made to use ICT in education. The preparations made by the government stakeholders or academic institutions to use ICT in education during non-crisis contexts are helpful to manage crisis contexts too or vice versa. For example, developing the digital skills of teachers during the crisis contexts will also help teachers utilise technology during the post-crisis contexts.

During the pandemic, several educational practices evolved to mitigate educational disruptions. Amongst them, Tole education and learning through television became useful in a

developing country like Nepal. Future education policies designed for crisis situations should clearly outline the ways teachers can engage pupils in learning via Tole education and radio or television. These policies should be accompanied by action plans that are implementable in practice. Some regions in Nepal are still without internet access, and there are some pupils who do not have access to quality digital devices or the internet, and they may need to continue their learning by relying on some alternative means. To help the pupils whose learning is affected due to the limited availability of and access to digital devices, there should be a focus on practices such as Tole education and learning through radio and television. Thus, the issue of digital disparity amongst pupils can be mitigated until such time as all pupils have access to technology.

Online learning boomed during the COVID-19 pandemic in an attempt to continue teaching and learning (Anderson, 2020; R. K. Karki, 2020; Sharma, 2020). As a forced opportunity brought by the pandemic, teachers acquired digital skills from their colleagues as well as from their professional associations (Section 6.2.4). The training teachers received on the use of digital tools in teaching and learning during the pandemic was not structured. Although the ICT skills that teachers gained during the pandemic were limited, those skills laid a strong foundation for technology use, which enabled teachers to use ICT in their sessions during the pandemic. Therefore, future ICT in education policies should ensure that a structured teacher training model to enhance teachers' ICT skills is put in place. For this, the help of the local teachers' associations which were established by teachers themselves, such as the Society of Technology Friendly Teachers Nepal (STFT Nepal) can be elicited to structure, design and deliver training sessions. This could be combined with the work of local teacher trainers associated with the government-managed educational units.

Teachers are willing to continue using technology; however, access to resources is a problem in public schools (Rana, 2022). The accomplishment of transformative learning by teachers

during the pandemic reveals that they are keen on learning how to use technologies for teaching and learning. Thus, the local and federal government should design and implement policies informed by research findings that enable teachers to continue using technology. These policies should both ensure the provision of the technological resources required for teaching enhance teachers' ability to regularly upskill in terms of the technology they use.

Furthermore, the analysis of affordances of technology reveals which ICT affordances are acted upon and which are not as well as how they are acted upon by teachers. Such analysis helps local policymakers and institutional heads identify the areas of technology use they can focus on based on the action potentials of technology and create a teacher development toolkit to constantly update teachers' ICT skills and knowledge.

Even though crises cannot be predicted, preparation for dealing with crises is key. To mitigate educational disruption during crises, previously developed guidelines and action plans can play a significant role in managing educational disruption during crises. Therefore, broad, general guidelines applicable to a variety of crisis situations and combined with practical action plans are needed to mitigate the impact of crises on education. Limited action plans guided practice aimed at mitigating the educational disruption during the pandemic. Therefore, action plans that build on the experience during the pandemic of major educational stakeholders such as teachers and parents should be prepared to address issues of educational disruption in the future.

An 'ICT census' in education in a non-crisis period can be a good preparatory step to manage educational disruptions during crises. An ICT census can comprise the information about the availability of technological devices to each learner, pupils' digital skills, the type of technological support a pupil gets at home and so on, and it can be conducted at every school. Since ICT has been able to play a crucial role to mitigate educational disruption during such periods (Conceição et al., 2020; Pacheco, 2021), an ICT census is a need which this study has

indicated as the schools who participated in this study could not design the programs based on the available data during that time. It shows the necessity to collect data related to technology to design a plan that can include implementable actions. Having collected such data, academic institutions will be able to decide an appropriate strategy or an intervention to continue teaching and learning in any crises in future as well as in post-crisis contexts. At the same time, a national policy can be formed based on such evidence as the government can collate ICT census conducted by each school and create and disseminate national ICT census in education.

Urban schools used ICT reasonably well. However, in semi urban schools, ICT was used minimally to optimise pupils' learning. In congruence with Dawadi et al. (2020) and Rana (2022), this study supports the argument that the digital divide exists between urban and semi-urban schools which directly impacts pupils' learning. If such a divide is not resolved, it can create a wider gap between the pupils studying in urban and semi-urban areas both during crises and in normal periods. ICT in education policies should focus on equitable access to technology. There must be strong policies to ensure that pupils have access to quality devices and internet, as well as a provision of learner training to enable learners to gain digital skills. The latter requirement highlights the need for a digital literacy framework to facilitate the assessment of the current literacy of all educational stakeholders, such as teachers, pupils and parents. It would also facilitate the design of an intervention based on their needs to promote their digital literacies. The improved digital literacies of all educational stakeholders can ensure pupil's equitable learning.

8.3   Challenges and limitations

The limitation of third generation activity theory is that it cannot factor in runaway objects (Section 3.1, p. 28) such as the issues related to pandemic, climate change, global warming etc. Multiple stakeholders get engaged to deal with the impact of such issues, which are out of human control. An analysis of the activity at different layers and for multiple times is a need to

understand such issues. Albeit my focus is on teachers' activity system, my study shows that there was a flow of 'power relationship' between policy makers, school management and teachers and to the flow of resources between them (Section 5.6, p. 113). I could not equally focus on all other interacting activity systems such as the activity systems of management, policy makers, etc. to analyse and understand the issue. In addition, such study has to be carried out multiple times, probably following an interventionist approach to have a rigorous analysis, for which fourth generation activity theory is required (Engeström and Sannino, 2021).

Due to travel restrictions during COVID-19 crisis context, I could not travel to Nepal in order to collect data in person (Section 4.3.1, p. 74). The classroom observations were, therefore, limited by a forced reliance on the online mode. However, as I could record the teaching sessions, the multimodal analysis segmenting each recording of online sessions into different sequences helped me see minutely what is happening in each activity. I could also see how actions progress in each sequence (Chapter 6, p. 118).

In addition, there is always a possibility that some changes in classroom delivery occur when a researcher says to a teacher that their classes are going to be observed. There can be an indirect pressure on a teacher for better performance. Even though a researcher tells participants that they are going to observe their regular classes, the presence of a researcher in a class itself makes a class distinct compared to a regular class. Thus, the classes observed for this study may not exactly reflect the real classrooms that teachers and learners are engaged in. The researcher's online presence, which is almost close to faceless presence, might have made teachers feel less pressure in their lesson delivery. As I observed sessions virtually and as my video was turned off during classroom observation, teachers might not have felt the same level of pressure which they could feel during the observation of face-to-face sessions.

The focus groups and interviews also had to be conducted virtually, using Zoom. Therefore, I

often had to select participants to respond to the questions that the researcher had posed rather than having them self-select to respond more naturally, which normally happens in a face-to-face focus group discussion. The online focus groups limited the possibility to have a prompt and rigorous discussion on the issue being raised. The nature of online focus groups lies somewhere between face-to-face focus groups and individual interviews.

Many interviews were conducted in local languages and the excerpts presented in the result sections are the translation of the originals. At times, translations may not carry the essence of the original; however, the researcher has made every effort when translating to remain faithful to the originals.

This study analyses the data generated by 12 sessions in five schools. Given the sample size, the result cannot be generalised to all the contexts. However, the findings can nonetheless provide some insights into how teachers used ICT in secondary school science and English online and onsite sessions in Nepal during the pandemic, what kind of digital disparity exists between urban and semi-urban schools, how such disparity can affect pupils' learning, what contradictions emerge in science and English sessions and what ICT affordances were realised by teachers in science and English sessions.

8.4   Future directions

Albeit being an activity theoretical study, this research is not an interventionist study (Section 3.5.2., p. 47). Activity theory is an interventionist theory (Sannino, 2011), and moreover, fourth generation of activity theory accentuates runaway objects (Section 3.1 & 8.3). In this latest version of activity theory, a researcher conducts a series of discussions at different levels with different stakeholders in which even research participants contribute to research, so they are considered an essential part of a study. Through knowledge exchange between researchers and participants after identifying the contradictions, the interventions are designed

collaboratively and implemented to resolve systemic contradictions (Sannino & Engeström, 2021). Thus, future research may focus on such an interventionist approach to activity theoretical research which aims to change the situation alongside gaining an understanding of the phenomenon. Such research could be capable of making more immediate and direct contribution to a society.

Having looked at policies and policymakers' views on and observed the teachers' practices of using ICT to address educational disruptions during crisis situations, this research indicated the gaps between policies and practices related to the use of ICT in education during crisis contexts. Further studies that collect data from interviews and focus group discussions with a number of policymakers working at both federal and local levels can identify various levels of tensions between policies and practices, which can help form a new policy or adapt the existing policies to address the possible educational chaos during crisis situations. Policies drive practices, and there is a need to have strong policies that help educational stakeholders such as teachers use ICT to optimise pupils' learning in developing countries.

This study focuses on the affordances of ICT acted upon by teachers in English and science education during the pandemic. Affordances of technology in both crisis and normal contexts in the contexts of developing countries is an under-researched study area. This area has the potential to help different stakeholders of education, such as policymakers, school managers, teacher educators or trainers and teachers understand the action potentials of ICT in education. First and foremost, such studies will help the government to frame policies that can help teachers use ICT in education both during crises and normal contexts. Secondly, those studies can help teachers act upon ICT affordances when they use technology in their classrooms.

This study has indicated disparity in technology use in urban and semi-urban and public and private school settings in Nepal. Further exploration of these issues with a larger pool of data

would give a comparative picture related to the digital divide between regions and school types, and further reveal how such a digital divide may impact urban and semi-urban, and private and public schools. Also, this study relies heavily on classroom observation and looked into contradictions that emerged and affordances realised by teachers only in online sessions. A large-scale mixed methods approach that focuses on all types of classes could give a very clear comparative pictures which could help generalise the findings and provide a tangible input into policy formulation.

8.5 Conclusions

The COVID-19 pandemic brought the opportunity for teachers to test technology for teaching and learning. Secondary school teachers used technology to engage pupils in learning both online and onsite during the pandemic. They learnt to use new tools and integrated technology in their sessions. They used a variety of tools, such as video conferencing platforms, Microsoft PowerPoints, Mentimeter and so on to engage pupils in learning. During their attempt to integrate technology, they acted upon the action potential of technology to resolve contradictions. They realised technological affordances such as, directing learners to the figures or texts while screen sharing, zooming the texts, changing background in a virtual conferencing platform, using notes to provide a matching task, tracking time and using chat etc. The teachers' realisation of technological affordances led them to act upon educational affordances such as, bringing variety to a lesson, explaining lesson related terms and concepts and engaging pupils in learning. Many teachers became familiar with technology, gained digital skills, however limited, which enabled them to use technology to mitigate educational chaos during the pandemic. At this moment, there are both challenges and opportunities for Nepalese government stakeholders (National Center for Educational Development, Nepal, Educational Training Centers and local educational units in municipalities and rural

municipalities) to enhance teachers' digital skills to prepare them to use technology in teaching

and learning during both crisis and normal settings.

References

Al-Bataineh, A., Anderson, S., Toledo, C., & Wellinski, S. (2008). A study of technology integration in the classroom. *International Journal of Instructional Media*, *35*(4), 381–387.

Alhumaid, K. (2019). *Journal of Educational and Social Research*, *9*(4), 10–20.

Al-Jenaibi, B. (2015). E-Collaboration, public relations and crises management in UAE organizations. *International Journal of E-Collaboration (IJeC)*, *11*(3), 10–28. https://doi.org/10.4018/ijec.2015070102

Almekhlafi, A. G., & Almeqdadi, F. A. (2010). Teachers' perceptions of technology integration in the United Arab Emirates school classrooms. *Journal of Educational Technology & Society*, *13*(1), 165–175.

Anderson, J. (2020, March 5). *With 290 million kids out of school, coronavirus is putting online learning to the test*. Quartz. https://qz.com/1812638/millions-of-kids-testing-e-learning-after-coronavirus-school-closures/

Asian Development Bank. (2022, February 24). *Model schools improve quality of public education, benefit female, disadvantaged students in Nepal*. Asian Development Bank. https://www.adb.org/results/model-schools-improve-quality-public-education-benefit-female-disadvantaged-students-nepal

Baerentsen, K. B., & Trettvik, J. (2002). An activity theory approach to affordance. *Proceedings of the Second Nordic Conference on Human-Computer Interaction*, 51–60. https://doi.org/10.1145/572020.572028

Bajracharya, N. (2016, June 14). Big reforms ahead in Nepal education. *The Himalayan Times*. https://thehimalayantimes.com/kathmandu/education-act-eight-amendment-bill-nepal-education

References

Basnet, N. (2022). Parental decisions and influence on young women's education to work transitions and possible selves futures in Nepal. *Journal of Applied Youth Studies*, *5*(2), 135–150. https://doi.org/10.1007/s43151-022-00074-8

Batiibwe, M. S. K. (2019). Using cultural historical activity theory to understand how emerging technologies can mediate teaching and learning in a mathematics classroom: A review of literature. *Research and Practice in Technology Enhanced Learning*, *14*(1), 12. https://doi.org/10.1186/s41039-019-0110-7

Bezemer, J. (2012, February 16). *What is multimodality?* Institute of Education UCL. https://mode.ioe.ac.uk/2012/02/16/what-is-multimodality/

Bezemer, J., & Kress, G. (2015). *Multimodality, learning and communication: A social semiotic frame*. https://www.routledge.com/Multimodality-Learning-and-Communication-A-social-semiotic-frame/Bezemer-Kress/p/book/9780415709620

Blin, F. (2004). CALL and the development of learner autonomy: Towards an activity-theoretical perspective. *ReCALL*, *16*(02). https://doi.org/10.1017/S0958344004000928

Blin, F. (2005). *CALL and the development of learner autonomy: An activity theoretical study* [Doctoral dissertation]. The Open University.

Blin, F. (2016). The theory of affordances. In C. Caws & H. Marie-Josée (Eds.), *Language-Learner computer interactions. Theory, methodology and CALL applications* (pp. 41–64). John Benjamins Publishing Company. https://benjamins.com/catalog/lsse.2.03bli

Blin, F., & Munro, M. (2008). Why hasn't technology disrupted academics' teaching practices? Understanding resistance to change through the lens of activity theory. *Computers & Education*, *50*(2), 475–490. https://doi.org/10.1016/j.compedu.2007.09.017

Bokayev, B., Torebekova, Z., Davletbayeva, Z., & Zhakypova, F. (2021). Distance learning in Kazakhstan: Estimating parents' satisfaction of educational quality during the coronavirus. *Technology, Pedagogy and Education*, *30*(1), 27–39. https://doi.org/10.1080/1475939X.2020.1865192

References

Brecher, M., & Wilkenfeld, J. (1997). *A study of crisis*. University of Michigan Press.

https://www.press.umich.edu/14982/study_of_crisis

Bryman, A. (2012). *Social research methods* (4th ed.). Oxford University Press.

Cadwell, P., O'Brien, S., & DeLuca, E. (2019). More than tweets: A critical reflection on

developing and testing crisis machine translation technology. *Translation Spaces*, *8*(2),

300–333. https://doi.org/10.1075/ts.19018.cad

Carter, S. P., Greenberg, K., & Walker, W. S. (2017). Should Professors Ban Laptops? *Education*

Next, *17*(4), 68–74.

CEHRD. (2020a). *COVID-19 education cluster contingency plan, 2020*.

https://planipolis.iiep.unesco.org/sites/default/files/ressources/nepal_covid-19-

education-cluster-contingency-plan.pdf

CEHRD. (2020b). *Procedures for communication networking in schools, 2020*.

https://cehrd.gov.np/file_data/mediacenter_files/media_file-1-1136122789.pdf

Central Bureau of Statistics. (2012). *National population and housing census 2011 (National*

report). https://unstats.un.org/unsd/demographic-

social/census/documents/Nepal/Nepal-Census-2011-Vol1.pdf

Chen, M. (2022). Digital affordances and teacher agency in the context of teaching Chinese as

a second language during COVID-19. *System*, *105*, 1–13.

https://doi.org/10.1016/j.system.2021.102710

Chiu, T. K. F. (2022). Applying the self-determination theory (SDT) to explain student

engagement in online learning during the COVID-19 pandemic. *Journal of Research on*

Technology in Education, *54*(S1), S14–S30.

https://doi.org/10.1080/15391523.2021.1891998

Chiu, Y. (2017). A case study of making multimodal digital videos in the EFL settings. In J.

Colpaert, A. Aerts, R. Kern, & M. Kaiser (Eds.), *CALL in context proceedings* (pp. 171–

174). University of California.

References

Conceição, P., Hall, J., Jahic, A., Kovacevic, M., Nayyar, S., Ortubia, A., Pavez, F., Rivera, C., &

Tapia, H. (2020). *COVID-19 and human development: Assessing the crisis, envisioning*

the recovery. UN. https://doi.org/10.18356/161b9678-en

Dahal, M. S. (2020, May 8). Online classes may widen digital divide. *Nepali Times*.

https://www.nepalitimes.com/latest/online-classes-may-widen-digital-divide/

Dahya, N. (2016). *Education in conflict and crisis: How can technology make a difference? A*

Landscape review. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

GmbH. https://reliefweb.int/report/world/education-conflict-and-crisis-how-can-

technology-make-difference-landscape-review

Dai, C. (2017). An exploratory study on integrating virtual reality video into L2 Chinese festival

teaching. In C. J. Colpaert, A. Aerts, R. Kern, & M. Kaiser (Eds.), *CALL in context*

proceedings (pp. 439–445). University of California.

Damani, K., Daltry, R., Jordan, K., Hills, L., & Evans, L. (2021). EdTech for Ugandan girls:

Affordances of different technologies for girls' secondary education during the Covid-

19 pandemic. *Development Policy Review*, *n/a*(n/a), e12619.

https://doi.org/10.1111/dpr.12619

Dawadi, S., Giri, R., & Simkhada, P. (2020). Impact of COVID-19 on the education sector in

Nepal—Challenges and coping strategies. *Preprint*.

https://doi.org/10.31124/advance.12344336.v1

Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-methods research: A discussion on its

types, challenges, and criticisms. *Journal of Practical Studies in Education*, *2*(2), 25–36.

https://doi.org/10.46809/jpse.v2i2.20

Day, D., & Lloyd, M. (2007). Affordances of online technologies: More than the properties of

the technology. *Australian Educational Computing*, *22*(2), 17–21.

Department of English Education. (2011). *Multilingual education in Nepal: Hearsay and reality?*

A report. United Nations Educational, Scientific and Cultural Organization Office in

Kathmandu.

https://www.gcedclearinghouse.org/sites/default/files/resources/214861e.pdf

Dey-Plissonneau, A. (2019). *Designed and emerging affordances in tutor-learner multimodal interactions via videoconferencing for second language learning and teaching: An activity theoretical approach* [Doctoral dissertation, Dublin City University]. DORAS.

Dhital, H. (2018). *Opportunities and Challenges to Use ICT in Government School Education of Nepal*. *6*(4), 6.

Dreesen, T., Akseer, S., Brossard, M., Dewan, P., Giraldo, J.-P., Kamei, A., Mizunoya, S., & Ortiz, J. S. (2020). Promising practices for equitable remote learning: Emerging lessons from COVID-19 education responses in 127 countries. *UNICEF*, 10.

Engeström, Y. (1990). *Learning, working and imagining: Twelve studies in activity theory*. Orienta-Konsultit Oy.

Engeström, Y. (1999). Activity theory and individual and social transformation. In Y. Engeström, R. Miettinen, & R.-L. Punamäki (Eds.), *Perspectives on activity theory* (pp. 19–38). Cambridge University Press. https://doi.org/10.1017/CBO9780511812774.003

Engeström, Y. (2001a). Expansive Learning at Work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, *14*(1), 133–156. https://doi.org/10.1080/13639080020028747

Engeström, Y. (2001b). Expansive Learning at Work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, *14*(1), 133–156. https://doi.org/10.1080/13639080020028747

Engeström, Y. (Ed.). (2008a). Disturbance Management and Masking in a Television Production Team. In *From Teams to Knots: Activity-Theoretical Studies of Collaboration and Learning at Work* (pp. 22–47). Cambridge University Press. https://doi.org/10.1017/CBO9780511619847.004

References

Engeström, Y. (2008b). *From teams to knots: Activity-theoretical studies of collaboration and learning at work*. Cambridge University Press. https://doi.org/10.1017/CBO9780511619847

Engeström, Y. (2009). The Future of Activity Theory: A Rough Draft. In A. Sannino, H. Daniels, & K. D. Gutierrez (Eds.), *Learning and Expanding with Activity Theory* (pp. 303–328). Cambridge University Press. https://doi.org/10.1017/CBO9780511809989.020

Engeström, Y. (2015). *Learning by expanding: An activity-theoretical approach to developmental research*. Cambridge University Press. https://www.doi.org/10.1017/CBO9781139814744 (Original work published 1987)

Engeström, Y., Engeström, R., & Kerosuo, H. (2003). The discursive construction of collaborative care. *Applied Linguistics*, *24*(3), 286–315. https://doi.org/10.1093/applin/24.3.286

Engeström, Y., & Sannino, A. (2010). Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review*, *5*(1), 1–24. https://doi.org/10.1016/j.edurev.2009.12.002

Engeström, Y., & Sannino, A. (2021). From mediated actions to heterogenous coalitions: Four generations of activity-theoretical studies of work and learning. *Mind, Culture, and Activity*, *28*(1), 4–23. https://doi.org/10.1080/10749039.2020.1806328

Erümit, S. F. (2021). The distance education process in K–12 schools during the pandemic period: Evaluation of implementations in Turkey from the student perspective. *Technology, Pedagogy and Education*, *30*(1), 75–94. https://doi.org/10.1080/1475939X.2020.1856178

Espino-Díaz, L., Fernandez-Caminero, G., Hernandez-Lloret, C.-M., Gonzalez-Gonzalez, H., & Alvarez-Castillo, J.-L. (2020). Analyzing the impact of COVID-19 on education professionals. Toward a paradigm shift: ICT and neuroeducation as a binomial of action. *Sustainability*, *12*(14), 5646. https://doi.org/10.3390/su12145646

References

Ewing, L.-A., & Cooper, H. B. (2021). Technology-enabled remote learning during Covid-19: Perspectives of Australian teachers, students and parents. *Technology, Pedagogy and Education*, *30*(1), 41–57. https://doi.org/10.1080/1475939X.2020.1868562

Fu, J. S. (2013). ICT in education: A critical literature review and Its implications. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, *9*(1), 112–125.

Gaver, W. W. (1991). Technology affordances. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems Reaching through Technology*, 79–84. https://doi.org/10.1145/108844.108856

Ghimire, B. (2019, January 9). *Schools have 10 years to convert into trust, private school operators object to the move*. https://kathmandupost.com/valley/2019/01/09/schools-have-10-years-to-convert-into-trust

GIbson, J. J. (1979). *The ecological approach to visual perception*. Lawrence Erlbaum Associates, Inc.

Gillham, B. (2000). *Case study research methods*. Continuum. https://www.scirp.org/(S(lz5mqp453edsnp55rrgjct55.))/reference/referencespapers.aspx?referenceid=1313822

GoN, MoE. (2013). *Information and communication technology (ICT) in education master plan (2013-2017)*. https://en.unesco.org/icted/sites/default/files/2019-04/89_ict_in_education_masterplan_nepal_0.pdf

GoN, MoE. (2016). *School sector development plan 2016/17-2022/23*. https://planipolis.iiep.unesco.org/sites/default/files/ressources/nepal_ssdp_final_document_oct_2016_0.pdf

GoN, MoEST. (2019). *National education policy, 2019*. https://moe.gov.np/assets/uploads/files/Education_Policy.pdf

GoN, MoEST. (2020a). *Emergency action plan for school education, 2020*.

https://moe.gov.np/article/1364/alternativeeducationguideline.html

GoN, MoEST. (2020b). *Framework for school operation, 2020.*

https://moe.gov.np/article/1373/schoolopeni.html

GoN, MoEST. (2020c). *Student learning facilitation guideline, 2020*.

https://moe.gov.np/article/1364/alternativeeducationguideline.html

Government of Nepal. (2018). *Disaster risk reduction national policy*.

http://drrportal.gov.np/uploads/document/1353.pdf

Greenhow, C., Lewin, C., & Staudt Willet, K. B. (2021). The educational response to Covid-19

across two countries: A critical examination of initial digital pedagogy adoption.

Technology, Pedagogy and Education, *30*(1), 7–25.

https://doi.org/10.1080/1475939X.2020.1866654

Gustafsson, M. (2021, March 25). *Pandemic-related disruptions to schooling and impacts on*

learning proficiency indicators: A focus on the early grades - World | ReliefWeb.

https://reliefweb.int/report/world/pandemic-related-disruptions-schooling-and-

impacts-learning-proficiency-indicators

Hammond, M. (2010a). What is an affordance and can it help us understand the use of ICT in

education? *Education and Information Technologies*, *15*(3), 205–217.

https://doi.org/10.1007/s10639-009-9106-z

Hammond, M. (2010b). What is an affordance and can it help us understand the use of ICT in

education? *Education and Information Technologies*, *15*(3), 205–217.

https://doi.org/10.1007/s10639-009-9106-z

Hartson, H. R. (2003). Cognitive, physical, sensory, and functional affordances in interaction

design. *Behaviour & Information Technology*, *22*(5), 315–338.

https://doi.org/10.1080/01449290310001592587

References

Hermann, C. F. (1969). *Crises in foreign policy: A simulation analysis*. Bobbs-Merrill.

 https://books.google.ie/books?id=zneOAAAAMAAJ

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). *The difference between*

 emergency remote teaching and online learning.

 https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-

 teaching-and-online-learning

Hung, S. A., & Huang, H. D. (2017). The effects of multimodal videoconferencing on EFL

 learners willingness to communicate, self-efficacy, and communication confidence. In

 C. J. Colpaert, A. Aerts, R. Kern, & M. Kaiser (Eds.), *CALL in context proceedings* (pp.

 439–445). University of California.

Jewitt, C. (2006). *Technology, literacy, learning: A multimodal approach*. Routledge & CRC

 Press. https://www.routledge.com/Technology-Literacy-Learning-A-Multimodal-

 Approach/Jewitt/p/book/9780415478830

Jhurree, V. (2005). Technology integration in education in developing countries: Guidelines to

 policy makers. *International Education Journal, 6*(4), 467–483.

John, P., & Sutherland, R. (2005). Affordance, opportunity and the pedagogical implications of

 ICT. *Educational Review*, *57*(4), 405–413.

 https://doi.org/10.1080/00131910500278256

Jonassen, D. H., & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing

 constructivist learning environments. *Educational Technology Research and*

 Development, *47*(1), 61–79. https://doi.org/10.1007/BF02299477

Joshi, P. (2021). Private Schooling and Tutoring at Scale in South Asia. In P. M. Sarangapani & R.

 Pappu (Eds.), *Handbook of Education Systems in South Asia* (pp. 1127–1146). Springer.

 https://doi.org/10.1007/978-981-15-0032-9_23

Kamanga, R., & Alexander, P. M. (2021). Contradictions and strengths in activity systems:

 Enhancing insights into human activity in IS adoption research. *The Electronic Journal*

of Information Systems in Developing Countries, *87*(1), e12149.

https://doi.org/10.1002/isd2.12149

Kaptelinin, V. (n.d.). Affordances. In *Affordances*. Retrieved October 21, 2022, from

https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-

computer-interaction-2nd-ed/affordances

Kaptelinin, V., & Nardi, B. (2012). Affordances in HCI: Toward a mediated action perspective.

Proceedings of the 2012 ACM Annual Conference on Human Factors in Computing

Systems - CHI '12, 967. https://doi.org/10.1145/2207676.2208541

Karki, R. K. (2020, January 31). *A majority of community schools destroyed in the 2015*

earthquake yet to be constructed—Nepal. Reliefweb.

https://reliefweb.int/report/nepal/majority-community-schools-destroyed-2015-

earthquake-yet-be-constructed

Karki, S. (2020, May 8). Lockdown gives distance learning a boost in Nepal. *Nepali Times*.

https://www.nepalitimes.com/banner/lockdown-gives-distance-learning-a-boost-in-

nepal/

Kennewell, S. (2001). Using affordances and constraints to evaluate the use of information and

communications technology in teaching and learning. *Journal of Information*

Technology for Teacher Education, *10*(1–2), 101–116.

https://doi.org/10.1080/14759390100200105

Kirschner, P., Strijbos, J.-W., Kreijns, K., & Beers, P. J. (2004). Designing electronic collaborative

learning environments. *Educational Technology Research and Development*, *52*(3), 47.

https://doi.org/10.1007/BF02504675

Koirala, B. N., Bhandari, A. B., Lingthep, P. R., Khanal, B., Bhagat, B., & Shrestha, S. (2016). *A*

Study on the Use of Information Communication Technology ((CT) and its sustainability

in school education (pp. 1–58). Transcend Vision Nepal (TVN) Pvt. Ltd.

Kozma, R. B. (n.d.). *ICT and Educational Reform in Developed and Developing Countries*.

Kozma, R. B. (2010). *ICT policies and educational transformation*.

https://www.academia.edu/42103274/ICT_Policies_and_Educational_Transformation

Kozma, R. B., & Vota, W. S. (2014). ICT in developing countries: Policies, implementation, and

impact. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of*

research on educational communications and technology (pp. 885–894). Springer.

https://doi.org/10.1007/978-1-4614-3185-5_72

Kreijns, K., Kirschner, P. A., & Jochems, W. (2002). The sociability of computer-supported

collaborative learning environment. *Journal of Educational Technology & Society*, *5*(1),

8–22. JSTOR.

Kuutti, K. (1995). Activity theory as a potential framework for human-computer interaction

research. In B. A. Nardi (Ed.), *Context and Consciousness: Activity theory and human-*

computer interaction. The MIT Press.

https://direct.mit.edu/books/book/3274/chapter/101163/activity-theory-as-a-

potential-framework-for-human

Kuziola, A. G. (2019). Cleared for takeoff? A collective case study of the academic value of

drones in STEM education through the lens of cultural-historical activity theory

[Unpublished doctoral dissertation, New Jersey City University]. In *ProQuest*

Dissertations and Theses.

https://www.proquest.com/docview/2480781110/abstract/4141E666D19D4A0DPQ/1

Lai, C. (2017). Language learners autonomous learning with mobile devices beyond the

classroom. In C. J. Colpaert, A. Aerts, R. Kern, & M. Kaiser (Eds.), *CALL in Context*

Proceedings (pp. 439–445). University of California.

Lamb, R., Lin, J., & Firestone, J. B. (2020). Virtual Reality Laboratories: A Way Forward for

Schools? *Eurasia Journal of Mathematics, Science and Technology Education*, *16*(6),

em1856. https://doi.org/10.29333/ejmste/8206

References

Laudari, S. (2019). *Breaking barriers: Exploring digital practices of teacher educators in Nepal* [Unpublished doctoral dissertation]. University of Technology.

Laudari, S., & Maher, D. (2019). Barriers to ICT use in EFL teacher education courses in Nepal: An activity theory perspective. *Journal of NELTA*, *24*(1–2), Article 1–2. https://doi.org/10.3126/nelta.v24i1-2.27681

Lee, J. C.-Y., & Sparks, P. (2013). Three hurdles to technology integration: A case study of technology integration in Bungamati. *Journal of NELTA*, *18*(1), 105–114. https://doi.org/10.3126/nelta.v18i1-2.10334

Leffa, V. J. (2017). Redesigning open educational resources to meet different learner contexts: An experiment in co-authorship. In C. J. Colpaert, A. Aerts, R. Kern, & M. Kaiser (Eds.), *CALL in Context Proceedings* (pp. 439–445). University of California.

Leont'ev, A. N. (2009). *Activity and consciousness*. Marxist Internet Archive; Marxist Internet Archive. https://www.marxists.org/archive/leontev/works/activity-consciousness.pdf (Original work published 1977)

Light, D. (2009). The role of ICT in enhancing education in developing countries: Findings from an evaluation of the Intel Teach Essentials Course in India, Turkey, and Chile. *Journal of Education for International Development*, *4*(2), 52–66.

Ligorio, M. B., & Ritella, G. (2010). The collaborative construction of chronotopes during computer-supported collaborative professional tasks. *International Journal of Computer-Supported Collaborative Learning*, *5*(4), 433–452. https://doi.org/10.1007/s11412-010-9094-4

Lim, C. P., & Hang, D. (2003). An activity theory approach to research of ICT integration in Singapore schools. *Computers & Education*, *41*(1), 49–63. https://doi.org/10.1016/S0360-1315(03)00015-0

Livingstone, S. (2012). Critical reflections on the benefits of ICT in education. *Oxford Review of Education*, *38*(1), 9–24. https://doi.org/10.1080/03054985.2011.577938

Marsh, T. (2003). Staying there: An activity-based approach to narrative design and evaluation as an antidote to virtual corpsing. In G. Riva, F. Davide, & W. A. IJsselsteijn (Eds.), *Being there: Concepts, effects and measurement of user presence in synthetic environments* (pp. 86–95). IOS Press.

Martin, K., Davis, L. S., & Sandretto, S. (2019). *A seed for future adoption: Mobile-filmmaking in the secondary science classroom*. 54–61. https://www.learntechlib.org/p/210601/

Marwan, A., & Sweeney, T. (2019). Using activity theory to analyse contradictions in English teachers' technology integration. *The Asia-Pacific Education Researcher*, *28*(2), 115–125. https://doi.org/10.1007/s40299-018-0418-x

McGrenere, J., & Ho, W. (2000). Affordances: Clarifying and evolving a concept. *Proceedings of Graphics Interface 2000*, 179–186.

McPherson, H., & Pearce, R. (2022). The shifting educational landscape: Science teachers' practice during the COVID-19 pandemic through an activity theory lens. *Disciplinary and Interdisciplinary Science Education Research*, *4*(1), 1–13. https://doi.org/10.1186/s43031-022-00061-2

Mishra, S. (2021, May 10). *Education in crisis: Nepal's educational sector in the pandemic*. Education.SouthAsia. https://educationsouthasia.web.ox.ac.uk/article/thinkpiece14

Murphy, E., & Rodriguez-Manzanares, M. A. (2008). Using activity theory and its principle of contradictions to guide research in educational technology. *Australasian Journal of Educational Technology*, *24*(4), 442–257. https://doi.org/10.14742/ajet.1203

Mwanza, D. (2001, July 9). Where theory meets practice: A case for an activity theory based methodology to guide computer system design. *Proceedings of INTERACT' 2001: Eighth IFIP TC 13 Conference on Human-Computer Interaction*. Eighth IFIP TC 13 Conference on Human-Computer Interaction, Tokyo, Japan. http://oro.open.ac.uk/11804/1/Daisy_Japan_Interact_2001.pdf

National Examinations Board. (n.d.). *National examinations board*. Retrieved June 13, 2022,

from https://www.neb.gov.np/en/pages/welcome

NepalNews. (2021, May 10). *SEE and class 12 exams postponed*. NepalNews.

https://nepalnews.com/s/nation/see-and-class-12-exams-postponed

Nkhoma, M., Z., Dang, D. P. T., & Lu, T. H. (2012). Towards an understanding of

implementation and benefits of ICT in education: Review of issues to be considered by

developing countries. In N. Callaos, H. W. Chu, C. Kaufmann, H. Wahl, & F. Welsch

(Eds.), *Proceedings of the International Conference on Society and Information

Technologies (ICSIT 2012)* (pp. 31–35). International Institute of Informatics and

Systemics.

https://www.academia.edu/1890325/Towards_an_Understanding_of_Implementatio

n_and_Benefits_of_ICT_in_Education_Review_of_Issues_to_be_Considered_by_Devel

oping_Countries

Nocchi, S. (2017a). *The affordances of virtual worlds for language learning: An activity

theoretical study*. Dublin City University. School of Applied Languages and Intercultural

Studies.

Nocchi, S. (2017b). *The affordances of virtual worlds for language learning: An activity

theoretical study* [Doctoral dissertation, Dublin City University]. DORAS.

Nocchi, S. (2018). Foreign language teaching and learning in virtual worlds: The construct of

affordance. In L. Falconer & M. C. Gil Ortega (Eds.), *Virtual worlds: Concepts,

applications and future directions.* (pp. 148–168). Nova Science Publishers.

Noor-Ul-Amin, S. (2013). An effective use of ICT for education and learning by drawing on

worldwide knowledge, research and experience: ICT as a change agent for education

(A Literature review). *Scholarly Journal of Education*, *2*(4), 38–54.

Norman, D. (2013). *The design of everyday things*. Massachusetts Institute of Technology.

References

Pacheco, J. A. (2020). The "new normal" in education. *PROSPECTS*.

https://doi.org/10.1007/s11125-020-09521-x

Pacheco, J. A. (2021). The "new normal" in education. *Prospects*, *51*(1), 3–14.

https://doi.org/10.1007/s11125-020-09521-x

Pherali, T. J. (2011). Education and conflict in Nepal: Possibilities for reconstruction.

Globalisation, Societies and Education, *9*(1), 135–154.

https://doi.org/10.1080/14767724.2010.513590

Phyak, P., & Ojha, L. P. (2019). Language education policy and inequalities of multilingualism in

Nepal: Ideologies, histories and updates. In *The Routledge International Handbook of*

Language Education Policy in Asia (pp. 341–354). Routledge.

Powers, S., & Azzi-Huck, K. (2016). *The impact of Ebola on education in Sierra Leone*. World

Bank Blogs. https://blogs.worldbank.org/education/impact-ebola-education-sierra-

leone

Puentedura, R. R. (2009). *An intro to SAMR: Building ladders* [Presentation slides].

http://hippasus.com/rrpweblog/archives/2020/01/AnIntroToSAMR_BuildingLadders.p

df

Pupion, P.-C. (2010). ICT adoption and crisis management: The case of a public education

organization. *Problems and Perspectives in Management*, *8*(4), 15–22.

Rai, N. (2020). *Digital divide exposes class divide in Nepal schools*.

https://www.nepalitimes.com/here-now/digital-divide-exposes-class-divide-in-nepal-

schools/

Rana, K. (2022). How teachers developed remote learning during the Covid-19 crisis: What can

we learn from rural teachers in Nepal? In M. Hammond (Ed.), *Supporting remote*

teaching and learning in developing countries: From the global to the local (pp. 48–61).

British Council, Nepal.

Rana, K., Greenwood, J., & Henderson, R. (2022). Teachers' experiences of ICT training in Nepal: How teachers in rural primary schools learn and make progress in their ability to use ICT in classrooms. *Technology, Pedagogy and Education*, *31*(3), 275–291. https://doi.org/10.1080/1475939X.2021.2014947

Redecker, C. (2017). *European framework for the digital competence of educators: DigCompEdu*. Publications Office of the European Union. https://data.europa.eu/doi/10.2760/159770

Richards, K. (2003). *Qualitative inquiry in TESOL.* Springer.

Sadeck, O. (2022). Technology adoption model: Is use/non-use a case of technological affordances or psychological disposition or pedagogical reasoning in the context of teaching during the COVID-19 pandemic period? *Frontiers in Education*, *7*, 1–14. https://doi.org/10.3389/feduc.2022.906195

Sah, P. K., & Li, G. (2018). English medium instruction (EMI) as linguistic capital in Nepal: Promises and realities. *International Multilingual Research Journal*, *12*(2), 109–123. https://doi.org/10.1080/19313152.2017.1401448

Sahlberg, P. (2021). Does the pandemic help us make education more equitable? *Educational Research for Policy and Practice*, *20*(1), 11–18. https://doi.org/10.1007/s10671-020-09284-4

Samata Foundation. (n.d.). *Data of dalits in Nepal*. Samata Foundation. Retrieved June 13, 2022, from https://samatafoundation.org/data-of-dalits/

Sannino, A., Daniels, H., & Gutiérrez, K. D. (Eds.). (2009). *Learning and Expanding with Activity Theory*. Cambridge University Press. http://lchc.ucsd.edu/MCA/Mail/xmcamail.2012_01.dir/pdfHqmCdPgVef.pdf

Sannino, A., & Engeström, Y. (2018). Cultural-historical activity theory: Founding insights and new challenges. *Cultural-Historical Psychology*, *14*(3), 43–56. https://doi.org/10.17759/chp.2018140304

References

Sharma, R. (2020, May 4). *Can we embrace tech education during lockdown?* Khabarhub.

https://english.khabarhub.com/2020/04/92360/

Shrestha, S. (2016). *Exploring mobile learning opportunities and challenges in Nepal: The*

potential of open-source platforms [Doctoral, University of West London]. UWL

Repository.

Shrestha, S., & Gnawali, L. (2021). Emergency Response in Educational Policies during COVID-

19 in Nepal: A Critical Review. *IAFOR Journal of Education*, *9*(2), 163–181.

https://doi.org/10.22492/ije.9.2.10

Shrestha, S., & Harrison, T. (2019). Using machinima as teaching and learning materials: A

Nepalese case study. *International Journal of Computer-Assisted Language Learning*

and Teaching (IJCALLT), *9*(2), 37–52. https://doi.org/10.4018/IJCALLT.2019040103

Sifferlin, A. (2014). *5 million kids aren't In school because of Ebola*. Time.

https://time.com/3637570/5-million-kids-arent-in-school-because-of-ebola/

Spinuzzi, C. (2020). "Trying to predict the future": Third-generation activity theory's codesign

orientation. *Mind, Culture, and Activity*, *27*(1), 4–18.

https://doi.org/10.1080/10749039.2019.1660790

Stickler, U. (2019). How online language teachers deal with the void. In D. Barr, E. Banados, &

A. Gimeno (Eds.), *Proceedings WorldCALL 2018 CALLing all the CALLers Worldwide* (pp.

125–128).

Strömmer, M. (2016). Affordances and constraints: Second language learning in cleaning work.

Multilingua : Journal of Cross-Cultural and Interlanguage Communication, *35*(6), 697–

721. https://doi.org/10.1515/multi-2014-0113

Su, Y., Feng, L., Hsu, C.-H., & Yang, C.-C. (2013). Technology as an activity system for self-

directed, expanding learning: An analysis based on activity theory. *Procedia - Social*

and Behavioral Sciences, *106*, 2575–2582.

https://doi.org/10.1016/j.sbspro.2013.12.296

References

Tausan, M., & Stannard, L. (2018). *EdTech for learning in emergencies and displaced settings: A rigorous review and narrative synthesis*. Save The Children. https://resourcecentre.savethechildren.net/pdf/edtech-learning.pdf/

The Constitution of Nepal 2015. Part 1, preliminary 6. https://www.mohp.gov.np/downloads/Constitution%20of%20Nepal%202072_full_english.pdf

The Interim Constitution of Nepal 2007. Part 1, preliminary 5 (1). https://constitutionnet.org/sites/default/files/interim_constitution_of_nepal_2007_as_amended_by_first_second_and_third_amendments.pdf

Their World. (2020, April 2). *From Ebola to coronavirus: Education must not be forgotten in a health crisis*. Theirworld. https://theirworld.org/news/ebola-to-coronavirus-education-vital-in-health-crisis/

Timmis, S. (2014). The dialectical potential of cultural historical activity theory for researching sustainable CSCL practices. *International Journal of Computer-Supported Collaborative Learning*, *9*(1), 7–32. https://doi.org/10.1007/s11412-013-9178-z

Tolani-Brown, N., McCormac, M., & Zimmermann, R. (2011). An analysis of the research and impact of ICT in education in developing country context. In J. Steyn & G. Johanson (Eds.), *ICTs and Sustainable Solutions for the Digital Divide: Theory and Perspectives* (pp. 218–242). IJI Global. https://doi.org/10.4018/978-1-61520-799-2.ch011

UNESCO. (n.d.). *Education in emergencies | UNESCO*. Retrieved October 22, 2022, from https://www.unesco.org/en/education/emergencies

UNESCO. (2022). *Education: From disruption to recovery*. UNESCO. https://en.unesco.org/covid19/educationresponse

UNICEF. (n.d.). *Continuing children's education in Nepal during the COVID-19 pandemic*. Retrieved December 1, 2022, from

https://www.unicef.org/nepal/media/14216/file/Child%20and%20Family%20Tracker%20-%20Education.pdf

UNICEF. (2016). *Nearly a quarter of the world's children live in conflict or disaster-stricken countries*. https://www.unicef.org/press-releases/nearly-quarter-worlds-children-live-conflict-or-disaster-stricken-countries

United Nations. (2020). *Policy Brief: Education during COVID-19 and beyond*. https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/08/sg_policy_brief_covid-19_and_education_august_2020.pdf

United Nations Children's Fund (UNICEF). (2017). *The state of the world's children 2017: Children in a digital world*. https://www.unicef.org/reports/state-worlds-children-2017

United Nations Children's Fund [UNICEF] South Asia. (2022, March 4). *How school closures changed my life*. https://www.unicef.org/rosa/stories/how-school-closures-changed-my-life

United Nations Nepal. (2022). *Earthquake contingency plan nepal 2022*. https://mail.un.org.np/sites/default/files/doc_publication/2022-02/2021%20EQ%20ERP%20FINAL.pdf

United Nations Office of the High Commissioner for Human Rights. (2012). *Nepal conflict report*. https://www.ohchr.org/sites/default/files/Documents/Countries/NP/OHCHR_ExecSumm_Nepal_Conflict_report2012.pdf

Unwin, T., Weber, M., Meagan, B., & Hollow, D. (2017). *The Future of learning and technology in deprived contexts*. Save the Children. https://resourcecentre.savethechildren.net/pdf/the_future_of_learning_and_technology.pdf/

Valente, C. (2014). Education and Civil Conflict in Nepal. *The World Bank Economic Review*,

28(2), 354–383.

van Lier, L. (2004). *The ecology and semiotics of language learning: A sociocultural perspective*.

Springer Science & Business Media.

Vellaichamy, A., & Jeyshankar, R. (2015). Impact of Information and Communication

Technology among the physical education students in Alagappa University, Tamilnadu.

In *Handbook of research on inventive digital tools for collection management and

development in modern libraries* (pp. 340–360). IJI Global.

https://doi.org/10.4018/978-1-4666-8178-1.ch020

Vyas, D., Chisalita, C. M., & van der Veer, G. C. (2006). Affordance in interaction. *Proceedings of

the 13th Eurpoean Conference on Cognitive Ergonomics Trust and Control in Complex

Socio-Technical Systems - ECCE '06*, 92–99. https://doi.org/10.1145/1274892.1274907

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*.

Harvard University Press.

Wagner, D. A. (2018). Technology for education in low-income countries: Supporting the UN

sustainable development goals. In I. A. Lubin (Ed.), *ICT-Supported Innovations in Small

Countries and Developing Regions* (pp. 51–74). Springer International Publishing.

https://doi.org/10.1007/978-3-319-67657-9_3

Walker, A., & White, G. (2013). *Technology enhanced language learning: Connecting theory

and practice*. Oxford University Press.

Wallet, P. (2016). *ICT in education statistics: Shifting from regional reporting to global

monitoring; progress made, challenges encountered, and the way forward*. UNESCO

Institute for Statistics. https://unesdoc.unesco.org/ark:/48223/pf0000245572

Webb, M. E. (2005). Affordances of ICT in science learning: Implications for an integrated

pedagogy. *International Journal of Science Education*, *27*(6), 705–735.

https://doi.org/10.1080/09500690500038520

References

Wijekumar, K. J., Meyer, B. J. F., Wagoner, D., & Ferguson, L. (2006). Technology affordances:
The 'real story' in research with K-12 and undergraduate learners. *British Journal of
Educational Technology*, *37*(2), 191–209. https://doi.org/10.1111/j.1467-
8535.2005.00528.x

Willermark, S., & Islind, A. S. (2022). Seven educational affordances of virtual classrooms.
Computers and Education Open, *3*, 100078.
https://doi.org/10.1016/j.caeo.2022.100078

Williamson, B., Eynon, R., & Potter, J. (2020). Pandemic politics, pedagogies and practices:
Digital technologies and distance education during the coronavirus emergency.
Learning, Media and Technology, *45*(2), 107–114.
https://doi.org/10.1080/17439884.2020.1761641

Wims, P., & Lawler, M. (2007). Investing in ICTs in educational institutions in developing
countries: An evaluation of their impact in Kenya. *International Journal of Education
and Development Using Information and Communication Technology (IJEDICT)*, *3*(1), 5–
22.

Wise, S., Greenwood, J., & Davis, N. (2011). Teachers' use of digital technology in secondary
music education: Illustrations of changing classrooms. *British Journal of Music
Education*, *28*(2), 117–134. https://doi.org/10.1017/S0265051711000039

Wong, E. M. L., & Li, S. C. (2008). Framing ICT implementation in a context of educational
change: A multilevel analysis. *School Effectiveness and School Improvement*, *19*(1), 99–
120. https://doi.org/10.1080/09243450801896809

World Education. (2022, January 25). *Tole Shikshya: Improving learning in the community*.
World Education. https://worlded.org/tole-shikshya-improving-learning-in-the-
community/

World Population Review. (2022). *Nepal Population 2022 (Live)*.
https://worldpopulationreview.com/countries/nepal-population

Worldometer. (2022, June 11). *World/Countires/Nepal*.

https://www.worldometers.info/coronavirus/country/nepal/

Yadav, Y. P. (Ed.). (2014). Language use in Nepal. In *Population monograph of Nepal* (Vol. 2, pp.

51–72). Government of Nepal, National Planning Commission Secretariat, Central

Bureau of Statistics. https://nepal.unfpa.org/sites/default/files/pub-

pdf/Population%20Monograph%20V02.pdf

Yamagata-Lynch, L., C. (2010). *Activity systems analysis methods: Understanding complex*

learning environments. Springer.

Zhang, P. (2008). Motivational affordances: Reasons for ICT design and use. *Communications of*

the ACM, *51*(11), 145–147. https://doi.org/10.1145/1400214.1400244

Zorfass, J., & Rivero, H. K. (2005). Collaboration is key: How a community of practice promotes

technology integration. *Journal of Special Education Technology*, *20*(3), 51–67.

https://doi.org/10.1177/016264340502000306

Zurita, G., & Nussbaum, M. (2007). A conceptual framework based on Activity Theory for

mobile CSCL. *British Journal of Educational Technology*, *38*(2), 211–235.

https://doi.org/10.1111/j.1467-8535.2006.00580.x

Appendix A: Ethical Approval

Appendix A1: Ethical Approval for this study

by Research Ethics Committee DCU Dublin

Ollscoil Chathair Bhaile Átha Cliath
Dublin City University

DCU

Mr. Sagun Shrestha
School of Applied Language & Intercultural Studies

Prof. Francoise Blin
School of Applied Language & Intercultural Studies

Dr. Jennifer Bruen
School of Applied Language & Intercultural Studies

6th April 2020

REC Reference:	**DCUREC/2020/061**
Proposal Title:	**Information and Communication Technology in Education: A study of Affordances, Challenges and Policies in Multilingual Nepal**
Applicant(s):	**Mr. Sagun Shrestha, Prof. Francoise Blin, and Dr. Jennifer Bruen**

Dear Colleagues,

Further to expedited review, the DCU Research Ethics Committee approves this research proposal.

Materials used to recruit participants should note that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee.

Should substantial modifications to the research protocol be required at a later stage, a further amendment submission should be made to the REC.

Yours sincerely,

Geraldine Scanlon

Dr Geraldine Scanlon
Chairperson
DCU Research Ethics Committee

DCU
Research & Innovation

Taighde & Nuálaíocht Tacaíocht
Ollscoil Chathair Bhaile Átha Cliath,
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Appendix A2: Plain language statement

DUBLIN CITY UNIVERSITY

Plain Language Statement

(for teachers, school managers, teacher trainers, students and parents)

Research Title: Information and Communication Technology in Education: A Study of Affordances, Challenges and Policies in Multilingual Nepal

Investigator: Sagun Shrestha

Institution: School of Applied Language and Intercultural Studies (SALIS), Dublin City University (DCU), Glasnevin, Dublin, Ireland

Supervisors: Professor Françoise Blin and Dr Jennifer Bruen

The research project explores the use of information and communication technology (ICT) in Education. It will analyse the potential of ICT and challenges of using it in Nepalese secondary schools that use Nepali and English as mediums of instruction; and recommend strategies for the successful integration of ICT in secondary education in Nepal. The findings will be expected to help improve the way technology is used in the classroom in Nepal and in other countries.

For this research, interviews with the teachers, students and school managers and teacher trainers will be conducted which will be audiotaped, and Science and English Classes will be observed. The observed classes will be video-recorded. The researcher will also take notes of the classroom activities during the classroom observation.

The data gathered in a form of interview and classroom observation will be used for this research and dissemination of this research by anonymizing the data that can potentially reveal participants' personal details. By ensuring anonymity, the same data will also be used for any potential future research. The anonymised data will be shared with the interested people and institutions if need be. There is a legal limitation to data confidentiality for example, some information related to the institution might help to identify who the research participant is being referred to; however, the researcher will make every effort to safeguard confidentiality of a participant as far as possible. The raw data which will have personal information will not be shared beyond the principal investigator and the research supervisors.

A participant has the rights to ask for a copy of the data that the researcher has collected about him or her. A participant's involvement in the research study is voluntary. He or she may withdraw from the Research Study at any point. A participant's involvement/non-involvement in the project will not affect any ongoing assessment related to his or her profession and grades he or she achieve in a particular subject.

The DCU Data Protection officer, Mr. Martin Ward can be contacted at or via phone: 7005118 / 7008257.

If participants have any queries and would like to contact researcher, please contact at .

If participants have concerns about this study and wish to contact an independent person,

please contact:

The Secretary, Dublin City University Research Ethics Committee, c/o Research and Innovation Support,

Dublin City University, Dublin 9. Tel 01-7008000, e-mail rec@dcu.ie

Translation of plain language statement in Nepali (for teachers, school managers, teacher trainers, students and parents)

डब्लिन सिटी यूनिभर्सिटी

सामान्य भाषामा दिइएको जानकारी

अनुसन्धानपत्रको शीर्षक : शिक्षामा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको प्रयोग: यसको बहुभाषिक नेपालमा सम्भावना, चुनौती र नीतिहरूका बारेमा अध्ययन ।

अनुसन्धानकर्ता : सगुन श्रेष्ठ

सङ्लग्न संस्था : स्कूल अफ अप्लाइड ल्याङ्ग्वेज एण्ड इन्टरकल्चरल स्टडिज (सालस), डब्लिन सिटी यूनिभर्सिटी (डि.सि.यू), ग्ल्यास्नेभिन, डब्लिन, आएरल्याण्ड

सुपरभाइजरहरू : प्राध्यापक फास्वाँज ब्लन र डा जेनिफर ब्रुइन

यस अनुसन्धानपत्रले शिक्षामा इन्फर्मेसन र कम्युनिकेसनको बारेमा अध्ययन गर्ने छ । यसले नेपालका माध्यामिक विद्यालयहरू जसले नेपाली र अंग्रेजी माध्यमहरू प्रयोग गर्दै आएका छन् ती विद्यालयहरूमा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजी प्रयोग गर्दा देखिने सम्भावना, चुनौती र नीतिहरूका बारेमा विश्लेषण गर्नेछ र नेपालका माध्यमिक विद्यालयहरूमा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको सफल प्रयोगका लागि उपायहरू सिफारिस गर्ने छ । यो अनुसन्धानलाई आएरल्याण्ड सरकार, अन्तर्राष्ट्रिय शिक्षा छात्रवृत्ति र स्कूल अफ अप्लाइड ल्याङ्ग्वेज र ईन्टरकल्चरल स्टडिज (सालस) छात्रवृत्तिले सहयोग गरेको छ । यसबाट आएको निष्कर्षले नेपाल र अन्य देशहरूको कक्षाहरूमा टेक्नोलोजीको प्रयोगको तरिकालाई अभ धेरै मजबुत बनाउने विश्वास गरिन्छ ।

यस अध्ययनको लागि शिक्षक र विद्यार्थीहरूसँग अन्तर्वाता लिइने छ जसको ध्वनि रेकर्ड गरिने छ र विज्ञान र अंग्रेजी बिषयका कक्षाहरू अवलोकन गरिने छ । अनुसन्धानकर्ताले कक्षाहरू अवलोकन गर्दा कक्षामा हुने क्रियाकलापहरू सम्बन्धी केही टिपोटहरू पनि लिइने छ ।

यस अध्ययनमा अन्तर्वाता र कक्षाकोठा अवलोकनबाट प्राप्त जानकारीहरू यो अध्ययन र यो अध्ययनसँग जोडिएका विभिन्न तहका प्रचारहरूमा व्यक्तिगत विवरण नखुल्ने गरी प्रयोग हुने छ । डाटामा हुने व्यक्तिगत विवरण गोप्य राख्दै, यो डाटालाई भावी अनुसन्धानहरूमा पनि प्रयोग गरिने छ । यदि आवश्यक्ता परेमा, व्यक्तिगत विवरण गोप्य राखेको डाटा इच्छुक मानिसहरू र संघ संस्थाहरूलाई प्रदान गरिने छ । डाटा गोपनियतामा केही कानुनी कमजोरी या जटिलताहरू पनि छन् । जस्तै, शैक्षिक संस्थासँग सम्बन्धित केही जानकारीहरूले अनुसन्धानमा आबद्ध व्यक्तिहरू को को हुन् भन्ने कुरा निर्धारण गर्न सहयोग गर्न सक्छ, तथापि अनुसन्धानकर्ताले व्यक्तिगत विवरणको गोपनियतालाई जति सक्दो ख्याल गर्ने छ । यो अनुसन्धानको क्रममा प्राप्त मुख्य (व्यक्तिगत विवरण गोप्य नराखेको)डाटा प्रमुख अनुसन्धानकर्ता र यो अनुसन्धानमा सङ्लग्न सुपरभाईजरहरूभन्दा पर आदान प्रदान गरिने छैन ।

यस अनुसन्धानमा संलग्न व्यक्तिसंग आफ्नो बारेमा संकलन गरेका डाटाको कपी पाउने अधिकार छ । अनुसन्धानमा कुनै पनि व्यक्तिको सङ्लग्नता भनेको स्व निहित कुरा हो । यदि अनुसन्धानमा संलग्न व्यक्तिले चाहेमो यो अनुसन्धानबाट कुनै पनि बेला सो व्यक्ति बाहिरिन सक्छ । । अनुसन्धानमा कुनै व्यक्तिको सङ्लग्नता वा असङ्लग्नताले उसको पेशासँग सम्बन्धित नियमित मूल्याङ्कन र आफ्नो बिषयमा प्राप्त गर्ने अङ्गहरूमा कुनै प्रभाव पार्ने छैन ।

डि.सि.यू. डाटा संरक्षण अधिकारी, श्री मार्टिन वार्डलाई इमेलबाट : <u>data.protection@dcu.ie</u> मा वा फोनबाट : ७००५११८/७००८२५७ मा सम्पर्क गर्न सकिने छ ।

यदि अध्ययनमा सहभागी महानुभावहरूसँग केही प्रश्नहरू रहेमा र अनुसन्धानकर्तासँग सम्पर्क गर्न चाहेमा, यो <u>sagun.shrestha2@mail.dcu.ie</u> ईमेलमा सम्पर्क गर्नुहोला ।

यदि अध्ययनमा सहभागी महानुभावहरूसँग यस अध्ययनसँग सम्बन्धित केही प्रश्नहरू रहेमा र स्वतन्त्र व्यक्तिसँग सम्पर्क गर्न चाहेमा तलको ठेगानामा सम्पर्क गर्नुहोस् ।

सचिव, डब्लिन सिटी यूनिभर्सिटी रिसर्च एथिक्स कमिटी, रिसर्च एयान्ड इनोभेसन सपोर्ट, डब्लिन सिटी यूनिभर्सिटी, डब्लिन ९, टेलिफोन नम्बरः ०१७००६०००, ईमेलः **_rec@dcu.ie_**

यदि अध्ययनमा सहभागी महानुभावहरूसँग यस अध्ययनसँग सम्बन्धित केही प्रश्नहरू रहेमा र स्वतन्त्र व्यक्तिसँग सम्पर्क गर्न चाहेमा तलको ठेगानामा सम्पर्क गर्नुहोस् ।

सचिव, डब्लिन सिटी यूनिभर्सिटी रिसर्च एथिक्स कमिटी, रिसर्च एयान्ड इनोभेसन सपोर्ट, डब्लिन सिटी यूनिभर्सिटी, डब्लिन ९, टेलिफोन नम्बरः ०१७००६०००, ईमेलः **_rec@dcu.ie_**

Appendix A3: Informed consent form
DUBLIN CITY UNIVERSITY
Informed Consent Form
(for teachers, school managers, teacher trainers and parents)

Research Title: Information and Communication Technology in Education: A Study of Affordances, Challenges and Policies in Multilingual Nepal
Investigator: Sagun Shrestha
Institution: School of Applied Language and Intercultural Studies (SALIS), Dublin City University (DCU), Glasnevin, Dublin, Ireland
Supervisors: Professor Françoise Blin and Dr Jennifer Bruen

The research project explores the use of information and communication technology (ICT) in Education. It will analyse the potential of ICT and challenges of using it in Nepalese secondary schools that use Nepali and English as mediums of instruction; and recommend strategies for the successful integration of ICT in secondary education in Nepal.

I am aware that the data gathered in a form of interview and classroom observation will be used for this research and dissemination of this research by anonymizing my personal details subject to legal limitations.

> **I conform that** (Circle Yes or No for each question)
>
> *I have read the Plain Language Statement (or had it read to me)*
>   *Yes/No*
> *I understand the information provided*
>   *Yes/No*
> *I have had an opportunity to ask questions and discuss this study*
>   *Yes/No*
> *I have received satisfactory answers to all my questions*
>   *Yes/No*
> *I am aware that my interview will be audiotaped*
>   *Yes/No*
> *I am aware that my classroom will be video-recorded*
>   *Yes/No*

I may withdraw from the Research Study at any point if I feel that I no longer want to contribute to this research. I consent to the use of my data for the future studies within the following parameter.

    a.   The data that I have provided will be used by safeguarding my personal details.

I have read and understood the information in this form. My questions and concerns have been answered by the researchers, and I have a copy of this consent form. Thus, I consent to take part in this research project.

    Participant's Signature: _____
    Name in Block Capitals: _____
    Date: _____

(Translation of Informed consent form in Nepali for teachers, school managers, trainers and parents)

<div align="center">

डब्लिन सिटी यूनिभर्सिटी

सहमति फाराम

</div>

अनुसन्धानपत्रको शीर्षक : शिक्षामा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको प्रयोग: यसको बहुभाषिक नेपालमा सम्भावना, चुनौती र नीतिहरूका बारेमा अध्ययन ।

अनुसन्धानकर्ता : सगुन श्रेष्ठ

सङ्लग्न संस्था : स्कूल अफ अप्लाइड ल्याङ्ग्वेज एयान्ड इन्टरकल्चरल स्टडिज, डब्लिन सिटी यूनिभर्सिटी, ग्ल्यास्नेभिन, डब्लिन, आएरल्याण्ड

सुपरभाइजरहरू : प्राध्यापक फास्र्वाँज ब्लन र डा जेनिफर ब्रुइन

यस अनुसन्धानपत्रले शिक्षामा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको प्रयोगको बारेमा अध्ययन गर्ने छ । यसले नेपालका माध्यमिक विद्यालयहरू जसले नेपाली र अंग्रेजी माध्यमहरू प्रयोग गर्दै आएका छन् ती विद्यालयहरूमा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजी प्रयोग गर्दा देखिने सम्भावना, चुनौती र नीतिहरूका बारेमा विश्लेषण गर्ने छ र नेपालका माध्यमिक विद्यालयहरूमा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको सफल प्रयोगका लागि उपायहरू सिफारिस गर्ने छ ।

यस अध्ययनमा अन्तर्वाता र कक्षाकोठा अवलोकनबाट प्राप्त जानकारीहरू यो अध्ययन र यी अध्ययनसँग जोडिएका विभिन्न तहका प्रचारहरूमा व्यक्तिगत विवरण नखुल्ने गरी प्रयोग हुने कुरामा म जानकार छु । कुनै पनि जानकारीहरू प्रचारप्रसार गर्दा व्यक्तिगत विवरण नखुलाउनका लागि गर्ने प्रयत्नमा आइपर्ने जटिलताका बारेमा पनि जानकार छु ।

मैले यी तल उल्लेखित कुराहरूमा सहमति दिन्छु । (प्रत्येक वाक्यका लागि राखिएका हो या होइनमा गोलो लगाउनुहोस् ।)

मैले सामान्य भाषामा लेखिएका यस अध्ययनसँग सम्बन्धित जानकारीहरू पढेको छु । (अथवा कसैले मेरो लागि पढिदिनुभएको छ ।)	हो ∕ होइन
मैले दिइएको जानकारी बुझेको छु ।	हो ∕ होइन
मैले यो अध्ययनको बारेमा प्रश्नहरू सोध्ने र छलफल गर्ने अवसर पाएको छु ।	हो ∕ होइन
मैले मेरा प्रश्नहरूको सन्तोषजनक उत्तरहरू पाएको छु ।	हो ∕ होइन
मसँग लिने अन्तर्वाताको ध्वनि रेकर्ड गरिने कुरामा म जानकार छु ।	हो ∕ होइन
मेरो कक्षाकोठामा हामीले अध्ययन गर्ने अवधिमा गर्ने कियाकलापहरू भिडियो रेकर्ड हुने कुरामा जानकार छु ।	हो ∕ होइन

यदि मैले नचाहेको खण्डमा यो अनुसन्धानबाट कुनै पनि बेला म बाहिरिन सक्छु । तल दिइएको बुँदासँग मेल खाने गरी मैले उपलब्ध गराउने जानकारी ∕ डाटा पछि गरिने अनुसन्धानका लागि पनि प्रयोग गरिने कुरामा म सहमति जनाउँछु ।

क. मैले उपलब्ध गराउने जानकारी ∕ डाटा मेरो *व्यक्तिगत विवरणहरूलाई सुरक्षित गर्दै प्रयोग गरिने छ ।*

मैले यस फारममा उल्लेखित जानकारीहरू पढेको र बुझेको छु । मेरा प्रश्नहरू र केही जिज्ञासाहरू अनुसन्धानकर्ताले प्रस्ट पारेका छन् । त्यसैले म यो अनुसन्धानमा भाग लिन मन्जुर छु ।

सहभागीको सही : ....

नाम : ....

मिति : ....

DUBLIN CITY UNIVERSITY

Informed Consent Form (for parents)

Research Title: Information and Communication Technology in Education: A Study of Affordances, Challenges and Policies in Multilingual Nepal
Investigator: Sagun Shrestha
Institution: School of Applied Language and Intercultural Studies (SALIS), Dublin City University (DCU), Glasnevin, Dublin, Ireland
Supervisors: Professor Francoise Blin and Dr Jennifer Bruen

The research project explores the use of information and communication technology (ICT) in Education. It will analyse the potential of ICT and challenges of using it in Nepalese secondary schools that use Nepali and English as mediums of instruction; and recommend strategies for the successful integration of ICT in secondary education in Nepal.

I am aware that the data gathered in a form of interview and classroom observation will be used for this research and dissemination of this research by anonymizing my ward's personal details subject to legal limitations.

I confirm that (Circle Yes or No for each question)

I have read the Plain Language Statement (or had it read to me)	*Yes/No*
I understand the information provided	*Yes/No*
I and my son/daughter have had an opportunity to ask questions and discuss this study	*Yes/No*
My and my son/daughter have received satisfactory answers to all my questions	*Yes/No*
I am aware that my son's/daughter's interview will be audiotaped	*Yes/No*
I am aware that my son's/daughter's classroom will be video-recorded	*Yes/No*

My son/daughter may withdraw from the Research Study at any point if he/she feels that he/she no longer wants to contribute to this research. I consent to the use of my son's/daughter's data for the future studies within the following parameter.

a. The data that my son/daughter has provided will be used in a manner that safeguards his/her personal details.

I have read and understood the information in this form. My questions and concerns have been answered by the researchers, and I have a copy of this consent form. Thus, I consent for my son/daughter to take part in this research project.

Participant's Name: _____

Parent's Signature. _____

Parent's name: _____

Date: _____

(Translation of informed consent form in Nepali to be sent to parents)

डब्लिन सिटी यूनिभर्सिटी

सहमति फाराम

अनुसन्धानपत्रको शीर्षक : शिक्षामा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको प्रयोग: यसको बहुभाषिक नेपालमा सम्भावना, चुनौती र नीतिहरूका बारेमा अध्ययन ।

अनुसन्धानकर्ता : सगुन श्रेष्ठ

सङ्लग्न संस्था : स्कूल अफ अप्लाइड ल्याङ्वेज एयान्ड इन्टरकल्चरल स्टडिज, डब्लिन सिटी यूनिभर्सिटी, ग्ल्यास्नेभिन, डब्लिन, आएरल्याण्ड

सुपरभाइजरहरू : प्राध्यापक फ्रास्वाँज ब्लन र डा जेनिफर ब्रुइन

यस अनुसन्धानपत्रले शिक्षामा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको प्रयोगको बारेमा अध्ययन गर्ने छ । यसले नेपालका माध्यमिक विद्यालयहरू जसले नेपाली र अंग्रेजी माध्यमहरू प्रयोग गर्दै आएका छन् ती विद्यालयहरूमा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजी प्रयोग गर्दा देखिने सम्भावना, चुनौती र नीतिहरूका बारेमा विश्लेषण गर्ने छ र नेपालका माध्यमिक विद्यालयहरूमा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको सफल प्रयोगका लागि उपायहरू सिफारिस गर्ने छ ।

यस अध्ययनमा अन्तर्वाता र कक्षाकोठा अवलोकनबाट प्राप्त जानकारीहरू यो अध्ययन र यी अध्ययनसँग जोडिएका विभिन्न तहका प्रचारहरूमा व्यक्तिगत विवरण नखुल्ने गरी प्रयोग हुने कुरामा म जानकार छु । कुनै पनि जानकारीहरू प्रचारप्रसार गर्दा मेरो छोरा वा छोरीको व्यक्तिगत विवरण नखुलाउनका लागि गर्ने प्रयत्नमा आइपर्ने जटिलताका बारेमा पनि जानकार छु ।

मैले यी तल उल्लेखित कुराहरूमा सहमति दिन्छु । (प्रत्येक वाक्यका लागि राखिएका हो या होइनमा गोलो लगाउनुहोस् ।)

मैले सामान्य भाषामा लेखिएका यस अध्ययनसँग सम्बन्धित जानकारीहरू पढेको छु । (अथवा कसैले मेरो लागि पढिदिनुभएको छ ।)	हो ∕ होइन
मैले दिएको जानकारी बुझेको छु ।	हो ∕ होइन
मैले र मेरो छोरा वा छोरीले यो अध्ययनको बारेमा प्रश्नहरू सोध्ने र छलफल गर्ने अवसर पाएको छु ।	हो ∕ होइन
मेरो र मेरो छोरा वा छोरीका प्रश्नहरूको सन्तोषजनक उत्तरहरू पाएको छु ।	हो ∕ होइन
मेरो छोरा वा छोरीसँग लिने अन्तर्वाताको ध्वनि रेकर्ड गरिने कुरामा म जानकार छु ।	हो ∕ होइन
मेरो छोरा वा छोरीको कक्षाकोठामा उनीहरूले अध्ययन गर्ने अवधिमा गर्ने क्रियाकलापहरू भिडियो रेकर्ड हुने कुरामा जानकार छु ।	हो ∕ होइन

यदि मेरो छोरा वा छोरीले नचाहेको खण्डमा यो अनुसन्धानबाट कुनै पनि बेला उनीहरू बाहिरिन सक्छन् । तल दिएको बुँदासँग मेल खाने गरी उनीहरूले उपलब्ध गराउने जानकारी ∕ डाटा पछि गरिने अनुसन्धानका लागी पनि प्रयोग गरिनेमा म सहमति जनाउँछु ।

क. मेरो छोरा वा छोरीले उपलब्ध गराउने जानकारी ∕ डाटा मेरो व्यक्तिगत विवरणहरूलाई सुरक्षित गर्दै प्रयोग गरिने छ ।

मैले यस फारममा उल्लेखित जानकारीहरू पढेको र बुझेको छु । मेरा प्रश्नहरू र केही जिज्ञासाहरू अनुसन्धानकर्ताले प्रस्ट पारेका छन् । त्यसैले म मेरो छोरा वा छोरीले यो अनुसन्धानमा भाग लिने कुरामा मन्जुर छु ।

सहभागीको सही	:	....
नाम	:	....
साक्षी	:	....
मिति	:	....

Appendix A4: Assent Form (for minors)

Research Title: Information and Communication Technology in Education: A Study of

Affordances, Challenges and Policies in Multilingual Nepal

"My name is *Sagun Shrestha* and I am doing my PhD at the School of Applied Language and Intercultural Studies, Dublin City University (DCU) .

"I am asking you to take part in this research study because I am trying to learn more about use of digital technologies in education. I want to learn about the potential of ICT and challenges of using it in Nepalese secondary schools that use Nepali and English as mediums of instruction.

"If you agree, some of you will be asked to take part in interview and your 3 classrooms will be observed. In an interview, you will be asked how often you use digital technologies in your English language and science classrooms. You will be asked what kinds of digital tools and technologies you use in your English and science classrooms. You will be asked about the challenges that you have faced while using technology in your classroom. You will be asked what your teachers, school, parents and you can do to make effective use of technology in your classrooms. There will also be a few other questions based on your answers. The interview will be conducted for maximum 40 minutes. Your personal information will not be revealed later when I write about what you have said."

"In the classroom observation, you don't need to prepare anything. I will just observe your regular classes and this is to understand how you all are using digital technologies in the classroom."

"You do not have to be in this study. No one will be angry at you if you decide not to be in this study. Even if you start, you can stop any time later if you want. You can ask questions about the study anytime."

"If you decide to be in the study I will not tell anyone else that includes your parents and teachers what you say or do in the study by revealing your identity."

"Signing here means that you have read this form, or have had it read to you, and that you are willing to take part in this study."

"I will also get consent from your parents for your participation in this research."

Participant's name: _____

Signature of participant: _____

Date: _____

(Adapted from the assent form retrieved from https://provost.umw.edu/irb/files/2011/09/App_D.pdf)

Translation of assent form in Nepali

एयासेन्ट फाराम

अनुसन्धानपत्रको शीर्षक : शिक्षामा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजीको प्रयोग : यसको बहुभाषिक नेपालमा सम्भावना, चुनौती र नीतिहरूका बारेमा अध्ययन ।

"मेरो नाम सगुन श्रेष्ठ हो र मैले स्कूल अफ अप्लाइड ल्याङ्ग्वेज एयान्ड इन्टरकल्चरल स्टडिज, डब्लिन सिटी यूनिभर्सिटी, बाट पि.एच.डी गर्दै छु ।"

"मैले तपाईंहरूलाई मेरो अनुसन्धानमा भाग लिन अनुरोध गर्दछु किनकि मैले शिक्षामा डिजिटल टेक्नोलोजीको प्रयोगको बारेमा अध्ययन गर्दै छु । मलाई नेपालका माध्यमिक विद्यालयहरू जसले नेपाली र अंग्रेजी माध्यमहरू प्रयोग गर्दै आएका छन् ती विद्यालयहरूमा इन्फर्मेसन र कम्युनिकेसन टेक्नोलोजी प्रयोग गर्दा देखिने सम्भावना, चुनौतीहरूका बारेमा विश्लेषण गर्ने मन छ ।"

"यदि तपाईंहरूले सहमति जनाउनु भएमा, तपाईंहरू मध्ये केहीलाई अन्तर्वातामा भाग लिनको लागी अनुरोध गने ंछु र तपाईंहरूको ३ वटा कक्षाहरू अवलोकन गर्ने छु । अन्तर्वातामा, तपाईंहरूलाई तपाई आफ्नो अंग्रेजी र विज्ञान विषयका कक्षाहरूमा कतिको डिजिटल टेक्नोलोजी प्रयोग गर्नुहुन्छ, कस्ता प्रकारका डिजिटल टेक्नोलोजी प्रयोग गर्नुहुन्छ, तपाईंले आफ्नो कक्षाहरूमा डिजिटल टेक्नोलोजी प्रयोग गर्दा के कस्ता कठिनाइहरू भोग्नुभयो, तपाई लगायत तपाईंका शिक्षकहरू, विद्यालय र अभिभावकहरूले डिजिटल टेक्नोलोजीलाई प्रभावकारी रुपमा प्रयोग गर्न के गर्न सकिन्छ जस्तो लाग्छ इत्यादिका बारेमा सोधिने छ । तपाईंका उत्तरहरूका आधारमा थप केही प्रश्नहरू पनि सोधिने छन् ।। अन्तर्वाता जम्माजम्मी बढिमा ४० मिनेटको हुने छ । तपाईंले भनका कुराहरू मैले कुनै लेखन तयार गर्दा तपाईंको व्यक्तिगत विवरणहरू उल्लेख गरिने छैन ।"

"कक्षाकोठा अवलोकनका लागि तपाईंलाई केही कुराहरू गर्न अनुरोध गरिने छैन । मैले खालि तपाईंको नियमित कक्षाहरू अवलोकन गर्ने छु र यो अवलोकन तपाईंहरूले कसरी आफ्नो कक्षाहरूमा डिजिटल टेक्नोलोजी प्रयोग गर्नुहुन्छ भनेर बुझ्नको लागि हो ।"

"तपाईंले यो अध्ययनमा भाग लिनै पर्छ भन्ने छैन । यदि तपाईंले यस अध्ययनमा भाग लिनु भएन भने कोही पनि तपाईंसँग रिसाउने छैन । तपाईंले यो अध्ययनमा भाग लिन सुरु गरेता पनि कुनै पनि बेला भाग लिनबाट आफूलाई रोक्न सक्नुहुन्छ । तपाईंले जुनसुकै बेला यो अध्ययनको बारेमा प्रश्न सोध्न सक्नुहुन्छ ।"

"यदि तपाईंहरूले यो अध्ययनमा भाग लिन मन्जुर गर्नुभयो भने, मैले तपाईंले के भन्नु भयो र यो अध्ययनमा के गर्नुभयो भन्ने कुरा तपाईंको परिचय खुल्ने गरी तपाईंका अभिभावक, तपाईंको शिक्षकहरू र अरु कसैलाई पनि भन्ने छैन ।"

"तपाईंले यो फाराममा सही गर्नु भयो भने तपाईंले यो फाराममा लेखेको कुराहरू पढ्नुभयो वा कसैले तपाईंको लागि पढिदिनुभयो र तपाई यो अध्ययनमा भाग लिन इच्छुक हुनुहुन्छ भन्ने बुझिन्छ । "
मैले तपाई यस अनुसन्धानमा भाग लिनका लागि तपाईंको अभिभावकबाट पनि मन्जुरनामा बटुल्ने छु ।"

सहभागीको नाम : ....

सहभागीको सही : ....

मिति: ....

Appendix B: Semi-structured focus group and interview questions

For teachers (it was also translated in Nepali as the focus group was conducted in the Nepali language)

1. Please tell me a little about your background - your professional involvement and experience of teaching.
2. What technologies do you use in your regular classrooms?
3. Why do you use technology in your classroom?
4. What kind of response do you get from learners when you use technologies in your classroom?
5. What kind of response do you get from school managers and parents when you use technologies in your classroom?
6. What kinds of technology have you used in your classrooms during Covid-19 and other crisis situations?
7. What kind of response have you got from learners when you use technology in your classrooms during Covid-19 and other crisis situations?
8. What kind of response have you got from school managers and parents when you use technology in your classroom during Covid-19 and other crisis situations?
9. What are the benefits of technology that you have found in teaching and learning when you use them in your classrooms both in normal and in emergency settings? Why are they benefits to you?
10. What are the challenges that you have faced while using technology in your classrooms both in normal and in emergency settings?
11. What strategies do you think can be suitable to make effective use of technology in your classrooms in normal and in emergency situations?
    Anything else at all you would like to add in this regard?

For Pupils (it was translated in the Nepali language)

1. Tell us about yourself. (the grade you are in, how long you are in this school, your interests etc.)
2. Are you familiar with technologies, e.g., computers, smart phones, etc?
3. How often do you use technologies in your English language and science classrooms?
4. What kinds of technologies do you use in your English and science classrooms?
5. Why do you use technology in your classroom?

6. How often does your English language and science teacher use technology and when do they use technology?

7. Do you get help from your teachers and friends when you use technologies in your classrooms? If yes, what kind of help do you get from them?

8. In your opinion, how and why can technology be supportive for learning science and English?

9. What kinds of technology have you used in your English and science classrooms in the Covid-19 crisis situation?

10. How have you used technology in your English and science classrooms in the Covid-19 crisis situation?

11. Have you got any help from your teacher(s) and friend(s) when you use technology in your classrooms during Covid-19 pandemic? If yes, what kind of help have you got from them?

12. What are the challenges that you have faced while using technology in your classrooms both in a normal and in the Covid-19 crisis situations?

13. What can your teachers, school, parents and you do to make effective use of technology in your classrooms both in normal and crisis situations, such as in the Covid-19 pandemic?

14. Anything else at all you would like to add in this regard.

For School Managers (it was translated in Nepali)

1. Tell me about your background - your professional involvement and experience of being school managers.

2. How often do you use digital technologies in your own work?

3. What kinds of digital tools and technologies do you use?

4. Why do you use technologies?

5. What kind of support do you provide to the teachers who attempt to use or who are using digital technologies in their classrooms?

6. What kinds of technology have been used during Covid-19 pandemic at your school?

7. What are the benefits of technology in teaching and learning that you have found both in normal and crisis situations? Why do you think they are the benefits?

8. What are the challenges that you have faced while using technology both in normal and crisis situations such as in the Covid-19 pandemic?

9. What are the challenges that teachers and students reported to you about the use of digital technology in their classrooms both during normal and crisis contexts?

10. What strategies do you think can be suitable to make effective use of technology in your school?

For Teacher Trainers (it was translated in Nepali as one of the teacher trainer was interviewed in the Nepali language)

1. Tell me about your background - your professional involvement and experience of teacher training?
2. How often do you use technologies in your training sessions?
3. What kinds of digital technologies do you use in your training sessions?
4. What kind of response do you get from participants when you use digital technologies in your training?
5. Why do you use technology in your classroom?
6. Have you managed to deliver any training during Covid-19 pandemic? If yes, have you used any digital tools and technologies in the training?
7. What kind of response have you got from participants when you use technologies in your training during Covid-19 pandemic?
8. What are the benefits of technology in teaching and learning and teacher training that you have found both in normal and crisis situations? Why are they benefits to you?
9. What are the challenges that you have faced while using technology in your training program both in normal and crisis situations?
10. What strategies do you think can be suitable to make effective use of technology in classrooms both in normal and crisis situations?

For Parents (it was translated in the Nepali language)
1. Does your child/children use digital devices at home? If they do, what kind of digital devices and tools do they use?
2. Do you use any digital devices at home? If you do, what kind of digital devices and tools do you use?
3. What kind of help do you provide to your children in relation to the use of digital technologies at home to help them complete their home assignment which requires the use of digital technologies?
4. Have you ever talked to a teacher or school administration regarding technology (such as learning management system, digital tools, etc) that they use in their classes? If you have, can you mention what kinds of talk you have?

5. Has the teacher of your child ever engaged you in any activities that required the use of technology?

6. What challenges (if there are any) do you face when you help your child/children to use technology for his/her learning?

7. What kind of technology was used by your child/children to study during Covid-19 pandemic?

8. What are the benefits of technology in teaching and learning that you have found both in normal and crisis situations? Why do you think they are the benefits?

9. What kind of support did you provide to your child/children in relation to the use of technology to study during Covid-19 pandemic?

10. What kind of support did you receive from your child/children's school and his/her teacher(s) to engage your child in his/her study using technology during pandemic?

11. What do you think that parents can do to help their child/children use technology for learning both in normal and Covid-19 crisis settings?

For Policymakers

1. How do ICT policies in Nepal have helped to manage school education both in normal and crisis situations?

2. To what extent ICT policies in education have considered different mediums of instructions which are in practice in Nepal?

3. What are the benefits of ICT in teaching and learning that you have found both in normal and crisis situations? Why do you think they are the benefits?

4. What are the challenges that appear while developing ICT in educational policies when the policy makers look into the possibility of incorporating ICT in Education? And what are the challenges associated with the implementation of ICT in education policies in secondary school education?

5. What strategies do you think can be suitable to make effective use of technology in secondary schools in Nepal?

Appendix C: Sample transcripts of focus groups and interviews, and segmentation, annotation and transcription of classroom observations

Appendix C1: Transcription of focus group conducted in Nepali

I: हामीले शुरुमा चाहीँ जस्तो अँ, हामी एक अर्कामा परिचित नभएको हुनाले अँ छोटोमा अँ, भनौन तपाईंहरूले आफ्नो नाम, ठेगाना र पेशागत संलग्नता र पठनपाठनको अनुभवहरू अलिकति बताईदिनुस्न । ... विनोद सर, मैले right मा देखिरहेको छुँ, विनोद सर बाटै शुरु गरौं ।

ET3: (2.0) अँ नमस्कार साथीहरू सबैजनालाई, म विक्रम तिमल्सिना, हाल...छुँ । म पेशाले शिक्षक नै हो । यहाँ ... क्याम्पसमा मैले चाहीँ पढाउँछु, साथसाथै जनविकास स्कुल भन्ने छ, government school त्यसमा पनि मैले पढाँउछु । अहिलेलाई यति नै राखें ।

I: धन्यवाद, एकदमै छोटोमा भन्दिनुभयो अब मैले मेरो left hand side मा मेरो स्क्रिनमा म चाहीँ मैले म्यामलाई देख्दैछुँ, अन्जु म्याम हजुरले भन्दिनुस् न ।

ET1: नमस्कार सबै सरहरूलाई, सरहरू म्यामहरू सबैलाई नमस्कार, मेरो नाम अम्बिका, म ... स्कुल, काठमाण्डौमा as a secondary level को रुपमा कार्यरत छुँ । हरु धन्यवाद ।

I: प्रकृति म्यामले भन्दिनुस् न,

ST1: नमस्ते सबैजनालाई, सबै सर म्यामहरूलाई, म प्रकृती ..., मैले चाहीँ ..., काठमाण्डौमा पढाउँछु । म चाहीँ science teacher, हस् धन्यवाद ।

I: धन्यवाद, अनि राम बहादुर सर ।

नमस्कार म यहाँ राम बहादुर । म यहाँ ... स्कुलमा science teacher को रुपमा पढाउँदै छु ... ।

I: अँ धन्यवाद । .... अहिले चाहीँ म फेरी पनि तपाईंहरूलाई question गर्न चाहें त्यसमा चाहीँ जस्ले answer दिनुहुँदा पनि हुन्छ । जस्ले answer दिनुहुँदा पनि हुन्छ, मैले यसरी select गर्दिन । तपाईले दैनिको कक्षाहरूमा चाहिँ कस्तो प्रकारको अ, technology प्रयोग गर्दै हुनुहुन्छ त ? आजभोली अथवा pandemic को बेला, अहिले पनि pandemic नै छ र normal school को setting मा पनि ? कस्ले शुरु गर्ने, जस्ले गर्नुहुँदा पनि भयो । अथवा सजिलोको लागि मैले फेरी पनि छान - भनौन, अम्बिका म्यामबाट शुरु गरौं न त ।

ET1: ...हरू, thank you, sir अँ अब म चाहीँ मैले चाहीँ अ pandemic को बेलामा हाम्रो अब online class मा थियो । हो त्यस्मा हामिले चाहीँ online बाट zoom हरू use गरेर MS Teams बाट class हरू लियौं र अहिले अब यो जुन घरबाट नगरीकन school भै गएर पनि class (xxx) संञ्चालन भईरा छ । हाम्रो school शुरू भइसक्यो । त्यस school चलेतापनि म चाहीँ विद्यार्थीहरूलाई projector हरू use गरेर अनि त्यसपछि आएर हाम्रो ICT Hall पनि छ, ICT Hall को use गरेर class regular रुपमा ICT use गरेर class लिईरा छुँ । जे होस् pandemic मा तयार गरेको presentation हरू अहिले चाहीँ धेरै काम लागेको छ मलाई चाहीँ ।

I: ए, अनि, pandemic भन्दा अगाडी पनि त्यस्तै tools हरू digital artifacts हरू प्रयोग गर्नुहुन्थ्यो ?

ET1: = sure, गर्थ्यौं । तर एकदमै थोरै मात्रामा गर्थें हैन ? पहिलाचाहीँ अब यो pandemic भन्दा अगाडी गर्नु चाहीँ मैले गर्थें । तर जस्तो हप्तामा एक पटक । अब हप्तामा दुई पटक जस्तो use हुन्थ्यो । त्यति धेरै चाहीँ daily जस्तो चाही हुँदैनथ्यो । अहिले after pandemic भनौन lockdown पछिको period चाहिँ

daily जस्तो नै मेरो class को अ हरूमा चाहीँ अँ यो ICT को use भइरा छ र every day म ICT हलमै लगेर presentation हरू खोलेर नै class teaching (xxx) गर्दिर गदिराछु भा छ, विद्यार्थीलाई बुझाउनलाई पनि धेरै सजिलो भा छ मलाई चाहीँ ।

I: मैले म्यामलाई नै किन use गर्दै हुनुहुन्छ भनेर सोधें भने के जवाफ दिनुहुन्छ म्याम ?

ET1:   यस्तो सर कस्तो भन्दा खेरी पहिलो कुरो त अ lockdown को बेलामा गर्नुपर्ने एकदमै हामीलाई चाहीँ त्यो बेला compel नै भा थियो, हामीले गर्नै पर्छ भन्ने भयो, अब अहिले आउर चाहीँ अ, कस्तो भन्दा खेरी, for easiness क्या, आफूलाई पनि comfort feel भइराखेको छ के, गर्दा गर्दै । त्यहाँ त्यो बेलामा जुन लक डाउनको period मा मैले गन्या थिए, अब अहिले चाहीँ मलाई त्यो गर्ने गरेर पढाँउदा खेरी अहिले class मा गएर as a ICT use गरेर projector use गरेर class लिदाँ खेरी विद्यार्थीलाई बुझाउन पनि मलाई एकदम सजिलो । आफैँलाई पनि एकदमै easy भएको कारणले गर्दाखेरी चाहीँ यो चाहीँ ठीक छ जस्तो मैले feel गरेको कुरा । मलाई धेरै सजिलो भएको छ यो ICT को class लिदाँ खेरी चाहौँ ।

I: धन्यवाद, अँ भनुन अरु साथीहरूसंग यो प्रश्न राख्नुभन्दा अगाडी तपाईसंग फेरीपनि अलिकती खोतल्न चाहेँ, जस्तो तपाईले zoom प्रयोग गर्छु भन्नुभयो हैन अघि, अरुपनि digital tool हरु प्रयोग गर्नुहुन्छ कि जस्तो, १, २, ३ गरीकन भन्दुहुँदा खेरी कुन कुन digital tools हरू प्रयोग गर्नुहुन्छ ?

ET1:   सर, online class लिँदा खेरी सर ?

I   Online Class लिँदा खेरी अथवा भनौन अहिले पनि ?

ET1:   अब, online class लिदाँखेरी चाहीँ शुरुमा हामिले जुम नै जुमबाट class लियौ । त्यसपछि zoom बाट time को limitation चाहीँ 40 minutes को हुन्यो त्यो बेला, त्यही भएर पछि हामी Google Meet मा अँ बाट connection connect गऱ्यौ विद्यार्थीहरूलाई । Google Meet बाट चाहीँ time को limitation छैन भन्ने हिसाबले, लिएर आको थिएँ र त्यही अनुसार कमसेकम one week, five day मा पढाएका कुराहरूलाई, अँ त्यो ICT बाट presentation गर्दाखेरी विद्यार्थीमा clear idea दिन सक्ने विषयवस्तु छनेर, त्यो हप्ता अब पाँच दिनको क्रियाकलापमा कुनै figure हुनसक्ला कुनै Video dip हरू हुनसक्ला, या कुनै चाहीँ त्यस्तो material हरू हुन सक्छ जस्लाई projector through students हरू संग चाही share गर्दा खेरी अथवा चाहीँ कहिलेकाहीँ computer lab मै लगेर students हरूसंग चाहीँ share गर्दा खेरी अथवा चाहीँ कहिलेकाहीँ computer lab मै लगेर students लाई individual computer को अगाडी राखेर, आफूले चाहीँ main computer बाट controlling गर्दा खेरी, कुन effective हुन्छ त्यस्लाई हेरेर प्रत्येक Friday मा चाहीँ मैले, त्यो कुरा students लाई चाहीँ ICT प्रयोग गर्छु र अहिले पनि निरन्तरता दिईराखेको छुँ र अर्को चाहीँ ICT को Tool मा projector हरू, multimedia projector हरू मात्रै नभएर, regularly use गर्ने tool को रुपमा चाहीँ अँ भनौन मोबाइल फोनलाई use गर्छु मैले जस्तो listening activity गर्नु पऱ्यो भने, Bluetooth on गरेर सानो एउटा चाहीँ अँ अडियो material लिएर गैदियो भने पनि ठूलो केही गर्न नर्पने, कतिपय साथीहरू चाहीँ listening खै, material पाईएन, school मा cassette किन्दिएको छैन, के छैन, त्यो गाह्रो भो, त्यो भएर सिकाउँदिन भन्ने साथीहरूलाई मैले, त्यो गाह्रो भो, त्यो भएर सिकाउँदिन भन्ने साथीहरूलाई मैले, यहीँ पनि कुरा गर्छु, होइन, ठूलो कुरै छैन, मोबाइल तपाईसँग छदैछ, डाउनलोड गर्न सकिहाल्नु हुन्छ । सानो हजार आठ सय रूपैयाको चाहीँ एउटा चाहीँ पकेटमा हाल्ने जस्तो एउटा device लिनुस् । Bluetooth on गर्दिनुस्, एउटा class लाई पुगिहाल्छ, हैन त्यस्ले गर्न सक्नुहुन्छ । Plus mobile phone को चाहीँ multiple purposes जस्तो dictionary use देखि लिएर कतिपय

अवस्थामा तत्कालै student लाई केही confusion का कुराहरू, pronunciation मा चाहिँ students हरूले चाहिँ जुन, अ, habituate भईराखेको हुन्छ अनि त्यो हामीले, त्यसको real pronunciation गर्दा खेरी सर हामीले त यसरी सिके थियौं नि त भन्दा खेरी, ल है त के भन्छ, तिम्रो गुरूले के भन्छ, मेरो पनि गुरू हो Oxford ल हेर भनेर त्यहीँ चाहिँ साउण्डै सुनाई दिने (xxx) त्यल्ले गर्दा उनीहरूलाई पनि interest हुने र कतिपय सक्नेले तिमीहरू पनि फुर्सदको समयमा मोबाईल apps हरूमा (xxx) download गरेर गर्न सक्छौ भन्ने किसिमको कुराहरू हुन् । यद्यपी अहिलेलाई हेर्दाखेरी थोरै मात्रामा, करीब करीब 20-30% class चाहिँ मैले online बाट मतलब ICT प्रयोग गरेर लिने गर्छु, अरु चाहिँ most of the class चाहिँ discussion हुन्छ, question-answer हुन्छ, lecture methods, traditional methods पनि हुन्छ सर ।

I: अँ, धन्यवाद विक्रम सर, धेरै कुरा बताउनु भयो हगी ? अं, अभ्र धेरै म पछि पनि खोतल्छु, अहिले चाहिँ अँ भनौन, अँ पवित्रा भ्यामबाट, फेरी त्यही प्रश्न राखें एउटा, कुन कुन कुन digital tools प्रयोग गर्नुहुन्छ अनी किन गर्नुहुन्छ भन्ने ?

ST1: सर मैले चाहिँ यो pandemic को बेलामा चाहिँ laptop अर्न्तगत चाहिँ Google classroom बाट केही समय सञ्चालन गरिसकेपछि अनि Google classroom बाट अँ धेरै कुराहरू चाहिँ अँ student समक्ष चाहिँ गर्न नसकिने त्यस्तो भको कारणले गर्दा, फेरी हामीले चाहिँ हाम्रो स्कुलमा चाहि Ved App भनेर चाहिँ हाम्रो school ले नै .... को हैन त्यो अर्न्तगत चाहिँ हामीले चाहिँ homework हरू छैन अनि त्यसैबाट चाहिँ zoom connect गरेर त्यसैबाट चाहिँ हामी Class लिने चाहिँ बनायौं । अनि त्यस अर्न्तगत चाहिँ class लियौं । त्यस अर्न्तगत class लिंदा चाहिँ हामीले जे होस् effective नै भएको थियो, हैन ? science को पढाई effective नै भएको थियो त्यतिबेला चाहीँ video हरू Present गर्न पाईएको थियो, हैन ? अहिले त अब Class मा चाहिँ ICT को प्रयोग चाहिँ त्यति गर्न सकिएको छैन । अहिलेको समयमा चाहिँ, हैन त्यतिबेला चाहिँ अब pandemic को बोलामा चाहिँ video द्वारा science लाई चाहिँ अलिकति present गर्दा उनीहरूको बुभ्नको लागि पनि सजिलो, हैन, उनहिरूले बुभ्नको लागि चाहिँ धेरै नै सजिलो भको थियो । अहिले चाहिँ अलिकती त्यो चाहिँ गर्न पाईएको छैन, प्रत्योगात्मक पनि अँ, अहिले चाहिँ, अहिले चाहिँ गईसकेको चाहिँ छैन, ICT चाहिँ । चाहिँ । त्यहि हो ।

I: Okay धन्यवाद प्रकृति म्यामलाई पनि । रामबहादुर सर ?

ST2: (2.0) अम् अँ, मेरो कुरो पनि करीव करीव, सरहरू मिसहरूले भन्नु भाको जस्तो जस्तै नै करीव करीव त्यस्तो त्यस्तो नै पुग्यो । हाम्रो यहाँ पनि अब हामीले यो समयमा, मेरो science हो । मेरो, ९ र १० म science पढाउँछु र शुरु शुरुको अब बेला नै भईहाल्यो हामी first chapter बाटै शुरु गर्नु पर्ने भयो, र हामीहरूले पनि यहाँ अब अघि म्याडमले भन्नु भएको जस्तै अरु 40 minutes को zoom class हुन्थ्यो भनेर भन्नु हुन्थ्यो, हाम्रो school मा त्यल्लाई चाहिँ unlimited zoom ऊ थियो, program थियो । त्यसकारण हामीले चाहिँ 45 minutes कै हाम्रो period हुन्थ्यो, अधिपछि जुन सामान्य हाम्रो class हुन्थ्यो, सामान्य class हाम्रो 45 थियो, त्यही 45 लाई नै मि मिलाएर 45 minutes कै हामीले class लिन्यौं र त्यसमा अब त्यहाँ हो zoom class लिने र हामीले सकेसम्म विद्यार्थीहरूलाई अब बुभोस् राम्रो संग देखोस् भन्ने हिसाब किताबबाट बोर्डमा आफूले लेखेर अथवा हामीले कुनै chart हरूलाई टाँगेर, त्यस्तो किसिमले हामीले बुभाउने कोसिस गर्यौं हगी ? त्यसैमा, अनि त्यसपछि त अरु त हामीले खासै त्यस्तो गरिएन । त्यस्तो अब अन्य projector, machine हरू त हामी संग चिन् त थियो तर त्यल्लाई अब प्रयोग गर्ने ऊ पनि भएन । अँ time मिलेन अथवा भनौन हामीले त्यो program केही पनि राखिएन त्यसकारणच हामीले (xxx) zoom

class बाट नै 45 minutes लाई class मानेर अनि त्यसैमा सकेसम्म अब राम्रोसंग लेखेर बच्चालाई धेरै भन्दा धेरै दिने भन्ने कुरो भयो, त्यसमा अब जुन homework check गर्ने अथवा बच्चाले बुझ्यो बुझेन भन्ने check गर्ने अथवा बच्चाले बुझ्यो बुझेन भन्ने checking गर्ने system लाई चाहिँ हामीले messenger मा Messenger मा question देखाईदिने र त्यही messenger बाट बच्चाबच्चीको त्यसबाट correction गरेर अनि आफ्नो केही कुरा लेखेर अनि फोटो खिचेर त्यो Messenger बाट send गर्थ्यौं अनि त्यसैलाई हामीले हेरेर अनि त्यहाँबाट मूल्याङ्कन गर्ने system हुन्थ्यो, अँ यही नै हो सर हामीहरूको (xxx) network issue 42 days जम्मा सकियो । त्यो सकाए पछि हामी (xxx) अँ अनि physical class भएपछि हामीले class चाहिँने हामीले जुन पहिला जरुरी पढाएको थियौं, अब पहिला जस्तो पढाउँदा खेरी अब त्यही हो, science मा अब chart ल्याउने, अँ अथवा diagram हरूलाई अब खिच्ने, आफू खिच्ने, अथवा तयार (xxx) त्यस्तै किसिमबाट चल्दै आईरहेको छ अब अहिले । जुन नर्मलै किसिमबाट चलिराखेको छ ।

I: Okay धन्यवाद रामबहादुर सरलाई पनि, अँ पछिल्लो चाहि अलिकती भनौन, Internet को connection को कारणले होला क्यारे धेरै कुरा सुन्न सकिंन । विक्रम सरले पनि सहमती जनाउनु भयो । के रे हामीले भखरै किन प्रयोग गऱ्यौं र कस्ता कस्ता digital tool हरू प्रयोग गऱ्यौं सरहरूले pandemic को बेलाको कुराहरू निकै मज्जाले ल्याईदिनुभयो धन्यवाद त्यस्को लागि । अनि अब चाहिँ मैले छोटोमा के चाहिँ जान्न चाहँ भने, कतिपय कुरा त त्यहाँ embed भएर पनि आयो, जोडिएर पनि आएको छ । तपाईंहरूले विद्यार्थीबाट चाहिँ कस्तो response हरू पाउनु भयो त, यो technologies हरू प्रयोग गर्दाखेरी चाहिँ जस्तो यस्मा पनि दुइटै कुरा रह्यो जस्तो crisis को बेलामा pandemic को बेलामा र अथवा अहिले भनौन, अहिले Nepal अलिकती pandemic साम्य भएको जस्तो देखिएको छ । कस्तो प्रकारको response हरू पाउनु भयो ? विक्रम सरबाट शुरु गरौं न त ।

ET3:   (5.0) हजुर सर, एक पटक मलाई फेरी अलिकती clear गर्नुस् त ।

I: अँ कस्तो प्रकारको responses हरू जस्तो भनौन, students को, विद्यार्थीको responses हरू चाहिँ technology प्रयोग गर्दा खेरी, कस्तो प्रकारको responses हरू पाउदै हुनुहुन्छ होला अथवा पाउनुभयो ?

ET3:   अ, oh, yes sir, अँ एकदम excited छन् students चाहिँ । आज Friday भनेपछि अरू class भन्दा Friday special class हुन्छ । अँ र कतिपय कुराहरू बुझाईका क्रममा पनि, जस्तो कहिँ पनि नबोल्ने जस्तो shy students पनि, त्यहाँ figure मा एउटा picture देखाएर अथवा कुनै conversation का कुराहरू देखाएर, what is happening in the picture, can you guess भन्दा खेरी, केही न केही रुपबाट बोल्ने उनीहरूमा motivation चाहिँ हुन्छ, त्यो positive कुरा छ, यल्ले motivation गदौं रहेछ, ICT ले एउटा कुरा छ भने, अर्को कुरा त जस्तो अभ्यासहरू, अरु ठाउँमा भएका अभ्यासहरू त्यही poem लाई अर्को teacher ले कसरी पढाएको छ त, हैन, त्यो हामीले YouTube बाट download गरेर छोटो छोटो clip देखाँउदाखेरी, अनी variety पाउने रहेछ, pronunciation मा variety पाउने रहेछ । Native voice लाई हामीले classroom मा लाँदाखेरी variety पाउँदो रहेछ । यी सम्पूर्ण कुराले उनीहरूमा एक किसिमको चाहिँ copy गर्ने केही pronunciation पनि improve भएको मैले केही पाएँ, संगसंगै जस्तो अँ, भनौन concept, विषयवस्तुको concept मा चाहिँ clarity पनि उनीहरूले चाहि develop गरेको पाएँ, अँ, अब मलाई teacher लाई पनि supportive र student लाई पनि विषयवस्तु बुझ्नको लागि एकदम

supportive हुने र motivational factor को रुपमा चाहिँ यस्लाई लिएको छुँ सर । अ exited छन् students हरू exited छन् । अरू class मा पनि, सरले त Friday मा चाहिँ English मा त ICT को प्रयोग गर्नुहुन्छ, अरु विषयमा पनि हुँदैन सर यस्तो English मा मात्रै हुने हो र, अरुमा मिल्दैन यसो गर्न भनेर माग गरेका छन् विद्यार्थीहरूले, सर तपाईंले त यसौ गर्नुभएछ, हामीलाई नी सिकाउनुस्न भनेर, सरहरूले पनि त्यो जिज्ञासा राख्नुभा छ सर, यो पक्कै नी positive impact नै होला सर ।

I: Okay, धन्यवाद विक्रम सर, अनि अम्बिका म्यामले कत्तिको सहमती अँ, भनौन उहाँको विक्रम सरको धारणासंग, विक्रम सहमती गर्नुहुन्छ ? सहमती छ, अरु केही थप्नुहुन्छ की ?

ET1:   Okay अब, लगभग, लगभग क्रिमसरले भन्नुमा जस्तै हो । तर अलिकति मैले चाहीँ के कुरा थप्न खोजें भने मैले दुईथरिको response यहाँनिर राख्या छुँ, अँ एउटा चाहिँ during अँ pandemic, lockdown को period मा र अहिले हामीले Face-to-Face को बोलामा चाहिँ ICT use गरेर class लिँदा र virtually चाहिँ class लिने बेलाको अलिकति कुराहरू share गर्न चाहेँ, किनकी हाम्रो लगभग लगभग असारबाट हामीले online class start गऱ्या थियौं अँ, अँ, कहिले भन्दा खेरी कार्तिक, मंसिर सम्मै हाम्रो online क्लासै चल्यो, अनि यो period मा चाहिँ पछि अनि school मा गईसके पछि विद्यार्थीहरूले भन्दौ थियो, online class त हामी त कहिले, student ले भन्थे कि क्लास एकोहोरो भएको जस्तो Feel हुने अनि त्यसपछि हामी त ओछ्यान भित्र, ओछ्यानमा बस्ने अनि त्यसपछि हेर्दिहेर्दै कहिले त निदाउने, त्यस्तो खालको हुन्थ्यो, हामीलाई त एकदम boring भयो भने विद्यार्थीहरूले भन्थे के, यो virtually मैले अहिले भन्न खोजेको चाहिँ, यो face-to-face नभईकन, ICT कै use गरेर, जुन virtually रुपमा online class हरू लिएको थियौं त्यो बेलाको कुराहरू, मैले विद्यार्थीले दिएको response हरू हजुरलाई मैले यो सुनाएँ । त्यसपछी अहिले, अहिले फेरी हामीले ICT कै use गरेर क्लास लिइराख्या छौं, जुन चाहिँ face-to-face नै भईराछ तर त्यसमा चाहिँ हामीले ICT को use गरेर class लिँदा खेरी यो चाहिँ एकदमै positive reaction हरू, अथवा उनीहरूको response हरू चाहिँ हामीले पाएका छौं । यसमा चाहिँ विद्यार्थीले उनीहरूले के भन्छन् भन्दा खेरी अहिले चाहिँ वरु यो virtually ICT को use गर्नुभन्दा, यसरी face-to-face नै बसेर ICT को use गर्दाखेरी धेरै बुझ्ने, धेरै सजिलो भएको छ हामीलाई सिक्नको लागि, कुनै पनि कुराहरू जान्नको लागि, अँ, यो face-to-face मा ICT use गर्दा खोरी अलिकति हामीलाई चाहिँ easy नै भएको छ पहिलाभन्दा भन्ने कुराहरू चाहिँ गऱ्या थिए र यस्मा मैले देखेको कुरा चाहिँ ICT नै use गरेर virtually लिँदा खेरी चाहिँ विद्यार्थीहरू अलिकती passive भएको हो कि जस्तो चाहिँ feel हुने रहेछ । अब कहिले कसैले response नै नदिँईदिने विद्यार्थीहरूले, online class गर्दा खेरिको मैले कुरा गरें है, अँ विशेष गरेर विद्यार्थीले response नै नदिँईदिने, अनि त्यसपछि दिक्क लाग्ने कहिले त, किन response नदिएको भनेर भन्नु पर्ने अवस्थामा रहने तर ICT कै use गरेर face-to-face class लिँदा खेरि त कमसेकम विद्यार्थीलाई हामीले हेर्न पाउँछौं, उनीहरूले के गरिरा छ, के गरिराछैन, उनीहरूको reaction कस्तो छ, facial expression के छ भन्ने कुराबाट पनि बुझ्न सकिन्छ की कतिको atttentive भएर चाहिँ class attend गरिको छ भन्ने कुरो चाहिँ र अर्को कुरो यस्को avantage मा भन्नु पर्दा खेरी यति सजिलो पनि छ कि यो विद्यार्थीको लागि पनि सजिलो र teachers को लागि teaching गर्न पनि सजिलो, teachers को लागि teaching गर्न पनि सजिलो, विद्यार्थीले कुनै पनि कुरा learning गर्नलाई पनि धेरै सुविधा सजिलो चाहिँ हुँदोरहेछ यो ICT को use गरेर class लिँदा खेरी, त्यो चाहिँ मैले feel गऱ्या हुँ सर ।

I: ... (muted for some time) अँ के रे विक्रम सरले पनि कतिपय कुराहरूमा चाहिँ सहमति जनाउँदै हुनुहुन्थ्यो कस्तो students हरू चाहिँ pandemic को time मा जुन भनौन निदाउने, अरु कुरामा हैन त सर ? अँ =

ET3:   = म हजुर

I: र अरू जस्तो मैले प्रकृति म्यामसंग, एकदमै धन्यवाद अम्बिका म्याम, प्रकृति म्यामसंग पनि थप कुराहरू छन् अथवा उहाँहरूको कुराहरूलाई सहमती जनाउनु हुन्छ कि ? अथवा अरु केही छ की, अलिकती share गरिदिनुस् न ?

ST1:   छैन सर, सहमती छ, त्यही हो शुरुमा school जाने वित्तिकै चाहिँ students हरूले के भनेको थियो भने online भन्दा पनि हामीलाई त प्रतक्ष नै ठीक लाग्यो म्याम भनेको जस्तो कुरा चाहिँ गरिराथे । प्रतक्ष पढ्दा चाहिँ अलिकति संगै चाहिँ भएको कारणले गर्दा, उनीहरूले बुझ्न पनि सजिलो अनि हामी चाहिँ उनीहरूको निगरानीमा भएको कारणले गर्दा उनीहरूले सिक्न पनि सजिलो, सोध्न पनि सजिलो छैन, सबै कुरा चाहिँ आमुने सामुन्ने भएर गर्दा चाहिँ राम्रो जस्तो चाहिँ उनीहरूले महसुस गरेका थिए । अनि अम्बिका म्यामले भने जस्तै दुइटै अब हुन सक्यो भने चाहिँ अझ better मलाई मलाई पनि त्यस्तै लाग्यो । अम्बिका म्यामको अनुसार चाहिँ हगी ? त्यही हो ।

I: धन्यवाद, अनि प्रकृति म्यामलाई एटा question, जस्तो उनीहरू कसैले पनि बच्चाहरूले, बाबुनानीहरू चाहिँ म्यामले फलाना picture हरू यसरी online मा देखाउनु हुँदाखेरी अथवा त्यो फलाना process चाहिँ online मा देखाउनु हुँदाखेरी चाहिँ एकदमै राम्रो संग बुझिएको थियो, त्यस्तै गरिकन school मा पनि ल्याउन सकिंदैन भन्ने केही कुराहरू आयो कि आएनन्, मैले जान्न मात्र खोजें ।

ST1:   त्यस्तो आको छैन सर, त्यस्तो आको छैन सर, त्यस्तो चाहिँ आको छैन, मैले जसरी के रे यो आफुले बनाएर पढाएको थिएँ नी, त्यसरी पढाउँदा चाहिँ मैले आफूले अनुभव गर्दा चाहिँ मैले चाहिँ त्यसरी बुझाउन सकेको जस्तो लाग्यो हैन ? अहिले चाहिँ त्यसरी बुझाउन सकेको जस्तो लाग्यो हैन ? अहिले चाहिँ मैले त्यति, त्यो जसरी चाहिँ लाग्यो हैन ? अहिले चाहिँ मैले त्यति, त्यो जसरी चाहिँ मैले चाहिँ विद्यार्थीहरूलाई बुझाउन सकेको छैन science मा जस्तो चाहिँ लागिराछ मलाई चाहिँ (laughs) त्यही हो ।

I: Okay, अँ ल धन्यवाद, अनि के रे, राम बहादुर सर केही थप्नुहुन्छ या केही कुरा छन् ।

ST2:   ... हजुर मेरो कुरा सर, मेरो कुरा पनि उहाँ प्रकृति म्याम स.ग झण्डै झण्डै मिल्न मिल्न खोजेको जस्तो लाग्यो हगि सर ? अब यो हामी zoom class बाट लिंदा खेरी नी सर, अब उहाँले अघि भन्नुभाको जस्तो, अब, बच्चाहरू कसरी बस्या छ, के छ स्थिति, कस्तो छ, हामीले direct हेर्न नी नपाउने, face-to-face class मा चाहिँ हाम्रो नजर भनौन सरर्र हाम्रो class मा दायाँ बायाँ नजर लाउने वित्तिकै यो बच्चा यस्तो हेच्या छ, यो बच्चा अलिकती attention छैन, दायाँ बायाँ हेरिराख्याछ छ भन्ने कुरा चाहिँ त्यो हुँदोरहेछ । तर हाम्रो zoom class मा चाहिँ त्यस्तो नहुँदो रहेछ । अब सिमित देखिन्छ, एउटा दुइटा बच्चालाई देखिन्छ, दुइचार जना, जम्मा ४ जनाको देखिन्छ, अनि अर्को नदेखिने, त्यल्ले गर्दा चाहिँ समस्या जस्तो हुने भयो बच्चा बच्चीहरू । अनि अर्को चाहिँ बच्चाबच्चीहरू । अनि अर्को चाहिँ समस्या कस्तो भन्दा नी सर, अब हामीले त्यहाँ हाम्रो sound भयो, हाम्रो video भयो, कतिको राम्रो गएको छ की छैन, audio video भनेर सोध्दा खेरी कोहीको बच्चाबच्चीहरूमा जस्को अब net राम्रो छ quality छ, अब नजिक छ, उस्को चाहिँ राम्रो देखिं वा रहेछ, हगी ? अनि अब कसैकोमा चाहिँ clear भएन भन्ने कुरो । धेरै जसो चाहिँ अलि sound problem चाहिँ देखिएको जस्तो लाग्यो । हाम्रो sound जाँदा खेरी टक टक भएर विकट किट भएर जाँदोरहेछ । Continuously नजाँदो रहेछ । त्यो नजाँदाखेरी उनीहरूले के भन्ने के भन्ने, digitally भनेको कुरो के हो, context (xxx) के अँ अनि एउटा कुरा त्यो भयो, अनि अर्को कुरा चाहिँ कस्तो भन्दा नी सर अब तेत्रो

भनौन, वैशाखबाट हाम्रो असोज महिनासम्म, असोज कार्तिकसम्म class नजाँदाखेरी बच्चाबच्चीहरू नयाँ class पढ्न पाईने भयो, पढ्न पाईने भयो खुसी त भए तर, त खुसी भएर आउँदा खेरी फेरी class यतातिर आउँदा खेरी अघि मैले भनेको जस्तै, कहिले line जाने, अब कहिले अब net को त्यस्तो समस्या भईदिने । अब low quality भईदिने, त्यल्ले गर्दाखेरी clear नभाहुनाले, बच्चाबच्चीहरूमा अघि म्याडमले भन्नुभाको जस्तै, बरु यो भन्दा बर हाम्रो physical class नै face-to-face class नै लिनपाए हुन्थ्यो । यो zoom class त त्यति effective भउन न कि भन्ने किसिमको कुराहरू हाम्रो guardian plus student बाट पनि आएका थिए सर । हाम्रो मनस्थिति पनि, हाम्रो मनस्थिति पनि यो zoom भन्दा बरु physical class लिन पाए हुन्थ्यो । अलिकति environment राम्रो भईथिए हुन्थ्यो भन्ने (issue of internet connection) भनौन एक डेढ महिना पछि त अब (poor internet connection, so disruption for some time) बच्चाबच्चीहरूलाई पनि यहि नै राम्रो भएको छ पहिले भन्दा भन्ने नै response आइराको छ सर अहिले त …।

I: धन्यवाद राजकुमार सर त्यसमा अन्जु म्यामले पनि सहमती जनाउनु भयो जस्तो लाग्छ । अँ अनि विक्रम सरसंग केही नयाँ कुरा छन् जस्तो लाग्छ, विनोदा सरले हात उठाउनु भयो ।

ET3: मैले, मैले यहाँ कुरा सुन्दै गर्दा खेरी, हामीले क कुरा बुझ्नु प-यो भने र reality पनि के हो भने, online VS face-to-face, त्यो compare गर्न सकिदैन हगी ? कुनै comparable नै होइन । On-online चाहिँ हामीले atternative pandemic को बेलामा alternative way बाट ल्याएका थियौं, त्यसबाट advantage कति मा थियो, disadvantage कति मा थियो भन्दा पनि कमसेकम १०० जना मध्येमा दशै जनालाई पनि education त्यो engage गराउन सकियो भनेपनि far better भनेर त्यो alternative way, विकल्पको रुपमा ल्याएका थियौं भने face-to-face मा ICT प्रयोग गर्ने भनेको, यो ICT यो चाहिँ topics मा प्रयोग गर्दाखेरी, teaching learning effective हुन्छ भनेर हाम्रो choice मा हाम्रो interest मा गरेको हुना- गछौँ । तसर्थ त्यो face-to-face र अँ जुन online मा त compare गर्ने सकिदैन, कति face-to-face far better चाहिँ छ, त्यही face-to-face मा पनि ICT लाई कसरी उपयोग गर्न सक्छौ, त्यस्को classroom कसरी systematic बनाउनलाई अथवा learning लाई चाहिँ कसरी effective बनाउन सक्छौँ भन्ने कुरा हो अँ जस्तो मलाई लाग्यो सर । यो त तुलना त गर्नै मिल्दैन । face-to-face र online मा ।

I: अँ, धन्यवाद विक्रम सर, एकदमै राम्रो कुरा पस्किदिनुभयो । सायद सबैले सहमती जनाउनु हुन्छ कि ? अँ हजुर यो पनि एकदमै राम्रो र बीचमा हैन जस्तो

ST2: त्यो त, त्यो त ठीकै हो सर । त्यो pandemic time period (Interruption due to poor connection, nearly for 30 secs)

I: … अब अर्को चाहि जस्तो भनौन, अघि हामीले विद्यार्थीको responses को कुरा गर्यौं । अब चाहिँ हामीले अँ प्रशासनको तर्फबाट विद्यालय व्यवस्थापकहरू र अभिभावकहरूबाट चाहिँ अभिभावकको प्रतिक्रिया तिर जाऊँ न । हजुरहरूलाई कस्तो प्रकारको प्रतिक्रिाय, कतिपय अवस्थामा त मैले अघि अभिभावकहरूले पनि यस्तो प्रक्रिया-प्रतिक्रिया दिनुभयो भन्ने कुरा पनि गरिसक्नु भएको छ । अँ त्यो गरिसकेको छ भने हजुरहरूले त्यस्लाई छोड्दिन सक्नुहुन्छ । मैले चाहीँ के जान्न चाहँ भने विद्यालय व्यवस्थापकहरू र अभिभावकहरूले चाहिँ हजुरहरूले आफ्नो अँ, अँ भनौन कक्षाकोठाहरूमा चाहिँ technology प्रयोग गर्दा खेरी कस्तो कस्तो प्रकारको प्रतिक्रिया पाउनु हुन्छ ? अथवा कस्तो प्रकारको सहयोगहरू हुँदैछ ? अँ कहाँबाट प्रकृती म्यामबाट शुरु गरौं होला हजुर । …

ST1: … pandemic को बेलामा अभिभावकबाट अब त्यस्तो, अब त्यो बेलामा हामीले चाहीँ online class संञ्चालन गर्दा उहाँले चाहिँ राम्रै response त जनाई राख्नु भएको थियो हैन ? अनि अलिकती चाहीँ आफ्नो

बच्चाहरूको अलि laziness को चाहिँ कुराहरू चाहिँ बढी उठाउनु भयो हैन ? यो, हाम्रो meeting हरूमा चाहिँ बढी homework नभएको कुराहरू, homework चाहिँ बढी homework नभएको कुराहरू, homework चाहि अलिकती कम भयो, अनि class period पनि अब हाम्रो day मा चाहिँ 4 देखी 5 वटा मात्र class हुन्थ्यो हैन, अब school मा त 1 to 4 hour चाहिँ, 10 to 4 चाहिँ बस्ने भयो student, हैन ? अनि यता चाहिँ अब, त्यो थोरै time चाहिँ class लिने भको कारणले गर्दा बच्चाहरू चाहिँ engage भएन, हैन ? हो त्यो चाहीँ बढी चाहिँ अँ, के रे, parents हरू बाट आएको गुनासो चाहिँ तयो थियो, अरु चाहिँ ठीक छ, राम्रो छ, अँ यस्तो बेलामा पनि राम्रो गर्नु भको हो भनेर चाहिँ कोशिस चाहिँ राम्रो छ भनेर चाहिँ, धेरै चाहिँ, त्यो चाहिँ response चाहिँ आईराको थियो । अनि अरु चाहिँ खासै चाहिँ त्यस्तो चाहिँ छैन सर । त्यति नै हो । अल =

I: = ए धन्य, धन्यवाद, अनि विद्यालय व्यवस्थापकहरूबाट नि, for example, अँ head sir बाट अँ, कस्तो सहयोग भयो ?

ST1: अँ उहाँहरूको त एकदमै सहयोग - अब कुन कुन way बाट चाहिँ लैजान सकिन्छ हैन, अब, अँ के रे कुन कुन चाहिँ materials हरू चाहिँ तपाईंहरूलाई के के चाहिन्छ, त्यो (xxx) हामीले चाहिँ उपलब्ध गर्न तयार छौं तर तपाईंहरू चाहिँ online teaching गर्नको लागि चाहिँ एकदमै तयार हुनु अनि अर्को चाहि के-के training चाहिँ हैन, अब, शुरुमा त अब online को लागि त, हामी त नयैँ हो नी हैन ? नयाँ भको कारणले गर्दा विभिन्न त्यो teaching method हरू चाहिँ, जे होस् सानो सानो ट्रेनिकै कति teacher हरूलाई त कम्प्युटरै चलाउन आउदैन हैन अनि presentation बनाउन नआउने, अनि त्यस्तो त्यस्तो थियो हैन, अनि त्यो कारणले गर्दा, जुमै चाहिँ प्रयोग गर्न नआउने, Google class हरूको चाहिँ join गर्न नआउने, त्यस्तो problem हरू थियो, सबै चहीँ उहाँहरूले चाहिँ training दिएर सबै गराउनु भयो, अनि मात्र चाहिँ, हामीले चाहिँ class संचालन गर्न सक्यौ, हैन ? त्यो कारणले गर्दा विद्यालय प्रशासन त एकदम positive हुनुहुन्छ, हैन । अहिले पनि हामीले चाहिँ Ved guru बाट नै Ved नै हाम्रो लागि चाहिँ online चाहिँ छ । त्यो हामीले चाहिँ राखेको छौं अनि त्यस्मा चाहिँ हामीले homework हरू चाहिँ class को activity, अब student ले homework गर्छ गर्दैन, त्यो बाट नै हामीले चाहिँ गराई राखेका छौं, त्यही हो ।

I: अँउ, अँ, धन्यवाद म्याम, सबैकुरा, एकदमै छोटोमा सबै कुरा भन्दिनुभयो । अँ विक्रम सर

ET3: हजुर सर, मैले बुझें, अँ, ठीक छ, सरले यो असाध्य राम्रो चाहिँ कुरा राख्नुभयो । यो अलिकती मैले चाहिँ थोरै background बाट शुरु गरौं कि ! 2011 सर, अँ बेलायतको The Royal Grammar School का केही साथीहरू आएर मेरो school का Class का Students लाई Computer को बारेमा सोद्धा खेरी, most of the students ले के भन्या भने we haven't seen computer भनेका थिए के । Computer कस्तो हुन्छ, त्यो हामीले छुन नी पाएका छैनौं भनेको थियो, त्यतिखेर सम्मन हाम्रो छुन नी पाएका छैनौं भनेको थियो, त्यतिखेर सम्मन हाम्रो School मा एउटा Computer पनि थिएन । अनि प्रक्-तयले एक किर किसिमको चाहिँ, त्यो गफ, उनीहरूले गरे, समूहमा गरे, अनि हामीहरूलाई पनि कुरा गर्दा खेरी, समितीमा पनि, School को व्यवस्थापन समितीमा पनि त्यतिखेर देखिनै राख्दै गरियो । क्रमश चाहिँ एक किसिमको coordination बन्यो र संजोगले २०१३ लाई त्यही school मा visit गर्ने अवसर पाएँ र technology बाट म प्रभावित भएँ । अनि त्यहाँको guardian हरूसंगको एउटा बेलुकाको interaction, dinner plus interaction यो । school ले आयोजना गरेको, मैले के राखेको थिएँ भने, technological knowledge हामीस.ग नभएको होइन, resources नभएको हो । कुन methodology को बारेमा theorectical कुराहरू हामी पढ्छौं, तपाईंहरूले त्यस्लाई practical

use गर्नुमा छ । हामीसंग resource को अभावले गर्दाखेरि यस्तो छ भन्ने कुरा गर्दा खेरी त्यहाँ तत्काल पाँच लाख पचास हजार रूपैयाँ donation ICT support को लागी भनेर त्यहाँका guardian हरूले support गर्नुभयो र मैले चाहिँ त्यो लिएर आउर school मा landline telephone पनि नभएको ठाउँमा पोले, School आफैले pole गाढेर, wi-fi zone बुनाएर चाहिँ पहिलो पटक school मा चाहिँ हामीले राख्यौं, त्यो काठमाण्डु पोष्ट र कान्तिपुरले पनि छापेको थियो । पछाडी, पछाडी फेरी क्रमश support आउने कुरा भयो र पछिल्लो समयमा चाहिँ हामिले चाहिँ विभिन्न स्रोतहरूबाट पनि जुटायौं । School आफ्नो स्रोतहरूबाट पनि जुटायौं । अँ अब त्यस्मा चाहिँ जुन school management committee छ, असाध्यै positive भएर लाग्यो जब की news नै, हिम-पहाडका विद्यार्थीहरू, दुर्गमका विद्यार्थीहरू पनि computer मा रमाउँदै भनेर विद्यार्थीहरूको चाहि computer खेलेको, मतलब interent चलाएको चाहिँ फोटो सहित चाहिँ पत्रिकामा आउँदाखेरी त्यो school समितिलाई पनि अभिभावकलाई पनि message पनि बन्यो, इज्जतको कुरा पनि बनयो । पछाडीका दिनहरूमा पनि school मा visit गर्न आउँदाखेरी, school को अदक्ष लगायतका, उहाँरू आउँदा खेरी कहिलेकाहीँ ढोकाबाट हेनुहुन्थ्यो अनि एकपटक मेरो कोठामा चाहीं लिएर आएँ । संजोगले त्यो दिन चाहिँ ICT प्रयोग गरिराखेको थिएँ, projector बाट चाहिँ सिकाई राख्या थिए । अनि उहाँले आउनुस् न भित्र आएर हेर्नुस्न भने, पछाडीबाट हेर्नुभयो, त्यसपछ्ढी उहाँ एकदम positive रुपबाट उहाँ असाध्य खुसी भएर जानु भयो र माथि कुरा गर्नुभएछ, अरु संग पनि कुरा गर्नु भो, विभिन्न proposal माग्ने क्रममा के हाल्ने त ल सरहरू भन्दाखेरी मैले नै एउटा draft बनाएँ त्यस्तै पाँच सात लाख रूपैयाँको चाहिँ फेरी ICT support भनेर चाहिँ proposal आयो, अँ क्रमश विस्तारै चाहिँ teacher हरूलाई पनि त्यस्मा चाहिँ involve गर्नुपर्छ सर । तपाईले मात्रै सिकेर हुँदैन अरूलाई पनि सिकाउनु पर्छ भनेर, उहाँहरूले even अँ, एउटा हामी (xxx) तीनजना हेडसरलाई, मलाई लगायतका ICT मा चाहिँ literate साथीहरूलाई चाहिँ school ले चाहिँ laptop पनि support गरेको छ सर तयो भनेको, school प्रयोजनको लागी चाहिँ तपाईहरूले अरू साथीहरूलाई पनि Support गर्ने, अरु साथीहरूलाई पनि लगिदिने । संगसंगै यस्को संरक्षण पनि गर्ने र अरु साथीहरूलाई पनि सिकाउने भनेर, त्यो पनि support गर्या छ । तयो पनि school management committee ले गरेको राम्रो support को रुपमा हामी लिन्छौं र कतिपय अवस्थामा अभिभावकहरूलाई चाहिँ positive सन्देश के गएको छ भने अँ, फलानो school मा जनविकासमा त ICT प्रयोग गर्छ अथवा projector बाट, Computer बाट उनीहरूले, सोभो अर्थमा भन्दा computer बाट पनि सिकाउन थाल्या छ अरे, अरु school भन्दा अब यो कम्ती छैन हे । बच्चाहरूलाई त त्यहाँ पनि पठाउनु पर्छ, त्यो किसिमको चाहिँ positive message अभिभावकमा पनि पुगेको छ सर, यो ICT बच्चाहरूमा मात्र होईन, अभिभावक र संचालक समिति even नगरपालिका, even शिक्षा कार्यालयबाट जाने सरहरू पनि ICT को प्रयोगको कुराहरू देख्दा खेरी, ल केही चाहिँ अब सुधार चाहिँ भए छ है तपाई हरूमोमा भनेर चाहिँ हामीलाई अलिकती प्रशंसा चाहि गर्नुहुन्छ त्यो चाहिँ एउटा positive कुरा पाएँ सर ।

I: कति राम्रो कुरा, अ, कति राम्रो कुरा गर्दिनुभयो । अ हामीले विक्रम सरबाट धेरै कुरा जान्ने पनि मौका पायौं हैन, अम्बिका म्यामलाई, अम्बिका म्याम बीचमा अलिकती connection ले होला, जानुभएको हुनाले, मैले question मामात्र दोहोऱ्याउन चाहें, question चाहिँ के गरिएको थियो भने, अभिभावकहरूबाट र तयसैगरिकन विद्यालय व्यवस्थापकहरू, जहाँचाहिँ विद्यालय व्यवस्थापक भन्दाखेरी head sir, vice-principle सबैको एउटा भनौन, जस्ले चाहिँ व्यवस्थापन पक्षमा सहयोग गर्नुहुन्छ, उहाँरूकोबाट कस्तो

प्रकारको प्रतिक्रिया दिनुभयो त भन्नेकुरा चाहिँ प्रकृती म्याम र विक्रम सरमा राखें । अँ तपाईंलाई पनि त्यही प्रश्न केही कुराहरू नयाँ छन्, उहाँकै कुरामा सहमती छ ?

ET1:   धेरैजसो कुरा त, सर (xxx) ... मैले भखरै सुनें सरको अघि बीचमा चाहिँ अलिकति म हराएँ सर, मेरो यहाँ data सकिया रहेछ त्यही भएर । ... अनि हाम्रो चाहिँ कस्तो भयो भन्दा खेरी घरमै बसेर class लिनु पर्ने बेलामा जुन अब pon यो lockdown को period मा त हामीलाई अब अँ school बाट त खासै त्यस्तो उ मा थिएन, गर्नु, लकडढाउनको बेलामा, हैन ? अब आफू आफू संग laptop थियो, त्यही laptop ले बाट नै हामीले कार्यक्रमहरू गर्यौं, गर्दै बच्चाहरूलाई चाहिँ । अनि School बाट चाहिँ हामीलाई के गर्नुभको थियो भन्दा खेरी, ग्रुपहरू बनाईदिने, Teams को ग्रुपहरू बनाईदिने, अनि ग्रुपमा चाहि हामीलाई पनि उहाँहरूले add गरिदिनु भएपछि, अनि विद्यार्थीहरूले संग हामीले चाहिँ अब ग्रुपमा बसेर share गर्ने कुराहरू चाहिँ भाथियो । अनि कतिपय teacher हरू, जुन जो teacher हरूको चाहिँ laptop थिएन, सायद मैले सुनेको कुरा, आ जो जो teacher हरूको laptop थिएन, उहाँ काठमाण्डौ valley भित्रै हुनुहुन्थ्यो भने, school बाट teacher हरूलाई laptop provide गराईदिनुहुन्थ्यो online class लिनको लागि भनेर र अब अहिले अहिले यो face-to-face हाम्रो class start पनि जे होस् online class हरू लिनको लागि भनौन, ICT बाट class हरू संचालन गर्नको लागि धेरै help गर्नुहुन्छ उहाँले । अब जस्तो मैले यो भन्दा अगाडीको वर्ष नै सरहरूसंग एउटा यो (xxx) राख्या थिएँ के, समितीको meeting मा थियो । School मा teachers हरू plus समितीको members हरू बसेर meeting मै कुरा राखे थिएँ । At least, class मा, माथिल्लो class मा तल्लो class मा नभए नी माथिल्लो class मा चाहिँ कम्तिमा पनि एउटा एउटा projector को व्यवस्था गरिदिनु पर्यो सर भन्ने कुरा चाहिँ मैले राख्या थिए । पोर र नै राख्या कुरा हो सर यो चाहिँ हाम्रो, यो pandemic हुनुभन्दा अगाडी नै, तर, अम, पोर चाहिँ थिएन, यसपाली चाहिँ जे होस्, अँ, class मा, माथिल्लो class मा भनौन, ९, १०, ११, १२ को class हरूमा चाहिँ projector हरू राखिदिनुभा छ र अनि त्यसपछी आएर ICT को हलहरू छ दुई तीन वटै ICT को hall हरू छ । lab बनाईदिनु भ छ बाहिरबाट कोरियन सरकारबाट पनि ICT को हल बन्या छ जस्ले गर्दाखेरी । अनि त्यसपछी संचालन गर्नको लागि पनि हामीलाई खासै केही गाह्रो छैन । उहाँहरूले एकदमै support गर्नुहुन्छ । जति सक्छ त्यति नै ICT मा चाहिँ use गरौं भनेर जस्तै हामीले अब यो English subject मात्र नभईकन अरू अरू subject हरू नेपाली subject, even Nepali, त्यसपछि आएर mateematics, (xxx) यो भन्दा अगाडी त हामीले अझ अँ, दैनिक रुपमा नै के गर्ने गर्या थियौं भन्दाखेरी, subject चाहिँ alternate गरेर classwise प्रत्येक teacher हरू एउटा period चाहिँ class लिनै पर्ने हिसाबले चाहिँ हामीले ICT हलको use पनि गरिराख्या थियौं र सबै teacher plus समितिबाट पनि हामीलाई एकदमै ort नै छ भन्नुपर्छ यस्को लागिचाहिँ । अनि, हजुर, projector को व्यवस्था पनि गरिदिनुभएको छ । अझै पनि पुग्याछैन भनेर भन्न चाहिँ भनिराख्या छौं । दुई चारवटा class मा अझै पुगिराख्या छैन । अँ माथिल्लो class को मात्रै कुरा गरें अहिले । माथिल्लो class मा त अझै पुगिराख्या छैन सर भनेको । हुन्छ विस्तारै हुन्छ भन्नुभाको छ । जेहोस, अहिले जति छ त्यतिमा पनि धेरै काम भईराख्या छ भनेर भन्छु म चाहिँ ।

I: Okay, धन्यवाद । अँ, अनि, अ, यही question चाहिँ अनि अभिभावकहरूको पनि कस्तो प्रतिक्रिया छ रे ma'am, हजुरले केही भन्नुभयो ?

ET1:   हजुर, अभिभावकको चाहिँ यस्तो छ, अभिभावकहरूले पनि कतिपयको चाहिँ आ, यो online बाट class हुँदाखेरी हिजो मात्रै, हिजो छैन, दुई दिन अगाडी मात्रै एकजना parents आउनु भ्याथ्यो हाम्रो class मा अनि

school मा अनि उहाँचाहिँ class 10 F को student को parents हुनुहुन्थ्यो अनि त्यसपछि result लिन आउनु भा थियो second term को, मैले हजुरसंग या अलिकती share गर्ने खोजें । अनि result लिन आउनुमा थियो । विद्यार्थी classroom मा 3 over age खालकै विद्यार्थी हो, त्यती नराम्रो भन्न मिल्दैन । विद्यार्थी राम्रै हो । म चाहिँ class 10 F को class teacher भको भएर उस्को, उँ, प्रत्येक त्यो class भरिएको सबै कुराको record मैले राख्नु पर्ने हुन्छ के । अनि त्यसपछी parent आउनुभएपछि सोध्नुभयो की अनि result लिनुभयो । Result लिनुभए पछि मैले देखाएँ यसो सो छ भनेर तर अँ, अब, एकदमै के भन्नुपर्छ भन्दा खेरी math, optional math मा उन्लाई उउटा subject लागेछ । अरु सबै राम्रो marks ल्याएर pass भएको छ तर optional math चाहिँ उल्लाई लागेछ, अनि त्यसपछी अनि parents ले चाहिँ भन्दै हुनुहुन्थ्यो अब यो चाहिँ online class ले गर्दा नै विग्रेको हो भनेर parents ले गाली गर्दै हुनुहुन्थ्यो कि । अँ खाली online class मा मोबाइल चाहियो, मोबाइल चाहियों मात्रै भन्ने, के पढ्छ पढ्दैन थाहा छैन, अनि त्यसपछी मोबाइल लियो, के पो गरेर बस्या हो ? खेल्या हो की पढ्या हो की, हामीलाई केही थाहा नै छैन, भन्ने कुरा चाहीं parents ले मलाई सुनाउनु भयो यो कुरा, अनि अनि त्यस्तै गरेर अर्को १०-अँ १२ को एउटा student पनि, student को parent पनि आउनु भा थियो अनि, त्यस्तै कुरा गर्ने क्रममा चाहिँ मेरो छोरो त जतिखेर पनि २४ सै घण्टा खाली laptop मा झुण्डया झुण्डै गर्छ, class छ मम्मी, class छ मम्मी मात्रै भन्छ, के गर्या हो, के गर्या हो । जतिखेरै हेर्यो, अम् बोली राखेको मात्रै सुन्छ । साथीसंग गफ गरिराखेको मात्रै सुन्छ, पढ्या हो की नपढ्या हो म्याम, के हो, के हो, हामी त बुझ्नै सकेनौं । यो online class ले विद्यार्थीलाई सुधार्यो कि बिगार्यो है म्याम भनेर सोध्नुभयो मलाई । (laughs) म त के भनौं के भनौं भयो अब, अब हेर्ने हो भने कतिपय ठाउँमा राम्रो पनि भा छ विद्यार्थीले कतिपयले अब अँ जस्तो apps हरू चलाउन जान्या छन्, अँ zoom हरू प्रयोग गर्न जान्या छन्, Teams को प्रयोग गर्न जान्या छन्, अँ त्यसपछी आउरु, assignment हरू, task हरू चहिँ त्यसबाट download गरेर फेरी, अँ - download गर्न जान्या छन् । त्यसपछी आएरु submission गर्न जान्या छन् । एक पक्षबाट हेर्दा खेरी राम्रो पनि भको छ अनि कुनै कुनै parents हरूले चाहिँ बच्चाचाहिँ online class ले गर्दा खेरी विग्यो भनेर पनि भनिरहनु भा छ के किनकी बच्चाले के गर्दिदो रहेछ भन्दाखेरी class छ मम्मी हाम्रो class छ भ्नने, अनि त्यसपछी parents ले लुकाई लुकाई उनीहरू game खेल्ने हो की, त्यो grouping ga- कस्तो कस्तो game हुन्दोरहेछ, game खेलेर बस्ने, अनि बोल्या बोलेई गर्छ मेरो छोरो class मा बस्या हो की के गर्या हो, हजुरहरूले हेर्नु हुँदैन त भनेर सोधेको, हेर्नु त हेर्छु नी अब, के गर्यो, के गर्यो थाहा नै हुँदैन भन्ने खालका जस्तो response पनि parents बाट भर-भको थियो हाम्रो यो lockdown को period मा अनि अहिले आउरु चाहिँ हाम्रो face-to-face class भएपछि चाहिँ parents ले यसरी भन्नुभयो कि, lockdown को कारणले गर्दा खेरी, online को कारणले गर्दा छोरोले छोरो मेरो fail भाको हो, हुने नत्र भए pass हुने विद्यार्थी हो भन्दे हुनुहुन्थ्यो parents ले ।

Okay, ... अम्बिका म्यामको जस्तै समस्याहरू चाहीँ अँ प्रकृती म्याम्को, विक्रम सरकोमा पनि केही त्यस्तो देखियो ? जस्तो parents हरूको complaint अथवा parents हरूको मनार्यहरू, त्यस्तो आयो केही ? (2.5) okay, विक्रम सरले agree गर्नु भयो ।

ST2:	... म्यामले जे जे भन्नुभयो नि
I:	हजुर
ST2:	ती साथै कुराहरू हाम्रोमा पनि नआएका (हैनन्), हाम्रोमा पनि आएका हुन् हगी ? (xxx) त्यो दुइटै पक्ष, एउटा (xxx) अब भनौन नयाँ zoom हरूको नयाँ technology, नयाा के के यता उता सबै थाहा पाएर, यनाँ

चलाउन जान्ने त्यो चाहिँ positive पक्ष भयो चलाउन जान्यो । तर अब त्यसैले गर्दा त्यो चलाउँदा चलाउँदै गर्दा के भन्देखी त्यहाँ ... हाम्रो class मा कस्तो भयो भन्दा जम्मा चारवटा class संचालनको लागि, बिहानमा तीन घण्टा class हुन्छ, तीन घण्टा बसेपछि त rest भयो । दिउँसो भरि घर बस्यो । अनि दिउँसो भरी घर बसेको time मा अब (xxx) बच्चा अलि इमान्दार छ, उ त अब पढाईमा लगनशील होला, पढाई तिर लाग्ला, जो बच्चा चाहिँ (xxx) त्यो बच्चा चाहीँ मोबाइल चलाउने, (xxx) त्यो बच्चा चाहीँ मोबाइल चलाउने, laptop चलाउने, त्यल्ले गर्दा खेरी बच्चा विग्रियो भन्ने (xxx) त्यो दुईटै पक्षहरू रहे सर । अनि अब अर्को कुरा तपाईले जुन विद्यालय व्यवस्थापन तर्फबाट भन्ने कुरा (xxx) हाम्रो विद्यालयको तर्फबाट full support भयो (xxx) zoom पनि हाम्रो unlimited zoom थियो । (xxx) अर्को हुन्यो, फेरी अनि (xxx) evening shift हुन्यो । class classwise गर्दाखेरी (disouption due to internet connectivity)

I: ... भन्नुस् त रामबहादुर सर ?

ST2:   ... अब त्यो zoom unlimited zoom भको हुनाले, हाम्रो shift shift-wise, morning shoft (interruption again due to poor connectivity, the interviewer asks Ram Bahadur to turn off the video) अँ अति म्यामले भन्नुमा जस्तै अब class जब साढें तीन घण्टा, साढें ६ बाट साढें ९ बजे छ हाम्रो, secondary level हुन्यो । त्यल्ले गर्दाखेरी, दिउँसो भर, बच्चा बस्दाखेरी, अ त्यो समस्या चाहिँ आ थियो । guardian हरूबाट अलिकति थोरै मात्रै ढाई भयो, main main subject मात्रै पढाई भयो, अरू कगदवभअत पढाई भएन भन्ने complaint चाहि अभिभावकबाट आएकै हो सर, अनि कुराहरू चाहिँ अघि म्यामले भन्नुभाको जस्तै positive negative पक्ष त्यो पनि यहाँ पनि साथै आका हुन् सर । अब त्यसैमा मैले फेरी दोहोऱ्याउन चाहिन सर अहिले । त्यसैमा मेरो पनि साथै कुराहरू तीनै हुन् सर ।

I: Okay, धन्यवाद, प्रकृति म्याम तपाईंकोमा पनि अ.अ. जस्तो हाम्रो अम्बिका म्यामले भन्नुभको जस्तो कुराहरू आयो त ? अभिभावकको तर्फबाट जस्तो भनौन अँ complain भनौं या suggestion हरू भनौं, त्यस्ता कुराहरू आए, जस्तो अँ technology ले गर्दा अथवा pandemic को time मा चाहिँ online classes ले गर्दाखेरी अफ्र यस्तो कठिनाई पनि भोग्दै छौं भन्ने कुरा पनि आए ?

ST1:   अँ सर आए सर, classes हरू चाहिँ हाम्रो चाहिँ class हरू जुध्यो हैन, अब, ८, ९ के रे ९, १० को लागि चाहिँ के रे हाम्रो १ देखि थियो, हैन ? अनि चाहिँ फेरी त्यो भन्दा अगाडीको चाहिँ केही बच्चाहरूको थियो अनि चाहिँ के रे ... ६ देखि ८ सम्मको थियो, हैन ? अनि यसरी गर्दा चाहिँ कुनै कुनै parents को घरमा चाहिँ एउटा मात्र mobile, हैन, अनि त्यो चाहिँ लिनुपर्ने, लगातार चलाईराख्दा अब मोबाइलमा असर पर्ने पनि भयो, अनि कुनै कुनै important class मात्र लिन पाउने अनि बच्चाहरूले आफ्नो, एउटै घरमा चाहिँ दुइ तीन जना चाहिँ बच्चाहरू भईसकेपछि अनि, class हरू जुध्ने अनि class हरू जुध्ने भएको कारणले गर्दा कुनै class चाहिँ लिने, कुनै class चाहि छोड्ने त्यो अवस्था पनि आयो कुनै कुनै बच्चाहरूको लागि चाहिँ है ? अनि कुनै कुनै ... parents हरूले चाहिँ अँ बच्चाहरू हामी चाहिँ घरमा मोबाइल दिएर जान्छौ अब उनीहरूले class लिन्छन् लिदैनन् हामीलाई थाहा हुँदैन भनेर चाही phone समेत चाही गर्न भ्याउनु भयो, parents ले चाहीँ हैन अनि phone गरेर चाहि मेरो बच्चा चाहीन class मा present हुन्छ की हुँदैन, हैन के के गर्छ के के गर्दैन भनेर ... सोधी, सोधनु पनि भयो । अनि बच्चाहरूमा फेरी interaction गर्दा चाहीँ कुनै बच्चा चाहीँ बोल्दै नबोलिदिने, class मा चाँहि उपस्थित हुन्छ अनि बोल्दै बोल्दिदैन, अनि जति बोलाउँदा पनि नबोलिदिने, अब class मा छ छैन, हामीलाई नै थाहा नहुने के, present चाहिँ छ अब ऊ

चाहिँ नबोलिदिँदा चाहीँ नेट problem भयो भन्छ, अब हामीचाहिँ मान्नु पनि पर्यो नेपालको condition मा, problem हुन सक्छ भनेर चाहिँ मान्नु पनि पर्यो, त्यो कारणले गर्दा, त्यस्तो नकरात्मक असर पनि छ हैन अनि त्यस्को positivity पनि छ, त्यो कारणले गर्दा त्यो हो सर ।

I: ए धन्यवाद अँ अ कतिपय कुराहरूमा अम्बिका म्यामले पनि सहमति जनाउनु भयो अनि जस्तो मोबाइल फोन चाहिँ एउटै मात्रै हैन घरमा रहेको र ती कुराहरूमा भयो र पछिल्लो कुरामा पनि, धन्यवाद अम्बिका म्याम । अनि अँ अधि हामीले अँ अधि यति धेरै भनौन छलफलहरू गरिरहँदा खेरी सर म्यामहरूले चाहिँ फाईदाहरूको बारेमा पनि कतिपय कुराहरू उल्लेख गर्नुभयो र त्यसै गरिकन कठीनाईको बारेमा पनि उल्लेख गर्नुभयो । मैले फेरी पनि फाईदा र कठीनाईलाई चाहिँ पृथक राखेर सोध्न चाहेँ सर म्यामहरूलाई जस्तो विषेश गरी science कै … (there was a query regarding sound clarity as one of the teachers reported that sound was not clear) विर विषेश गरि चाहिँ science को सर म्यामहरूले चाहिँ science नै पढाउनु हुदाँखेरी भयो र language को सर ग्यामहरूले चाहिँ … language नै पढाउनु हुँदाखेरीको फाईदाहरूले छन् त technology प्रयोग गर्दा नी, सामान्य स्थितिमा र अधि दोहोरिएको नदोहोर्याउनु होला, जस्तो अलिकती फरक भयो भने मात्र भन्नुहोला । फाइदाहरू चाहिँ विषेश गरी सामान्य स्थितिमा चाहिँ फाइदाहरू के छन् र त्यसै गरिकन crisis को परिवेशमा चाहिँ फाइदाहरू के छन् ? अनि सामान्य स्थितिमा चाहिँ कठिनाईहरू के छन् र त्यसैगरिकन crisis को स्थितीमा कठिनाईहरू के छन् अँ दोहोरिएको छन् भने त्यस्लाई छोड्नुहोला र बाँकी नया कुराहरू छन् भने भन्दिनुस् न ? मैले कहाँबाट शुरु गरेँ भने आ अम्बिका म्यामबाट, अम्बिका म्यामलाई मैले request गरेँ । …

ET1: अब, फाइदाबाटै शुरु गरौं हौ, अब फाइदा चाहिँ, हाम्रो यो language को भको कारणले गर्दा खेरी, फाइदा चाहिँ के भयो मलाई भन्दाखेरी, presentation हरू बनाउनको लागि एकदमै सजिलो भको हामीलाई चाहिँ हैन किनकी presentation through बनाउदाखेरी चाहिँ अब, time पनि धेरै नलाग्ने अनि चह लाएर अँ यो power point मा गइसकेपछि, हामीले यो जुनसुकै पनि अब हाम्रो बनाउनुपर्ने slide हरू सजिलै सित तयार गर्न सक्ने चाहिँ हामीलाई यो फाइदा भएको हो मैले feel गर्या अनि त्यसपछ्ठी आएर बच्चाहरूलाई अब interact गराउनको लागि पनि कुनै एउटा एउटा topic दिईसकेपछि त्यो topic मा उनीहरूलाई पनि विद्यार्थीलाई पनि ल आज चाहिँ यो topic मा PowerPoint बनाएर presentation गरौं भन्यो भने बच्चाहरूले पनि presentation गर्नको लागि सजिलो चाहिँ हाम्रो language को भको भएर होला सायद सजिलो चाहिँ एकदमै सजिलो भएको यो, अनि अब अँ गाह्रोको कुरा गर्नुपर्दा खेरी त अब मलाई खासै त्यस्तो गाह्रो चाहिँ भएन । अब अधि प्रकृती म्यामले भन्नुभएको जस्तो समस्या चाहिँ विद्यार्थीहरूबाट धेरै आको हो । कस्तो समस्या अधि म्यामले भनिसक्नुभयो । मैले सायद दोहोर्याउनु नपर्ला किनकी कोही सुतदिने कोही बोलाउँदा खेरी नबोलिदिने, एकदमै धेरै समस्या भएको हो के । त्यो चाहिँ मैले feel गरेको कुरा हो । म्यामले पनि भन्नुभयो अनि समस्या चाहिँ त्यतापट्टिको चाहीँ त्यो भाको हो, यतापट्टिको फाइदाको कुरामा चाहिँ presentation बनाउनको लागि मलाई चाहिँ सजिलो भाको हो है । यति चाहिँ मैले feel गर्या कुरा ।

I: Okay धन्यवाद अम्बिका म्याम । आ मैले अब किनभने subject पनि मिल्ने हुनाले, मैले विक्रम सरसंग गएँ । (3.75) विक्रम सरको mic =

ET3: = okay सर, अँ, कुरा त ठीकै छन्, म्याडमले भनेकै कुरामा agree गर्दै बुँदागत रुपमा मैले के राखेँ भने एउटा अवसरको रुपमा यो technology-friendly हामी विद्यार्थी पनि teacher पनि बनाउन सक्यो यस्ले । त्यस्तै चाहिँ classroom मा चाहि विविधता ल्याउने कुरा, variety Create गर्ने कुरा पनि यल्ले गर्यो र more resourceful हुने रहेछ, अँ कतिपय कुराहरू, हामीलाई पनि अस्पष्ट कुराहरू, more resource यस्ले उपलब्ध गराउने रहेछ । student लाई पनि हामीले त्यस्मा प्रयोग गर्न, कुनै

एउटा issue दिएर ल यस्मा खोज, तिमीहरूले चाहि Google search गरेर के गरेर तिमीहरूले खोजेर लिएर आऊ, भोली presentation गर्नुपर्छ, मैले जसरी presentation गरेको छुँ, त्यसरी नै presentation गर्नुपर्छ भन्दाखेरी कतिपय विद्यार्थीहरूले त मोबाइलमा पनि बनाएर class मा लिएर आए पछि चाहीँ, अँ projector मा link गरिदिपछि त्यसरी पनि, त्यो skill पनि develop गऱ्यो, त्यो एउटा positive कुरा पनि भयो र यस्को चाहि disadvantage को कुरा गर्दाखेरी त technical problem चाहिँ आईराछ्छ सर, कहिलेकाहीँ class मा लिएर गयो, जब शुरु गर्न लाग्यो त्यतिखेर लाइन गईदिईहाल्छ हहिग backup हरू त्यो support हरू नहुँदा खेरी, अथवा net अलिकती slow हुँखाखेरी problem हुने अनि cost management का कुरापनि छन् सर जति चिज सजिला छन् त्यल्लाई maintain गर्नको लागि हैन नियमित source भएन भने त त्यो एकदम ठूलो समस्याको रुपमा छ । एउटा projector विग्रिहाल्यो भने अठार बीस हजार रूपैयाँ त्यल्लाई maintain गर्न लाग्छ, हैन त्यो राम्रो ठाउँ चाहीँ पाउँछ, पाउदैन, काठमाण्डौ नै पुऱ्याउन पर्ने स्थिति हुन्छ । अँ त्यो चारवटा पाँचवटा यस्ता projector त हो नि school हरूमा । अँ त्यति धेरै चाहिँ छैन, त्यस्तै computer हरूमा नि problem हुन्छ, यि नै कुरा हरू हुन सर, ।

I: धन्यवाद, एकदमै प्रष्टसंग सबैकुरा बुँदागत रुपमा राखिदिनुभयो, अँ पवित्रा म्याम science को विषयमा चाहिँ अँ पठनपाठन गर्दाखेरी फाइदाहरू, technology का फाईदाहरू र अँ तपार्इंले भोग्नुभएका challenges हरू चाहिँ के के छन् त ? जस्तो normal र emergency setting दुइटैमा । प्रयोग गर्दा खेरी, भन्दिनुस् न । (2.0) प्रकृती म्याम, हजुर ।

ST1:   हजुर, हजुर

I: Sorry मैले अँ के प्रश्न राखें भने त्यहि प्रश्न हो, हजुरहरूको चाहिँ Science को जुन भन्नुन, technical subject पढाउँदा खेरी चाहिँ अँ technology ले दिने फाईदाहरू भयो के कस्ता छन् र तपाईंले आफैले अँ भनौन technology प्रयोग गद्गा खेरी चाहिँ, आफ्नो कक्षामा technology प्रयोग गर्दा चाहि भोग्नुभएको कठीनाईहरू दुइटै संकटको अवस्थामा र भनौन सामान्य स्थितिमा पनि के कस्तो कठीनाईहरू भोग्नुभयो, त्यो बताईदिनुस् न अलिकती ?

ST1:   हस्, हुन्छ सर, अँ सकटको अवस्थामा ल - अँ technology प्रयोग गर्दा अफ्ठयारो भन्ने त भएन सर हैन, अब मैले presentation बनाउनको लागि पनि त्यस्तो मैले चाहिँ त्यस्तो समस्या चाहि भोग्नु परेन हैन, अनि मैले चाहिँ अब अलिकती time चाहिँ बढी लाग्ने भयो हैन साइन्सको project हरू बनाउँदा चाहीँ, presentation बनाउँदा time चाहि अलिकती बढी नै लाग्यो । हेन त्यही अनुसारको चाहिँ materials हरू चाहिँ खोज्यो हैन, cut गऱ्यो अनि राख्यो, त्यो गर्दा चाहिँ धेरै नै त्यो अलिकती time चाहिँ बढी लाग्यो हैन presentation, तर फेरि present गर्नको लागि चाहिँ सजिलो । time चाहिँ बढी लाग्ने अनि चाहिँ present गर्नको लागि चाहिँ सजिलो भयो हैन । student लाई नि राम्रो भयो, अनि अर्को चाहिँ त्यसमा चाहीँ अलिकती कमी के रे student को लागि चाहिँ हामीले बनाएको video चाहि त्यस्मा play नहुने, अस्ति नै, अघि नै रामबहादुर सरले भन्या जस्तो, उनीहरूको चाहिँ video चाहिँ play नहुने चाहिँ समस्या चाहिँ धेरै नै भयो । अब बच्चाहरूमा चाहिँ त्यो नेतको चाहिँ अलिकती problem हुने बढी, अनि अर्को चाहिँ अर्को भनेको electricity problem नै हो । बीच बीचमा line गईदिने अनि बीच बीचमा चाहिँ rejoin हुनुपर्ने अनि त्यो गर्दा गर्दा नै time बढी जाने, हैन time बढी लाग्ने भयो, त्यो अलिकती, त्यो पनि problem हरू चाहीँ face गर्नुप्ऱ्यो, अनि अर्को त खासै अनि अहिले चाहीँ technical के रे यो ICT को प्रयोग चाहिँ मैले class चाहिँ गरिराखेको छैन, अब resources पनि त्यति बढी छैन, हाम्रो School

मा । एउटा project छ अनि त्यस्को लागि चाहिँ अब ICT room मै गएर पढाउनु पर्ने हुन्छ, हेन ? त्यो कारणले गर्दा अब सबै class लाई चाहिँ manage गर्नु पर्दा, त्यो कारणले गर्दा अहिले चाहिँ तत्काल चाहिँ भैराखेको चाहिँ छैन, त्यते नै हो सर ।

I: अहम्, धन्यवाद, अनि अ, फाईदाहरूको बारेमा पनि बताउनुभयो हजुर धन्यवाद ... अँ राम बहादुर सर, त्यही प्रश्न रामबहादुर सरलाई ।

ST2: हजुर सर, मेरो कुराहरू, मेरो कुराहरू, म lost मा परें है सर, साथै as a whole total साथै म्याम सरहरूले भन्नु भए पछि चाहिँ साथै समेटिदाँ रहेछ चाहिँ मेरो कुराहरू पनि भए । अनि अधि हाम्रो विक्रम सरलले भन्नुभयो यो technical कुराहरू, problem को कुरा भन्ने कुरा भन्नुभयो, त्यो चाहिँ समस्याको कुरा आयो, advantage को कुरा जाँदा खेरी चाहिँ, नयाँ नयाँ कुराहरू सिक्न पायौं हैन, compulsory अब हामी त अब बाध्यात्मक भयो, त्यो हामीले प्रयोग गर्नु पऱ्यो, zoom प्रयोग गर्नु पर्ने नै भयो त्यस कसरी गर्ने, के गर्ने भन्ने कुरो पहिले थिएन, ज्ञान थिएन त, हो त्यो ज्ञान नभएको कुराहरू धेरै हदसम्म अब हामी teacher staff ले नी धेरै सिक्ने मौका पाइयो अनि लगायतको हाम्रो बच्चाहरू plus guardian हरूले पनि सिक्ने मौका पायो । त्यो advantage point भयो । अँ अनि अब अर्को एउटा कुरा मैले चाहँ सर यसमा खासै, कस्तो भन्दानी अब अधि नै पनि कुरा दोहोरिएको थियो अब हामी zoom class बाट गईरहँदा खेरी बच्चा दुइचार जना मात्र देख्न सकिने अनि २/४ जना चाहीं activate भएको, हामीले सोध्दाखेरी उनीहरूबाट ठीकै response पनि पाउको । धेरै बच्चा बच्ची चाहिँ बीचमा हराईराखेको, attend भाछ, present देखिन्छ, त्यहाँतीर हेर्दाखेरी, तर उनीहरू चाहिँ वास्तवमा जुन learning छ नी, जुन हाम्रो teaching तिर छ त्यो उनीहरूको ध्यान केन्द्रित नभएको देखियो । अनि त्यल्ले गर्दाखेरी कस्तो भयो भन्दा हामी जुन course जुन अगाडी बढाउनु पर्ने जुन हाम्रो target छ नी त, हाम्रो lesson जुन plan छ, यती सक्छु आज, यति सक्छु भन्ने जुन plan मा छ, अँ त्यो plan मा चाहिँ हामी कता कता हामी आफैं अल्मलिदो रहेछौं । अब (xxx) (poor connection) सोचौं बच्चाहरूको response आउन, positive response बुझेन जस्तो लागेर भनौं भने, दोहोऱ्याई तेहऱ्याई भन्दाखेरी हामी course अगाडी बढ्नचाँहि अलिकती नसकिने हुँदो रहेछ । अनि फेरी ठीकै छ, मेरो कुरा मैले राम्रोसंग गरिहालें क्यारे, बच्चाले बुझ्याछ भन्दै जादाँखेरी कोही चाहिँ फेरी सर्रर जाँदोरहेछ के त्यो अब हामी teacher अनुसार, मैले मेरो कुरो मात्र गर्न खोजेको छैन, मेरो staff sir हरूको पनि कुरा गरेको, मेरो staff सर, कोही सरहरूले के भन्नुहुन्थ्यो भने course त मेरो मज्जासंग गाछ (xxx) अनि कसैको चाहिँ, मेरो व्यक्तिगतबाट हेर्दाखेरी चाहिँ खासै course अगाडी गएन, जुन physical class मा म जति speed मा म गईराखेको छुँ, मेरो online Zoom class मा त्यति जान सकिएन भनेको लगभग के भयो भन्दा अब हामी त्यसपछ्रीको positive नपाउँदा हामी अल्मलि राखिदाँ रहेछौं । तर physical class मा हामीले बच्चाहरूलाई direct भन्न पाईन्छ । हैन । गाली गर्न पाईन्छ अथवा सम्झाउन पाइन्छ । अथवा personally class मा बाहिरनी भन्न पाइन्छ । त्यो कुरो चाहिँ नहुँदो रहेछ online class मा । त्यो चाहि कस्तो हामीले अँ पुरा departed भएर बसिरहदाँखेरी, अनि अब phone मा कुराकानी गर्दाखेरी तर त्यो practical रुपमा लागु नहुँदो रहेछ के । अनि त्यो एउटा समस्या चाहिँ मेरो अलिकती, अधि म्याम सरहरूले भन्नुभएको भन्दा अलिकती फरक मेरो एउटा experience रह्यो सर । ...

I: हजुर धेरै कुरा भन्नुभयो सरले जस्तो पछि जोडिएर, एकदमै धन्यवाद । अब हाम्रो करीव अन्तिम प्रश्न भन्दा पनि हुन्छ, किनभने हामीले धेरै कुराहरू गऱ्यौं र अँ धेरै कुराहरू त अँ भनौन एकदमै मजाले जोडिएर आएका छन् । अन्तिममा चाहिँ एउटा प्रश्न भनेको यो के सुझावहरू सम्बन्धी हो । सामान्य स्थितीमा र संकटको अवस्थामा चाहिँ अँ पठनपाठनको लागि यो technology लाई, technology को प्रयोगलाई चाहिँ अझ धेरै

प्रभावकारी बनाउनको लागि चाहिँ अँ तपाईंहरू संग केही सुभावहरू छ ? त्यो छन् भने चाहिँ बताईदिनुस्न । शुरुमा म अम्विका म्यामबाट गएँ यतिखेर । ...

ET1:   अब पहिला शुरुमा लकडाउनको period को कुरा गरें मैले, हैन ? लकडाउनको period को कुरा गर्दा खेरी अब online class लाई नै सुचारु रूपले राम्रो class अथवा राम्रो सित चलाउन त्यो बेलामा हामीले, जस्तो भन्नु त हामी भन्या हो, विद्यार्थीलाई पनि भन्ने गरि राख्या हो की अब कतिपय विद्यार्थीहरू अब नआईदिदाँखेरी अथवा उनीहरूले response नदिए पछि video on गर्नें अब, सप्पैजना video on गरेर बस्ने अनि को आयो, को छ, को छैन भन्ने कुरो थाहा हुन्छ भन्ने सम्म हामीले राख्यौं, नत्र भए कम्तिमा एकजना parents चाहिँ हुनपर्‍यो प्रत्येक student को भन्ने कुरा गर्‍या थियौं, यो चाहिँ हाम्रो lockdown को period मा बच्चाहरूलाई कम्तिमा पनि class मा बस्नुपर्छ भन्ने मान्यताले हामीले यो एउटा नियम पनि लगाएको हो । र यो गर्दिदा खेरी अलिकती चाहिँ विद्यार्थीले पछिल्लो अवस्थामा गएर चाहिँ response दिन थालेको कुराहरू मैले हजुरसंग share गरें यो online को period मा, अहिले यो face-to-face को फेरी उस्मा आइसकेपछि चाहिँ अब यो ICT बाट नै class लिनको लागि चाहिँ हामीले अझै राम्रो सित संञ्चालन गर्‍यो भने विद्यार्थीले धेरै राम्रो सित बुभ्रन सकिन्छ, अनि अर्को कुरो सजिलै सित बुभ्रन सकिन्छ, जुन कुरोले मौखिक रुपमा क्लासैमा बसेर पनि chalk and duster को use गरेर पढाउनु, त्यही कुरो पढाउनु र अनि ICT बाट projector बाट video बाट picture बाथ पढाउँदा खेरी धेरै different हुन्छ, far different हुन्छ पढाउन पनि सजिलो, विद्यार्थीलाई पढाउन पनि सजिलो विद्यार्थीलाई बुभ्रन पनि सजिलो भको कारणले गर्दा खेरी चाहिँ अँ देखेको कुरा के हो भन्दाखेरी अब यो ICT को use चाहिँ सकेसम्म सबै क्लासमा गरिनु पर्नें रहेछ । सबै teacher हरूले यो use गर्नको लागि पहिला शुरु त्यो संग सम्बन्धित knowledge हरू पनि gain गर्नु पर्छ भन्ने चाहिँ मलाई लाग्छ अब, हुन त अब हामी बुढो भईसक्यौ भनेर कतिपय teacher हरूले चाहि एकदम के रे त्यसलाई चाहिँ अँ वास्ता नगर्नुभएको पनि भेटिया छ । अब हामी काम छैन, अब हामी retired हुन लाग्या हो, सकिन लाग्या हो भनेर पनि उहाँहरूले त्यो क्षेत्रमा जानकारी नै लिन नखोज्नु भको पनि भेटिया छ के, अनि त्यो भको कारणले गर्दाखेरी मैले अहिले देखेको चाहिँ यो face-to-face मा पनि ICT लाई प्रभावकारी रुपमा संचालन गर्नको लागि at least त्यल्लाई कसरी चलाउने भन्नेको knowledge चाहिँ साथै teacher मा हुनुपर्छ भन्ने मेरो मान्यता हो अब । अँ हुनपर्छ भन्ने suggestion को रुपमा म लिन्छु हैन । जति बढी यो technology लाई हामीले accept गर्न सक्यौ, तयति नै हामी technology संगसंगै अगाडी बढ्न सक्छौं । Technology लाई accept गर्न सकिएन भने पक्कै पनि हामीलाई technology ले पछ्याडी पारेर technology अगाडी बढेर जान्छ, यो चाहिँ एकदमै हो । मेरो विचारमा त्यो भएर चाहि सबै teacher ले यो संग सम्बन्धित हुनुपर्छ र दोस्रो कुरो at least एउटा device चाहिँ आफूसंग पनि र school ले पनि यस्को लागि चाहिँ support गरिदिनु पर्छ । जो संग device already छ, छ भईहाल्यो, जो संग छैन, उल्ले गर्छ म कुनै teacher ले म गर्न चाहन्छु तर म संग device- त्यस्को लागि त school plus प्रशासनले र त्यसपछ्याडी वयवस्थापन समितिले ल तपार्‍य) गर्न सक्नुहुन्छ, चाहनुहुन्छ भने हाम्रो तर्फबाट support भनेर उहाँहरूले at least device चाहिँ provide गराईदिनुपर्छ के । ICT बाट class संचालन गर्ने भन्ने, online class संचालन गर्ने भन्ने device छैन, teacher ले कहाँबाट पढाउन सक्नुहुन्छ ? त्यो पनि एउटा समस्या हो, त्यो भएको कारणले गर्दाखेरी, मेरो भित्रदेखिको कुरा के भन्दाखेरी हामीले पढाउने इच्छा चाहिँ गरिराख्या छौं, हामीसंग साधन छैन भने सकिदैन, त्यो चाहिँ school ले बुभिदिनु पर्छ, प्रशासनले बुभिदिनुपर्छ कि ल, तपाई पढाउनु हुन्छ भने हामी चाहिँ यो यो व्यवस्था चाहिँ हामीले गर्दिन्छौं भनेर । साथै चिजको व्यवस्था हामीले नै गरेर पढाउन त सकिदैन जस्तो, कतिपय class मा projector भईदिए हुन्थ्यो भन्ने हामी इच्छा गर्छौं छैन

त साथैमा हामीले individually राख्न त सक्दैनौ, at least school ले चाहिँ त्यो provide गराईदिनुपर्छ । ICT बाट base मा चाहिँ class संचालन गर्ने हो भने, त्यो हुनुपऱ्यो अँ school ले गर्ने कुरा अनि teacher ले गर्ने कुरा मैले अघि नै भनिसकें, त्यसपछी आएर अब, त्यो संगसँगै भइसकेपछि, student ले ICT through बाट face-to-face गरेर class लियो भने ऊ केही न त केही उल्ले सिक्छ नै र ऊ जुन अधिको traditional method भन्दा अलिकती बढेर चाहिँ उस्को चाहिँ creative, mind हरू पनि creative हुन्छ, त्यसपछि आएर उल्ले केही गर्न, म गर्छु मैले पनि video हरू ल्याएर presentation देखाउन पाएँ भने पछि, presentation देखाउनकै लागि पनि उल्ले केही मेहेनत गर्छ, मैले देखेको कुरो, त्यही भएर सकेसम्म ICT base बाट teaching गर्नको लागि दुवै पक्षबाट भनेको मतलब, school को पक्षबाट, teachers को पक्षबाट पनि यस्मा - चाहिँ केहशी लागि पर्नुपर्छ जस्तो मैले feel गरेको हो सर ।

I: धन्यवाद अनि तपाईंले, त्यसैमा मैले सानो कुरा बुझ्न चाहेँ । अभिभावकको पनि केही पक्ष देख्नुहुन्छकी केही role हरू त्यहाँ नीर ?

ET1:   अब, हजुर, अभिभावकले चाहिँ अब के गर्दिनु पर्ला जस्तो लाग्छ भन्दिदाखेरी, अभिभावकले चाहीं जस्तो हामी प्राय जस्तो के गर्छौं भने, विद्यार्थीलाई मोबाईल दिनु हुँदैन, मोबाईल दियो भने बिग्रिन्छ, गेभ खेल्छ, यिनीहरूको चाहिँ पढाई विग्रिन्छ भन्ने जुन हाम्रो मान्यता हामीले बोकिरहेका छौं । अहिले पनि हामीले school मा विद्यार्थीलाई, जुन त मोबाइल ल्याउनको लागि allow ने गर्दैनौ । त्यो पक्ष जुन छ, त्यतापटि पक्षबाट नहेरिदिएर, विद्यार्थीलाई मोबाइल त दिने, तर उल्ले त्यो मोबाईलमा के गरिरहेको छ त, पढिरहेको छ कि, केही knowledge हरू gain गरिरहेको छ भने त दिने नी, किन नदिने, त्यो त parents ले बुझ्दिनु पऱ्यो नि । parents ले खाली मोबाइल मात्र दियो, ना मैले दिए भनेर मात्र भएन के, बच्चाले त्यो दिएको device लाई कतिको utilise गऱ्या छ त, कुन क्षेत्रमा प्रयोग गरेको छ भनेर निग्रानी त गर्दिनु पऱ्यो नि त । अभिभावक भइसकेपछि at least घरमा पनि बच्चाले मोबाइल चलाउँछ अथवा ल्यापटमै चलाउँछ भने, के के गर्दै छ त बच्चाले, मेरो बच्चालाई दिएको छु मैले मात्रै नभईकन उनीहरूलाई यसो हेर्दिने, abserve गर्दिने, ओ यल्ले पढिराखेको छ कि छैन न game पो खेलेर बसिरहेको छ कि,न साथींसंग chat पो गरेर बसिराछ, त्यो निग्रानि चाहिँ parents ले दिनुपर्छ जस्तो मलाई लाग्छ, अनिमात्रै हामीले ICT base संग related भएर अँ teaching and learning दुवै काम गर्न सक्छौ otherwise एकजनाको पक्षबाट मात्रै गर्छु भन्यो भने teacher ले मात्रै गर्छु भनेर पनि हुँदैन यहा, प्रशासनले मात्रै गरेर पनि हुँदैन, parents ले पनि support गरिदिनुपर्छ, बच्चाहरूको लागि, device दिएर हुन्छ की, observation गरेर हुन्छ कि, अथवा net को facility दिएर हुन्छ कि, अथवा net को facility दिएर हुन्छ कि अथवा हुनसक्छ कतिपय ठाउँमा समस्या छ parents को पनि अब economic condition कम छ भने, ठीक छ हामीलाई भन्दिनु भयो भने, school मा हाम्रो केही facility छ भने हामी बच्चाहरूलाई पनि दिन सक्छौ तर at least बोबाइल त अहिलेको जमानामा, प्रत्येक घरमा प्रत्येक व्यक्तिको त एउटा मोबाइल त हुन्छ ने, त्यहीँबाट पनि केही बच्चाहरूलाई दिन सकिन्छ, काम गराउन सकिन्छ । यल्लाई negative को रुपमा नलिईकन positive रुपमा लियो भने अँ बच्चाले पनि केही गर्न सक्छ जस्तो लाग्छ । parents को चाहिँ एउटै काम के हो भन्दाखेरी at least बच्चालाई चाहिँ device मा के गर्दैछ भन्ने कुराको चाहिँ अँ उनीहरूले जानकारी चाहिँ लिईराख्नु पऱ्यो, update गराईराख्नु पर्ने हुन्छ र अँ उहाँहरूले observation चाहिँ गर्नुपर्छ जस्तो मैले feel गऱ्या छुँ सर ।

I: एकदमै धन्यवाद, धेरै कुराहरू एकदमै प्रष्टसंग राख्नुभयो । एकदमै धन्यवाद, कतिपय, जस्तो बीचमा त विक्रम सरले अँ सहमती पनि जनाउनु भयो त्यसैले विक्रम सरबाटै जाउँ होला मैले ...

ET3: ... अँ उहाँले, म्याडमले भनेका कुराहरू धेरै कुराहरू नै म सहमत गर्छु, हैन ? अँ बुँदागत रुपबाट मैले गएँ कि ICT को प्रयोग normal classroom मा पनि उपयुक्त छ भन्ने कुरा त हामीले अघि छलफल गरि सक्यौं । अहिलेको generation भनेको नै यो ICT या technologycal अ, यो friendly generation छ । Technology प्रयोग गरेर सिकाएका कुराहरू छिटो संग सिकेन सक्ने रहेछ । अब हाम्रो चाहिँ अवस्था के छ सुझावको रुपमा भन्दाखेरी, teachers हरू र students हरूलाई compare गर्दा खेरी, हामीले technology को प्रयोग गर्नु कतिपय कुराहरू student संगबाट सिक्नु पर्ने अवस्था छ, सिकि पनि राख्या छुँ । एकछिन चलाउन पायो भने, त्यो बच्चाले एकछिन चलाउन पायो भने device को धेरै function बताईदिनसक्छ जबकी, हामीलाई अलिक समय लाग्न सक्छ । अँ त्यसको लागि पनि अँ students लाई अहिलेको प्रतिस्पधामा जानको लागि ICT एउटा supporting device हुन सक्छन् । To the point मा जानको लागि त्यसको लागि ICT training को आवश्यकता छ । सम्पूर्ण teacher हरूले त्यसलाई कसरी प्रयोग गर्न सक्छन् भन्ने कुरा School ले अथवा स्थानीय level बाट सम्बन्धित निकायहरूल चाहिँ teacher हरूलाई चाहि ICT को training दिनुपर्ने कुराहरू अथवा कतिपय अवस्थामा teacher service commission मा पनि ICT एउटा, अहिले पछिल्लो समयमा त राखेको छ क्यारे । त्यसलाई त्यसमा चाँहि literate नभएको मान्छेहरू teacher बन्न योग्य छैनन् भन्ने किसिमबाट ने जानुपर्ने अवसथा छ । त्यस्तै अर्को चाहि resource available को कुराहरू, resource management चाहिँ school ले गर्नुपर्छ, school management committee ले गर्नुपर्छ अथवा municipality ले आफ्नो क्षेत्र भित्रका चाहिँ School हरूमा चाहिँ school support कसरी गर्न सक्छ त्यल्लाई चाहिँ resource management को पाटो पनि महत्वपूर्ण कुरा छ । अनि अ, guardian को कुरामा चाहिँ ठीक छ quality का कुराहरू आए, अलिकती गुणस्तरीय शिक्षा पनि चाहियो भन्ने किसिमका कुराहरू आईसकेपछि, केही support guardians को पाटोबाट पनि अँ पारदर्शि किसिमले त्यसलाई school ले manage त गर्नुपर्यो, infrastructure development को लागि especially ICT संग related कुराहरू गर्नको लागि थोरै students ले अँ school मा आएर computer facility लगायतको अन्य कुराहरू सिक्छ भने थोरै fee structure त्यल्लाई maintain गर्नु पुग्ने किसिमको fee structure पनि हामीले राख्न सक्छौ नी त । त्यो किसिमको चाहि कुरा पनि, चाहिँ, तीन दिन नसक्ला, तर भैराखेको कुनै संस्थाको दियो अथवा कहीँबाट School ले जुटायो भने, त्यसको repair गर्ने cost त एउटा सामान्य रूपबाट चाहिँ, nominal cast नियमित राखिदियो, guardian हरूले support गर्यो भने पनि school लाई चाहिँ supportive हुन्छ । ...

I ... सरी सर, सानो कुरा रोकें है तपाईंले जुन पछिल्लो, अँ जुन यो ... के रे विद्यार्थीहरूले पनि अथवा अभिभावकहरूले पनि, अँ भनौन maintanence को लागि चाहिँ थोरै सहयोग अभिभावकको तर्फबाट गरिदियो हुन्थ्यो भन्ने कुरा त्यसमा सरको School मा चाहिँ केही भएको छ जस्तो मैले जोड्न =

ET3: = अँ, अ, हामीले हाम्रो चाहिँ आ यो संचालक school व्यवस्थापन समितीले किसिमको चाहिँ proposal अगाडी सारेको र जुन संस्थासंग ... भन्ने संस्थासंग हामीले एउटा चाहि lab लाई Partnership कुरा गर्दाखेरी उनीहरूले एउटा तिमीहरूले चाहिँ basket fund राख्नुपर्छ है यही maintain को लागि, त्यसलाई चाहिँ स्कुलबाट बच्चाहरूलाई ठीक छ २० rupees हुन सक्ला ४०, ५० चगउभभक हुन सक्ला अँ त्यो मासिक रुपबाट त्यसरी चाहिँ दियो भने त्यो maintain गर्न चाहिँ support हुन्छ भन्ने कुरा भाको थियो

सर, यो Covid भन्दा अगाडि, अनि अभिभावकसंग राख्दा खेरी, उहाँहरू ठीक छ बच्चाहरूको लागि केही नयाँ कुरा सिक्छन् भने त्यतीकुरा चाहि दिन agree छौं किनभने अरु त हाम्रो fee, free नै चाहिँ थियो । अँ भने त्यति उहाँहरू ready हुनुहुन्थ्यो अनि बीचमा अलिकती Covid ले disturb गर्‍यो र school ले ने basket fund मा केही manage गरिदिएको छ र अब, अब नयाँ चाहिँ session बाट र हामी त्यस्लाई अलिकती व्यवस्थित किसिमबाट नै कमसेकम ह maintain गर्न पुग्ने किसिमको cost नै अभिभावक भेला गरेर राख्ने प्रयासमा छौं र एक किसिमको नेताबाट approve चाहि भइसकेको कुरा पनि छ सर । होला यो बीचमा covid को कारणले गर्दा हामीले त्यल्लाई चाहिँ regulate गर्न सकेनौं तर पनि उहाँहरूको mandate आएको छ र अर्को चाहिँ यो administration head sir हरू हुनुहुन्छ र coordinator हरू हुनुहुन्छ, उहाँहरूले चाहिँ अलिकती monitoring को पनि कुरा गर्नु पर्छ । जस्तो कि म, मैले पनि केही जिम्मेवारी school मा बहन गर्दाखेरी कतिपय junior class का चाहिँ teacher हरू miss, madam हरू पनि बच्चाहरू त भनिहाल्छ lab मा गएर सिकौं computer, lab मा गएर सिकौं अथवा चाहिँ Internet मा गएर सिकौं भन्ने कुरा तर कतिपय अवस्थामा उहाँहरूलाई अल्छि लागिदियो भने पनि ल ल्याएर चाहिँ lab मा बच्चाहरूलाई राखेर, दुईजना म्याडमहरू अथवा दुईजना सरहरू (xxx) साइडमा बसेर आफूचाहिँ mobile खेलाएर बस्ने हो तयो कुराहरू पनि छ, हो त्यस्तो कुराहरूमा पनि monitoring गर्नुपर्छ । Student ले मात्र होइन teacher ले पनि technology को misuse गरिराख्ने अवस्था छ । Mobile Class मा प्रयोग गर्नुहुन्न, switch off गरेर जानु पर्छ भन्ने कुराको अँ अ चाहिँ त्यस्को विपक्षमा छुँ, तर class मा चाहिँ as a teaching material को रुपमा teacher ले mobile प्रयोग गर्ने हो हैन की कुनै classwork दिएर आफू चाहिँ (xxx) अहिले अलि बढया छ की सर, अँ share, NEPSE कति पुगेछ, कहाँचाहिँ बढेछ, अनि अहिले त mero share बाट कतिपय teacher हरू त class बाटै share चाहिँ, हजारौं share कारोबार गर्ने त्यो अवस्था पनि मैले भेटेँ सर, हैन केही केही साथीहरूलाई त्यस्तो भेटिसकेपछि, होइन साथीहरू यो चाहिँ भएन है, यो चाहिँ गर्नु हुदैन । ठीक छ तपाईहरूलाई त्यस्तो छ, फुर्सदको समयमा गर्नुस् तर यो class मा चाहिँ अँ यो अवस्था यो misuse भयो, अँ use बाट फाईदा हुन्थ्यो भने mis use भयो, अँ use बाट फाईदा हुन्थ्यो भने mis use बाट बेफाइदा हुन सक्छ भन्ने किसिमको कुरा आयो । अर्को चाहिँ crisis, during crisis सर यो यस्को लागि त यो resilience भन्दो रहेछ सर, resilience school, उत्थानशील school, resilience education का concept हरू चाहिँ अहिले आएका छन् सर । आ पहिला हामी त्यो infrastructure नै त्यस्तो किसिमको, दह्रो foundation बनाउन सक्नुपर्‍यो की ताकी प्रत्येक school हरूमा भनौन ICT संग related team, जति हामीले छलफल गर्‍यौं ती resource हरू available भएको अवस्थामा त यस्ता संकटहरू अहिले Covid आयो यस्ता संकटहरू हिजो South Africa तिर चाहिँ अरू Country तिर Ebola ले यस्तै School हरू बन्द भई राखेको थियो, भूकम्पले लामो समयसम्म स्कुलहरू हाम्रो बन्द भए, यस्ता समस्याहरू आउदा खेरी पनि हाम्रो संरचनाहरू दह्रा भए भने, आ technologically हामी strong भयौं भने, त्यो technological mind ले पनि teacher लाई पनि तम्तयार बनाउछ, अँ हैन, त्यो त्यसरी चाहिँ knowledge plus त्यो physical structure नै बढी भयो भने, यस्ता crisis हरू जे आउँदाखेरी पनि हाम्रा school हरू निरन्तर चल्ने र बच्चाहरूको सिकाईमा निरन्तरता पाउन हुन्त सर त्यसैलाई नै ध्यान दिएर, अ school ले मात्र त्यो सम्पूर्ण गर्न सक्दैन, अहिले त local level मा चाहिँ राम्रो fund हरू जान्छ, School को जिम्मा local level लाई दिएको छ, local level पनि positive, त्यस्मा चाहिँ positive हुनुपछ जस्तो लाग्छ सर मलाई ।

I: कति राम्रो कुरा गर्नुभयो, धेरै कुरा गर्नुभयो है, त्यस्को लागि एकदमै धन्यवाद । अब म रामबहादुर सरसंग गएँ, राम बहादुर सर ... पवित्रा म्याम भन्दिनुस् न, सुझावहरूको कुरा गर्दै थियौं र अँ, अम्बिका म्याम र विक्रम सरले कतिपय कुराहरू, धेरै कुराहरू राखिदिनुभयो, तपाईंसंग केही छ की प्रकृती म्याम ? सबैकुरा आईसक्यो सर त्यस्तो केही पनि छैन मेरो त ।

ST1:   हँ हँ (laughs) खासै केही छैन । खास त School को resource नै हुनुपऱ्यो, हैन ? Resource नै हुनुपर्छ जस्तो लाग्छ मलाई त । अब कतिपय teacher हरूले mobile बाट पढाउनु भयो त्यो कति effective भयो, त्यो कति effective भएन हैन त्यतिबेलाको समयमा, लकडाउनको बेलामा, मोबाईलबाट र हामीले laptop बाट पढाउनु, अनि presentation गरेर पढाउनु र mobile बाट पढाउनुमा त धेरै नै फरक छ हैन ? त्यो कारणले गर्दा अहिले त resource नै हो main कुरा, resource नै हुनुपर्छ, हैन ? अनि अर्को चाहिँ अब teachers हरू पनि सबैजना technology friendly हुनु हुँदै - हुनु हुन्न, अब त्यो कारणे गर्दा technology-friendly बनाउनको लागि त्यो किसिमको चाहिँ school प्रशासनले चाहिँ पहल गऱ्यो भने, हेन, त्यो कारणले गर्दा चाहिँ अलिकती effective हुन्छ की भन्ने कुरा हो, सर ।

I: अनि, अर्को अभिभावकहरूको role चाहिँ कस्तो देख्नुहुन्छ म्यामले ?

ST1:   अभिभावकहरूको role चाहिँ अभिभावकहरू चाहिँ अलिकती सजष नै हुनुपर्छ अहिलेको बच्चाहरू देखी हैन ? भन्नाले उनीहरूले चाहिँ positive way बाट कती अब अलिकती जान्ने बुझ्ने बच्चाहरू, अलिकती पढाई प्रति अलिकती सजग विद्यार्थीहरू त mobile को चाहिँ misuse चाहिँ कमै गर्छन् हैन ? तर अलिकती त्यस्तै किसिमको student हरू चाहिँ बढी misuse नै गरेको देखेको, पाईएको छ के, त्यो कारणले गर्दा, अलिकती ... parents हरू चाहिँ आफ्नो बच्चाहरू प्रति अलिककती अँ सजग भएर उनीहरूलाई चाहिँ के गरिराखेछ, कस्तो गरिराखेछ भनेर अलिकती निग्रानी चाहिँ उनीहरूले राख्नै पर्ने देखिन्छ सर ।

I: अँ ल प्रकृती म्याम एकदमै धन्यवाद, रामबहादुर सर, तपाई हुनुहुन्छ, ... अन्तिममा चाहिँ तपाईंहरूले केही कुराहरू जुन technology प्रयोग सम्बन्धी थप्न चाहनुहुन्छ, थप्न चाहनु हुन्छ भने थपिदिनु होला, नभए भने हामीले अब अँ यही सकाउँछौं पनि

ET3:   ... अब त्यही नै हो, resource कै कुराहरू आए धेरै कुराहरू अब कतिपय अवस्थामा teacher हरू, कतिपय school ले गरेको अभ्यास, यद्यपी अ, मेरो school ले त त्यो अभ्यास गरे गरेको छ ैन, मेरै जिल्लाका केही school हरूले, अँ गरेका अभ्यासहरूमा चाहि, teacheres हरूलाई 50 percent तिमीले pay गर 50 percent school को स्रोतबाट भनेर ल्यापटप one teacher one laptop त्यो अवधारणा र तिमीले चाहिँ निय - JCT को चाहिँ प्रयोग चाहिँ गरेकै हुनुपर्छ, त्यो knowledge चाहिँ तिमीले develop गरेकै हुनुपर्छ भनेकै concept पनि लिएर आछन् कतिपय school ले । ह त्यो भनेको ICT प्रयोग गर्नको लागि teachers हरूलाई motivation-motivating factor पनि हो भने कतिपय school ले अहिले हामी किन्दिन्छौं, क्रमश १० percent अथवा कतिकति percent को दरले तिम्रो चाहिँ नियमित तलब आँउदाखेरी चाहिँ काटेर चाहिँ राखौंला त्यो पनि एकैचोटी हैन ८०,००० , ८५,००० हाल्न teacher ले हाल्न नसक्ला, तर प्रत्येक महिनामा तलब बुझ्दा खेरी ८, १० हजार घटाएर पनि, एक वर्ष दुई वर्ष भित्र । त्यो त्यसै गर्दा खेरी प्राय teacher हरूले ल्यापटप किनेको, त्यस्लाई प्रयोग गरेको कुराहरू सुन्नमा आएका छन् साथीहरूबाट यस्तै जमघटमा । त्यो पनि एउटा राम्रो अभ्यास हो सर ।

Appendix C2: Transcription of interview conducted in English

Interview with English Teacher (Danfe School)

R: What kind of technology do you use in your classroom, both before pandemic and during this time? (translated - the researcher asked a question in Nepali)

ET2:   Umm, yes Sir, for the effective conduction of the learning, we used to have projector, computer, laptop and even the smart phones in this physical classes before the crisis. We used to hook up the projector and then from there, we would display the content for the students and they could read it on the largest screen and then we would have discussion interaction and then they would learn that way. Through smart phones also sometimes, we would do like instantly whenever there was no projector available at the moment, we could display the pictures or some content through the smart phones, and then our students would see and learn sometimes like some words or some pictures. If we could not explain to them we could show the pictures through the smartphone. That, that's also what we used before the crisis and during the - and even we, yes we used to do so, such things, and we will have the whiteboards if we go for that type of technology as well and smart boards in the classroom. And we make use of those things - we used to make use of those things previously. Now in the time of crisis, we use different technologies like (xxx) PowerPoint presentation, then we do the quiz surveys from Google and even the Microsoft Teams, and we will have video conferencing, un, etc. sir.

R: Okay, so when you said, okay video conferencing tool, which tool do you use? Is it ?

ET2:   Un, we, mostly like what we are - like we sometimes, informally, like what I (xxx) (disruption due to the poor internet connectivity) class hours is limited to 45 minutes, and we take the class as per the schedule time from the school, sometimes, like students if they want to, you know, learn some - some are sigh student, and then if they want to know something extra, they sometimes - I allow them to the Messenger or Skype or even Ms Teams chat box etc, that is how also we did. I, I, I like - they would give me a call or they, they could give me a call. I would fix the time; however, they give me that call either in Messenger or in the Teams and then, they are in the Skype and then we like, they asked the question and I answered them like to make them (xxx).

R: Okay, it's yeah really interesting. So, un, do you have experience of using technology before, un, this, you know, I mean, if we divide this way, this crisis, this pandemic is okay, global crisis now. We're just, you know, taking reference of often and then before that the normal period and before that as well, we had some-some kind of crisis you know, in some form, right for example, crisis caused by un, natural disaster, let's say, in 2015, right? So if we talk about those crisis,

any crisis which we had earlier, do you have any experience of tackling crisis, particularly while managing education using technology?

ET2: (2.0) Un, actually, during the time of that massive earthquake and then maybe the Indian blockade or whatever, we were not that much prepared for this type of - you know classes because this virtual classroom has become the reality of present but that time we use not have such type of classes. We used to have physical classes. We had to hold the school for two months or so and then only we called the students for the physical classes, and we did not have such a - type of learning; however, like, just informlly not in a group, 1 student wanted to know, Ma'am I was writing this thing that would you please correct it and they would send through the email or even the Skype and this chat, chat rooms and they would do that and I would do that but it would go in personal level only not for the mass of students.

R: Okay that time, right during those crises=

ET2: Yes sir.

R: Okay, thank you, yeah it's great to learn even, yeah there was use of technology then as well at the personal level. So if I ask you why question, why do you use technology in your classroom? How would you answer?

ET2: Um, you know, that is the - this technology actually is the need of the day, you know. It has transformed the learning from you know, traditional to modern, to the current learning. I add, call it, current learning because nowadays what we did not know in the past has become our, you know, daily activities like we used to learn about distance classes and so and so. Distance learning learning we used to know, we used to hear but we - I think we did not much - I personally did not bother much about learning. What sort of learning is this? I used to just know that maybe she would telecast the broadcast the program from radio and then we would listen or was the television program called follow me like those things we would listen on that particular time at that time but actually, we did not know much about that, but these days, these technologies really have ruled us and then we have to be updated for battles or we have to be prepared for that. We are at this time we use different technologies in the classroom like even just from for (xxx) the pole, to giving the lecture or to you know, give the example of certain things like recently, we talk about recently that one per unit one in grade 10, I had to teach about the making the invitation card, simple thing was it and then now since last year let's say, in most of the household, this printed card was not issued because we do not have much functions and then some students say ma'am, what should we write? what used to be written? I don't know. I forgot it there. I know that there would be party at this time and we would go. But what would be written and then instantly I could just open from the Google or whatever I had in my folder, I could display it to them. So it's really in anyway, we can use it whether to simplify the things or ask the students to make the PowerPoint presentation

on that, it can be used from both the instructor side and the learner side.

R: Um, okay, very nicely said. So again probably the question which I'm going to ask right now, you might have answered, you know while answering the previous questions as well but still I would like to ask this question so if there are something left, then you can add it up. So what kind of response do you get from learners when you use technologies in your classroom during a normal situation? Let's focus on normal situation now.

ET2:   Um, this, the, actually in compa- okay, un, this responses are very prompt, quick and then you know even it is a really like what to say we can get the prompt response even from the students and even the parents like in the previous days when we, you know where when even the parents were busy with the, with their own official work, they used to go to different places and then they would not be available at home and if we gave the call, they would either say, un, they were busy or they would give the callback later or they would not pick the call now then. Now they pick the call and then they respond and they make the students sit in the class. This is the very positive response and quick response I've got because previously we started with this Zoom classes and then we move to the Google classes, Google Classroom and then we moved into the Teams. What facilities we have is that we can call the students instantly and then either the app is downloaded in parents' mobile even, even the parent's mobile and the student's mobile, they get the call and then we can easily tell sir, ma'am your ward is not in the class, can you please send them to the class or ma'am. really is the class going on, I didn't know about this! Okay thank you for calling, I will let him (xxx)in the class. They are really you know, positive towards this. Previously in the beginning of the previous year, they used not be very, you know, excited about this. They would think like Ke what the teachers doing and what is this? How the students will learn the when in absence of teacher as if the teacher speaking from the screen like the television news reader or so and my child may not learn. They would feel that way but they now even the students are happy because they have understood - this is the thing they have to do at present, there's no choice for it, there's no alternate for it and then they can even like you know, un, um, like why students are more happy is that, they can quickly submit the work even the science students like for example I am very shy that class, I don't want to show my face to you, I can hide my camera but I can respond to you that way as well just by keeping my microphone on or just uploading my work there. Science students are also participating this way any how they are you know, in contact with the teacher and they are learning and later on like in case of such students when they don't know, who do not actually want to come to the front when I asked after the class or before the classes, sometimes they say that ma'am, if I turn on the video he says this or she says that and they just comment me in the chat later on like and I say that we come to

> know about they are chatting at the backdrop of the classes as well but after we make the call, and then we give the assignment we asked them to do the activities and make them you know, involved in the class anyhow. They are really enjoying. They are happy, parents are happy, students are happy, the students are admiring the classes because now they have learned more features of the technology, this MS Teams that we use and then maybe they are (xxx) this friendly, that's why they are more happy and taking the classes or maybe the parents also have understood that ohat least the teachers are doing the work to make our children learn something else. So I have found that both the parties, let's say all three parties, me, teachers, students and parents, all are happy with this.

R: Um, yes, thank you. So it's during the pandemic, right?

ET2:   Yes Sir.

R: Okay and is it - okay is it like particularly connected to only the you know, classes that, that are run or yeah, that have been let's say, that have been running during second wave after second wave or also the you know, immediately after first wave? The actions which you told just before, yeah!

Bininta: Yes sir, i, it was in comparison to the classes we had during the first wave to the second wave, this later part, the students are enjoying much and the parents are enjoying much.

R: How bout the=

ET2:   =And (xxx)

R: Sorry, yeah, thanks and how about during the you know, let's say, first say, I mean during the initiatives that you had in response to the first wave of pandemic I would say?

ET2:   Un, you mean to ask their response at the time=

R: =Yeah how how, how, how are their responses then?

ET2:   Okay, the, yes, actually, whether to say this or not that we were even asked to give the personal call, telephone call to the parents regarding joining the classes and then if any technical like deficiency or any problem was there with them. And then, we came to know some sometimes, you know, we even used to get the scoldings or maybe they would just express their like heart burnt to or with the school towards the teacher. They would express with, through us like when we used to call, sir or Ma'am, it's been long that your ward is not in the class and then they would say that why should they be there that everything is uncertain now why, why should we make our children sit for the class? Are you sure that we will not get infected and so and so, such type of frustrating comments also used to come, but in, in the early days like mean, last early months of the last year season, but this year, there's no such remarks, the parents are saying that ma'am, sir you are really doing well, they have to sit. Yes sir, if he is not … today I'm not at home, tomorrow I'll make him do you. Thank you for your call otherwise I would not know about the classes going on. They have that response means we really you know, are happy to learn about such a encouraging commands from the parents.

R: Okay, great to learn, so how about how about the comments or responses from school managers, could be school principal, vice

principal, academic coordinator or directors, whoever else? How about the comments from school managers? …

ET2: ... yeah, sir, they are also you know, let's say somehow worried about this because after all, this is the - this type of classes like when we do - we are not able to have physical classes and we have to depend on this online classes. Un, the some of the student s may not, you know take the classes, they may be giving behind the scene you know and time and often, we are told from the school administrative side to ask the students about the problem if they are having or why they are not turning on the camera, why they are not responding, whether they were in the class. We are asked to enquire, we do, they are also worried about things, and they also keep on encouraging us for this thing because we are doing the thing which we did not do before. We are in learning, and they are teaching us. We are learning through them, we are learning through you know, YouTube and Googles and all these things. We are exploring and learning these things. They are also happy on ours, happy and even satisfied towards what we have done and about the students performances as well.

R: Un, hmm, any trainings provided from school or yeah, within city school managers as well as regards the technology use?

ET2: Yes, of course that like before the long holidays and during the session breaks we get this type of technical assistance training and, let's say, refresher's training like such from the school management side recently before like from the month of Ashad on/from Ashad 7, this session started, okay, the online started and the whole month of Ashad. We had different sessions like from a different this people, experts in this technical field. They were hired and then they gave us the training how to use technology in the classes and what can be used in the classes to assess the students and to you know, even teach in the classes.

R: Un, hmm, so this question I have not asked to any other interviewee earlier but I would like to ask to you. So if you would like to rate yourself you know, as regards let's say, efficacy or efficiency of using technology from 1 to 10, un, where do you think you belong to? For example, like one being the lowest and 10 being the highest, yeah.

ET2: Un, I got it. to be very frank, previously you know, like we were limited only with this emailing and then making PPTs and then you know using the social networking sites. That time if we talk about this digital, okay let's say, virtual teaching learning, maybe it was 2 at that time. Now I can rate myself 6 to 7, not more because I'm also at in the phase of learning, so many technical you know, things, issues coming in between in the classes and then I keep on exploring like I asked the school man - expert, in this like whoever in charge of this, I keep on asking them and then they keep on helping, so I rate myself seven now now. Previously I would rate only 2 to be very frank.

R: So great (laughs), great transformation, right, in a big transfo=

ET2:   =Yes, sir, really, really.

R: Yeah, do you also see same kind of transformation in parents as well?

ET2:   (2.0) Um, yes, uh, but not in all okay. But not in all the parents like we have more parents as because we have more students but most of the parents, uh, they have transformed themselves from you know, best to you know, they are in the way of way you know going upstairs, like previously they would never like when, when we called the parents, they said that really is there the app like such I never knew that. But we we you know, what we do, we take the classes and in each year, we upload the attendance after students and then some parents they did not know that their children were not there and when they were called at school they said that really is there such app, is there such technology, are you really having this, you're not telling lies like now now parents do not say yes mam, I checked in the app also but this has not been uploaded, what can be there? Ma'am, have you uploaded there or in other app or is there any question to come it or you will assign next week or this week. They even ask this type of questions means now they are also becoming you know, more you know, concerned about the learning and they have changed themselves a lot.

R: Um, and how about the, because you you earlier told as well like you know if it is repeated then you can just you know skip that section otherwise if there are some new things then you can add like, how about the transformation in school managers or school management team for example, like you know is there a discourse, for example, is there a discourse like you know, un, is there a discourse around teaching in more a new fashion later after you know, Covid or let's say post-Covid or new normal situation or will it be - will it go completely as the original plan, I mean, you know as the plan which we had or which you had before crisis. What kind of you know, transformation going to happen or how they have perceived this transformation or what kind of transformation do you see in school managers? Is my question clear? Sorry.

ET2:   Un, I was about ask - could you please repeat? I just=

R: So, yeah, sorry because many things came into my mind and I tried to put them all together. Actually you know, in single sentence, do you also see the changes or trans - transformations in school managers actions, (2.0) like=

ET2:   Yes, … let me answer this I'm sorry. I disturbed you. Like, uh, in the past, we were also like that. They also thought that we did not - we don't know much regarding the technology. They had that impression that these - these people are naïve and they don't know much about the technology, how they may take the classes, what may be the consequences? Whether the parents will like it or whether the students will understand it or not. They were concerned about this thing, now after getting the feedback from the parents after observing the classes themselves because they also entered our classes and observed themselves and then they after provided us the training, then they learned that oh,

yes, the teachers are doing, they are taking, you know, they are providing us the good responses. Did, did I answer the

R: Yeah, yeah, because, yeah, I could infer some of your answers to this question from the inner previous answers as well. Yeah, it's connected and one more question is what do you, or is there a discourse, or is there a conversation around like you know having some changes in the new normal situation for example, once the physical session, once the physical classes will be - will be commencing, so will there be some changes in the format of pedagogy later - format of teaching and learning later? What do you think=

ET2:   =Un, you mean to ask about that physical classes after the crisis over?

R: I don't know like for example, I exactly don't know. (xxx) are they talking about running completely physical this way or embedding teaching - sorry embedding some form of technology later or also running some virtual classes when crisis is there. I don't know what do you think like, or or have you heard any kind of you know conversation around the school management team regarding you know, future, un future course of you know, teaching and learning?

ET2:   yeah, un - until this crisis is, let's say what to say maybe we have heard that from October again, the third wave - third wave will hit the teenagers and then maybe not we will have the physical classes. We may have to go on this, go on with this virtual classes but yes, like for this year I think, I don't know maybe whether I'm – you are getting my answer or whether I got the question. (xxx) this year, I haven't heard, there's no such thing about changing the strategy. This year, we will have the same strategy same, un, like a policy regarding running the physical classes through Ms teams only.

R: Un, hmm. Yeah, okay, yeah yeah, no, yeah, yeah, beacause=

ET2:   Maybe, if, if at all, yes sir.

R: Yeah, because we are talking about uncertainties, so we don't know, right, so and we're just talking about whether there is a conversation in school management team so that's fine. Then now let's focus on some benefits of using technology and later I will, you know, un, ask about your let's say plan to teach in the new normal situation. So first benefits, let's focus. What are the benefits of technology that you have found in teaching and learning when you use them in classrooms both in normal and in crisis settings?

ET2:   Un, okay, um, actually, use of technology itself is challenging, you know. If we know it right, we can do it better, do better, yeah? If we do not know how to use that particular technology, we may not we'll definitely better because we - if we don't know, we don't do it well. Un, so this technology that I have used or what I learnt and what I have been using in my classes actually have helped me modify my lessons, okay? Like sometimes, I simply have the discussion through the chat box and just to collect their responses. Sometimes I ask them, sometimes through PowerPoint presentation, I ask them do the things like shared what they

have learnt and sometimes through MS forms or Google forms and even through Mentimeter, so different technologies we are using online, yes? They participate, and then they participate you know, in very enthusiastic way when we give pro - handover the quiz or we ask them certain - we just put certain question on the floor and then they are - anyone is free to answer them. They participate. What I found here is that more participation is seen. Like let's not say 100% is sure like in the physical class what it used to be like was some student would simply say ma'am, I don't know and just put their heads down, yes? Now, at least they are responding. At least they are responding. Some they wish to turn their camera off. Some they wish to turn it on but however they are responding. This is the good side of the things, and we are you know in fact they are also learning the technology, we are also preparing them for the future because maybe the future - in future, they may just go for this digital learning or whatever. Maybe teachers are replaced by the technology, we don't know. They are somehow prepared for those unm, technology and then they are being more techno-friendly, and like the classes like the benefit, another benefit what I have seen is that we can encourage all the students like for example, okay role number 1, name? Aashika, you say this, Binaya, you say this, you use this. (xxx) keep on calling the students and then anyhow, they respond and then, we can you know, include all the students in our discussion to find out whether they are learning or nor, not and then they speak and they stay in touch with us. This is also one benefit because other means would not be possible at this time, and then the main thing, the main benefit of this what I found is that we can accessed latest information, and through different sources, we can - we can gain more information. Regarding the use of that particular app only, we are learning like in every 15 days time, or, or whatever in months time or every 3 months time, they update like this new features have been added in this teams, and the, you can use this. So we can use that also. We are also acquiring their latest information, un, we are, let's say updated for that, and then it even helps in assisting the students. Like they can anytime like we gave the - we give the due date for submission of the world and then within that time, they do work and they submit that, and then we can, un, assist them because it, it, it, the system keeps on keeping the record of their work even if we forget in our manual copy - to record in our manual copy or whatever. It remains there. From there also, we can say, oh yes, this particular student had submitted at that time only. He is quick to respond to my question, or my respond to the - respond to the teachers. We can know about that also. This is also the benefit I have seen with the use of technology.

R: Okay, great, and yeah, okay, we highlighted response - sorry the benefits so well, how about the challenges, un, that you have faced while using technology in your classroom both in normal and crisis settings?

ET2:   Yes, yes when there are opportunities, of course there are challenges. You know the are, maybe I don't know because we our Internet system is not that sound or maybe I don't know what is the thing because of you know this poor network and all this connection also, we are facing lots of challenges to have online classes. Like the main thing, main challenge of having, main challenges of online classes keeping the students safe during online classes, like the ones who do not keep on - turn on the cameras maybe they are, you know searching in different search engines and then watching the videos or reading something else or watching movie or whatever, they might be chatting with the friends that can also be the possible. So keeping students safe during the online classes one of the more you know, one of the challenges and then another thing is that yes again the students misusing the technology, like you know when you forget to set the meeting options, they become the presenter themselves in Microsoft Teams and then they start sharing the screen. This is also the challenge because they know some students are very much sound in this technology, they know better than us. And then misuse of technology is also there and then the thing I already call this limited accessibility, network connection, um, and then sometimes you know like I don't know you know it well and I want to assist you, you may not be available at that moment. So limited technical support can also be one of the challenges for the running of this online classes and the other thing is this digital competency, you know, and then, un,

R: Digital competency of whom? Digital competency of learner=

ET2:   =The user, user and learner, instructor and learner both.

R: … Can you also related it to parents as well? Do we need to have - because we are talking about yeah, probably we do=

ET2:   Sometimes, like, yeah, usually during the class hours, we don't need that regarding the parents but when we are having the meetings or so like somet- yes it so happens. I don't know this. This is informal however, like sometimes we said the classes and then, stu - and then we send some note, and then, it may, that notification may go in the parents' mobile also and they sometimes react, you know when this reaction is open for that, for the classes I allow it. I allow the students to put the reactions because they can express their views like they can give the applause or clap or love react or anything, and then sometimes studen, parents also happen to do and when we come why did you react this way to my - this chat? I don't know ma'am who did but it is done from you. I don't know whether because this app is open in my mother's mobile also, or my father's mobile also, so maybe they are using. It happens sometimes that is because of not having this knowledge, much knowledge or lack of digital competency.

R: Hmm, hmm, okay, so=

ET2:   =Like this is one case. There can be other as well. I just remembered this one. Umn (laughs).

R: Okay, yes, thank you, un, so we talked about challenges as well now let's, let's think of some strategies. Un, what strategies

do you think can be suitable to make effective use of technology in classrooms in both settings normal and emergency situations and you can think of the challenges which you told me earlier as well.

ET2:   …. So, un,

R: What do you think could be the effective strategies to mitigate those challenges or to have effective use of technology?

        (A brief break as the interviewee wants to have a brief break)

ET2:   So, sir I'm back all … so you, you were questioning about the strategies to use, un, or that is suitable for both online and

R: Yeah, strategies to use technology in classrooms in normal and in emergency or crisis situations.

ET2:   (2.0) Un, okay, sir, un,

R: Or just sorry, let me, let me reframe the questions because we can simply think of okay what strategies can you think to mitigate those challenges by the way, the challenges you mentioned? Or sometimes the strategies which can be effective to make use of technology in your classrooms in normal and in emergency situations? So particularly strategies to use technology, yeah.

ET2:   Yes sir, Wa, Wa, one first thing can be like previously what I said according to that, that reply. Like for this, to talk about digital incompetency regarding the teachers and students and even the parents, training session can be, training can be given to all those like, like how to operate and what, what is required for the teachers to take the classes, separate classes for teachers to be given. And similarly what to be used in the classes and what not to be used and how should they act and react in the classes tha, the students can be given the training separately. And even the parents what to do if at all such type of crisis may occur, how should they be prepared, this type of thing also can be – this, this one can be suitable for, you know, both for this online classes, virtual classes, and for normal classes like physical classes, we have – we often have the parents-teachers meet, and then we called the students' parents who like, like parents of the students who are really, let's say, I don't know whether to use this word or not troublesome or who need extra guidance, let's say. So we call the parents, they come, that is there. Parents meet and then training can be there, and then we can even like you know, where to minim- sorry, for to tackle with this situation, we can even take the students' and parents' pole. Sometimes we often do that. We take their poll and then they respond and accordingly, we can bring change in ourselves and then we can also suggest the students to do, like separately parents we check and then what they wish their child do and then what they cannot make do – what they cannot make their child do that we can indirectly tell the students to change if the pole is conducted that way also we can do, and then what are our shortcomings and what we- we are wheather the way we are teaching the pace and then the you know, content that we are teaching is suitable for them or not, they can also give feedback through the polls that also can be done and then we

can even like to know whether they have really understood the things that the teacher has delivering or they learned from the classroom participation. We can ask them, un, give a review through PowerPoint presentation or you know, in the form of any short of writing. They can express their views, they can like even this can be done even through mentimeter like we can ask the questions and then they can respond anonymously because their name is not seen there. It helps the teacher to get the feedback of the classes. So these strategies can be used and I am planning for teaching more vocabulary. Some vocab games let's say, we can gamify the lessons. Vocab games like you know crossword puzzles, online solving or even I'm not used this Kahoot myself alone but other friends, they assisted me even in the physical classes we did it. That is also one interesting strategies that can be implemented in classroom and these days, like we can - I can see in the walls of different English teachers and other teachers also, social teachers and many teachers that we can take the students to virtual tour also. Like I'm also thinking of taking the tour when I teach this unit 4 of grade 10 of my memories of my visit to France. There is one lesson that about one museum, un, Dr. Bhattarai, he went to visit the museum that way I can take a tour of the student to the museum that this - this is what I learnt and then you know, by - some by doing, some by listening to other, some by reading others. Un, I'm planning to change these things, and even for the physical classes when we go down this but now lets say, let's be hopeful like within 3 months, 4 months, 6 months or within a year, if we can have physical classes then we can go more techno-friendly classes like we can use more use of digital things there instead of just giving lecture and then asking them questions, and then this thing, we can display certain things and then ask the students to just respond on the particular topic. Let them share first and then only if the sharing is out of the track then we can guide them and we can give our responses. We can make much use of technology in the coming days.

R: Okay, so that was my question which you answered. I mean I, I kept in mind like you know, do you have -whether you have any plan, different plan to teach in new normal situation I mean post-Covid, so I think you answered just before, uh, right? Okay, so now we are nearly - we are at the end now, so I would like to ask couple of questions only. Number one, like have you set any classroom rules while teaching online and has school also set up any kinds of rules or hat school send any kind of circulation as well, so regarding yeah, online teaching. Could you just tell me?

ET2:   Yes sir, we had set the online do's and don'ts. This is done from school side also. For our convenience, we have set another rule also like same rules are like students should turn on the video and then they should turn on the microphone or raise hand before they speak and then they should wear school uniform. This is the - these are certain rules, among all, among others set by the school, and some rules we even modify

in the classes because if we just say you have to turn on the camera, maybe they do not do and if we say that okay, today these many students only turn on the camera, so they are getting one point for turning on the camera. And these, these, these, they were wearing the school uniform, they will get extra one point and next many will wear the school uniform and turn on the camera. There are the rules, some we modified. If we do not modify that way no , if we just say you turn you turn on your video, you turn on your this and they right in the chat, ma'am, due to technical glitches, I cannot turn on my microphone or video, and this type of comments they write. So we modify the rules, we have the rules set from schools side also from teacher side also. For different subjects, we do different things, and for this continual assessment, okay, and the way, we, we keep on monitoring them, and then through, if we do not set the rules then, they do not. un, you know, perform as expected. So we make the rules and always we, we end up with the mark. saying marks There's marks. Certain marks allocated for this particular things, we say and for the sake of marks, they do that. And this is a kind - this is really, you know helping us to hook the students.

R: Un, okay, so, okay, you also brought the, you know, yeah, you also brought the element of continuous assessment as well, so do you mean to say the assessment pattern or format has been changed as well in the online teaching?

ET2:   Un, yes, sir. Like what we have done is like we - for grade 9 and 10 to talk about grade 9 and ten, we follow SEE format for que - un this, all this, after (xxx) students but in this online classes, we have modified, instead of going for 75 full marks pape - un, written paper. We have gone for 50 Marks and 25 marks for continual assessment. We assess them on their regularity, punctuality, their submission of work, again regularity punctuality (xxx) whether they are regular to the classes or not, they are regular to some submit their work or not whether they turn on the camera. If they don't turn on the camera, you know they may be doing other things there, like instead of listening to the teacher, they may be playing there or they may just login and go somewhere else, so there can be such chances just to avoid those possibility we ask them to turn on the camera, and then like previously I said if we don't say marks, they will not do. For the sake of marks, they do everything the teachers asked, um, we do that (xxx)and then we evem assist them on their attendance, I said. Attendance, regular - attendance and their punctuality, okay? whether there punctual for the classes or not, whether they just come at the end of the class and then they the teacher takes attendance, he or she is in present, the rest of 40 minutes is absent, five minutes only is present. we check that because we can download the attendance also what time and for how long did he or she stay in the class, we can see him Teams. We do that - we continually assess the students through all these things, Sir.

R: Okay, so according to your general survey, what devices do students use? Do they have their own devices or do they rely on, parents=

ET2:   = yeah, you asked the question that I, you know that in this class, the very first day, I asked and just for my understanding because in the later days, they would say ma'am, my camera is not working. I don't have a laptop. I, I'm sorry, I don't have a mobile phone, I have laptop. I'm using this and that PC and this thing, so I cannot turn on camera so for that only, I have kept the record on the very first day without letting them know what I would ask them later. asked them and most of the students, they used mobile devices sir. And let - only few students, they use like in a class, let's say, let talk about, let's talk about 10 E, for example, informal count, 1, 2, 3, 4, 5, 6, 7, 8. 8of the students, out of 41, they use laptop, and then 2 of the students, you see here I'm written this, desktop and mobile means D & M and then M&L means 2 of the students out of this 41, 8 of them have laptop and then 2 of them, they have both the devices, their own personal mobile plus, the laptop also they are provided and other students they use mobile phones only I have kept the record I just told you about one section but I have taken the record of all the classes because later on they say my video is not on because of using its old PC and this so that record I have kept. Most of them used mobile device and then smart phones and iPad like that.

R: Okay, oh god it seems like most of the students used mobile devices so un, and have you also tried to - you know carry out survey in relation to the devices whether they belong to themselves or they- they use their parents devices? For example, there can be significant difference right, I mean, in terms of learning=

ET2:   =Yes, it matters, yes sir, it matters because if it is their own, they keep on hanging with that only he he (laughs) if parents take on the correct - after the correct particular time then, they - there is chances of using this device, so in fact I am more asked that way like you asked but most of the students because they say that he called me in this number, she called me in this number like when informally we talk with the students what I found is that most of them they have been provided with mobile phone because parents go out for work and they are in the nuclear family and then just to keep in con - be in contact with the children, they provide the mobile phone 1 phone - 1 common phone actually that is - that is the common mobile phone for home but students they use as if that is their own.

R: Okay, so, again because this probably we don't, we may not know but still because you have been teaching for quite a long time, what do you think about the quality of devices? Is that okay to have teaching and learning online or the devices that they are having - the mobile devices they are having in general, what do you think or yeah.

ET2:   Hun, Hun, in fact, you know, these, the students those who use thes smartphone, their smartphones are really smarter ones. They use the latest technology. Most of them they said that ma'am, Mama brought from US, my uncle brought it from Dubai, my phalano brought from this country and that country. They have the smartphones, maybe because that's the boarding school. I taught in that public college also, the students used to have just common phone just for the purpose of making and receiving the calls and then if at all calculating and other things, they used to have. And then these students in boarding schools, they, most of them, they have as I said smarter phones like you know, advanced mobile phones and mobile devices, un, so which have the features which are more features than the old version of laptop, so they are you know, technically assisted and that is really working well for taking the classes and then doing their work.

R: Hun, okay, thank you, now, uh, yeah, how about you, you, how about yours using you know, like you know, devices that you use? Un, what do you use, your laptop, mobile and desktop?

ET2:   last year I used, throughout the year, I use an iPad and this year and then what would happen was while sharing the screen, my video would stop and again I would be asked why the teacher turn off the video while taking the class and what do they expect from the students in that class and such things came you know, and then I was trying to convince and then I can't, it was a kind of you know, difficulty for me. So I changed it, and this year, I'm using this laptop Sir.

R: Ah, okay, so yeah, okay=

ET2:   =I changed screen, my video is also on
        (Both laughs)

R: So great to learn, one final question and will wrap it up, which is again (xxx), it would be I guess kind of repeating as well but okay, if yeah, if if you have anything new then, please do share. So the question is what is your plan in future, like you know, how will you normally get engaged in teaching and learning in future after let's say COVID gets over?

ET2:   (2.0) Hum, after cay - COVID gets over or how, how, how I engage

R: In teaching and learning. How will you teach by the way? Okay, simply to make it more sim, simple like you know, will there be any change or?

ET2:   Of course, yes, because, now when we go for the, like you know, in between also, we had three months of physical classes like last year in the last session, we had three months almost 3 months of physical session, and that physical session was different than the, um, you know, pre-COVID classes. Like, wha, this you know, keeping students more engaged and then you know, having more discussion in the classes like strategy of changing this teaching strategy, pedagogy only was changed. What I felt myself you know like here, we ask them to interact more where there in physical class, we would interact more with the students. That would - that used to happen previously, but

now, now because we have to keep students engaged in the classroom here, to make sure that they are in class, they are engaged orally here or through their writing here, we - I did the same way in that physical class, so next time when we have more freedom, we - when we have physical classes then definitely, they will have un, un, different strategy of teasing - teaching and then I will, me even incorporate more technology in the classes then we used to do before, un, that there will be obviously more changes Sir.

Appendix C3: Segmentation, annotation and transcription of SC1SCO1 (Sample)

Sequences	Common time code	Transcription of spoken interactions	Sub-activity/Action sequences	Sequences description	Artefacts
Socializing and greetings	00:00:03.245 - 00:01:42.934		Socializing and greetings TC: 00:00:03.245 - 00:01:42.934	ST1 and pupils greet each other. TC: 00:00:03.245 - 00:01:42.934	A webcam and mic used by the teacher, and a mic used by pupils TC 00:03:39.524 - 00:03:39.459
	00:01:43.016 - 00:03:39.459		Waiting for pupils to join 00:01:43.016 - 00:03:39.459		
Discussing how to use technological tools	00:03:39.524 - 00:06:00.327	ST1 *'Anupa, the one I have sent to you with my comments?' Pupil 'Yes ma'am' ST1 'It was in the Google classroom, did you find it?' Pupil 'Yes, found it, I found it too' (Pupil B) ST1 'Really?' Pupil xxx ST1 'Sorry?'	Discussion on how to use technological tools TC 00:03:39.524 - 00:06:00.327	ST1 discusses how her pupils can take pictures of their tasks using mobile and send them to her in a Google drive. TC 00:03:39.524 - 00:06:00.327	A webcam and mic used by the teacher, and a mic used by pupils TC 00:03:39.524 - 00:06:00.327

		Pupil The comments you had written?			
		ST1 'Yes, did you understand them?'			
		Pupil 'Yes, we got them'			
		ST1 'I found your a little bit blur, Anupa. I couldn't understand there and couldn't go through your work properly'.			
		Pupil 'Oh, okay, ma'am.'			
		ST1 'I have also shared slides there, so please read them, okay? '			
		Pupil(s) 'Okay ma'am (Pupil A and B), ma'am xxx'			
		ST1 'Which one?'			
		Pupil xxx			
		ST1 'Which one, I could not understand what you say.'			
		Pupil 'of unit 17 - no, no, unit 16.'			
		Pupil 'As you told my work is blurred when I sent the photographs, do I need to send that or not?'			

		ST1 'No need to send. Now on, when you send your homework, you have to make sure the pictures that you capture of your work is clear, make sure the pictures that you capture of your work is clear, okay?'			
		Pupil(s) 'Okay ma'am' (Pupil A and B)			
		ST1 'There has to be a proper light. You need to concentrate a little bit when you take picture from your mobile.'			
Discussion around previous lessons	00:06:30.784 - 00:06:54.770	Pupil 'Ma'am, in human digestive system, describe the digestion of food that occurs in human stomach.'	Discussion around previous lessons TC 00:06:30.784 - 00:06:54.770	One of the pupils asks about human digestive system. TC 00:06:30.784 - 00:06:54.770	A webcam and mic used by the teacher, and a mic used by pupils 00:06:30.784 - 00:06:54.770
		ST1 'Did you read that, did you read that ?'			
		Pupil 'Yes, ma'am?'			
		ST1 'Did you read that or not?'			
		Pupil 'I read that unit but this is the exercise which I did not know.'			
		ST1 'Ye, okay, I will help to do that later.'			
	00:06:55.000 - 00:08:18.852		Waiting for students to join TC 00:06:55.000 - 00:08:18.852		

Preparing to begin a lesson	00:08:40.500 - 00:10:11.300	ST1 'Okay, now, let's start the class okay, you are altogether 60.'	Preparing to begin a lesson TC 00:08:40.500 - 00:10:01.723	ST1 runs slides. TC 00:08:40.606 - 00:09:32.278	A webcam and mic used, and PowerPoint slides shown by sharing a screen by the teacher. TC 00:08:40.606 - 00:09:32.200
		ST1 'Okay, switch off the microphones that are turned on, okay. Only switch them on when you ask questions.'			
		Pupil(s) 'Okay ma'am' (Pupil A and B)			
				ST1 admits pupils in the class. TC 00:09:36.393 - 00:09:57.540	
		ST1 'Is the slide being presented?'	Basic technology checks TC 00:10:01.723 - 00:10:08.409	ST1 checks if her slide could be seen by her pupils. TC 00:10:01.723 - 00:10:08.409	A webcam and mic used, and PowerPoint slides shown by sharing a screen by the teacher, and a mic used by pupils TC 00:09:32.200 - 00:10:02.100
		Pupil(s) 'Yes ma'am' (pupil A and B)			

Teacher's presentation	00:10:08.459 - 00:38:37.100	ST1 'Okay, now we will study about a nose. Do you know what functions does a nose carry out?'	Pupil teacher interaction TC 00:10:08.459 - 00:38:37.100	ST1 explains the parts of a nose by moving the cursor. TC 00:11:03.857 - 00:12:04.900	
		Pupil(s) 'Yes, we know them.' (Pupil A and B)			
		ST1 'What does it do?'			
		Pupil(s) 'I know, it smells' (Pupil A). 'It finds the smell' (Pupil B).			
			Explanation of terms and/or concepts by a teacher TC 00:10:33.284 - 00:12:05.100	She explains the functions and parts of the nose. TC 00:10:33.284 - 00:12:05.100	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - Pictures of a nose and some colourful texts) TC 00:10:02.100 - 00:13:00.600
	00:12:05.245 - 00:12:15.738	ST1 Who is coming? I have to connect your friend here.		ST1 admits pupils in the class. TC 00:12:05.245 - 00:12:15.738	
		ST1 'What is the Nepali term for Cartilage? 'Kurkure Had. It is made up of Kurkure Had. The upper part is connected to the frontal bone.'	Explanation of terms and/or concepts by a teacher TC 00:12:21.573 - 00:13:08.032	ST1 uses her cursor to point out nasal bones. TC 00:12:22.885 - 00:12:45.400	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide -Pictures of nose and some colourful texts) TC 00:10:02.100 - 00:13:00.600

		Pupil 'Kurkure Had'		One of the pupils is asks what is the page number in the chat box. 00:12:45.536 - 00:13:00.700	Chat
				Other pupils are answer her in the chat box. TC 00:13:00.900 - 00:13:09.852	Chat
				ST1 admits pupils. TC 00:13:09.978 - 00:13:16.195	
Teacher's presentation			Explanation of terms and/or concepts by a teacher TC 00:13:22.114 - 00:38:37.100		A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Pictures of external nose with labels and some colourful text) TC 00:13:21.939 - 00:13:58.500
				ST1 explains internal part of a nose by pointing out the internal parts in the picture. TC 00:13:58.968 - 00:15:25.900	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - Pictures of internal parts of a nose) TC 00:13:58.800 - 00:15:25.900

	00:13:22.114 - 00:38:37.100	ST1 'I have shown that part. Okay, this is the part shown here. About this, the main function is to smell which is from this part. We know the smell from this part.' So it is called olfactory region. This part is called olfactory region. This part.		ST1 uses a laser pointer available in PowerPoint slides. TC 00:15:26.100 - 00:15:26.200	A webcam, mic used, a red laser pointer available on PowerPoint used, pictures, and colourful texts on a slide was shown by sharing a screen TC 00:15:25.900 - 00:23:34.900
				ST1 uses a laser pointer to point out different parts of a nose and explains their functions. TC 00:15:26.100 - 00:15:26.200	
				ST1 explains internal parts of the nose by pointing each part through a red laser pointer. TC 00:19:23.500 - 00:20:16.700	
				ST1 reads English text given on the same slide and explains internal parts of a nose. TC 00:20:16.934 - 00:20:25.606	
				ST1 uses laser pointer to guide learners to the specific part of the figure and some texts. TC 00:20:34.300 - 00:21:11.100	

				ST1 explains functions of a nose by showing the slide that has colourful texts and the pictures of internal parts of a nose. TC 00:21:41.296 - 00:22:03.500	
		ST1 'There is hairlike projection in olfactory region. This kind of hair is there, which is also called olfactory hair. Like this, there is hair. Like hair. We call them olfactory hairs.'		ST1 points out a hairlike projection in both pictures given on the slide with the help of a red laser pointer. TC 00:22:29.623 - 00:22:43.800	
		ST1 'Okay, we have some questions. For example, the capacity of olfaction decreases when one suffers from common cold, give reason. Olfaction decreases meaning what does olfaction mean? Olfaction means the process of taking the sense of smell through nerves to brain.'		ST1 presents questions and answers related to the topic. TC 00:23:55.655 - 00:25:48.360	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Colourful texts) TC 00:23:35.456 - 00:25:47.800
		Pupil 'bringing to the brain'			

		ST1 'It is olfaction. There are olfactory cells which sense and those senses are taken to the brain by nerve and this process is called olfaction. The capacity of olfaction decreases when we get cold. We get less smell when we are suffering from cold. It says to give reason for that. The question says that the capacity of olfaction decreases when one suffers from common cold, give reason.'			
		Pupil(s) xxx			
		ST1 'It can't reach there.'			
		ST1 'Here is mucus membrane. Here is mucus. Look at here. What is here? In this part, there is mucus membrane. When mucus membrane is swollen, it blocks the smell. As it cannot go further, what happens? We just sense a little bit. What happens during the time of cold, this gets swollen and it obstructs the smells.'		ST1 points out different parts of a nose with a cursor and explains why olfaction decreases during common cold. TC 00:25:51.00 - 00:26:37.213	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Pictures of internal parts of a nose and colourful texts) TC 00:25:48.502 - 00:26:40.800
		Pupil 'It stops.'			
		ST1 For this region, we cannot know during other times.			
		Pupil It can't			

					A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Colourful texts) TC 00:26:41.396 - 00:38:37.000
		ST1 'Compared to normal times, when we are suffering from cold, we smell less.' Due to this, smell does not reach inside the olfactory nerves and we cannot detect it. So we cannot smell the things and do not ge...			
				ST1 explains questions related to functions of hair of the nose. TC 00:27:03.582 - 00:28:53.590	
		ST1 'Who will read this care and protection of the nose?'	Asking a pupil(s) to read TC 00:28:58.672 - 00:29:29.400	ST1 asks pupils to self-select to read the given text related to care and protection of the nose. TC 00:28:58.987 - 00:29:10.775	
		Pupil 'May I read?'			
		Pupil 'Ma'am, shall I read?'			
		ST1 'Okay, those who have not read regularly will read today. Who are there who haven't read it. Those new ones, please read it.'			
		Pupil 'Ma'am, I will read.'			
		ST1 'Okay, you will read.'			

		Pupil 'Ma'am, I will read'			
		ST1 'Okay'			
		Pupil Care and protection of the nose			
		ST1 'It has some questions. Look at the options and you will say an answer. Okay. one of you read the question.'	Pupil teacher interaction TC 00:29:59.745 - 00:38:36.700	ST1 asks pupils some questions about care and protection of the nose. TC 00:30:16.622 - 00:38:37.000	
		Pupil What are the important organs of the body which connected us to the external world?			
		ST1 'Okay, who knows the answer to this question?			
		Pupils Ma'am, organs of head (pupil A), ma'am no (pupil B), organs of head (pupil C)			
		ST1 'Haha, okay', what are the important organs of the body which connected us the external world?			
		Pupil 'Shal I, ma'am?'			
		ST1 'Okay, say, who will say?'			

		Pupil(s) xxx			
		ST1 'Who said the sense organs?'			
		Pupil 'I said'			
		ST1 'Okay, those who said sense organs are right'			
		ST1 Okay, now we will go for tongue.'			A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Pictures of a tongue) TC 00:38:39.100 - 00:38:48.600
Introduction to a new topic	00:39:05.047 - 00:49:36.370				A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Picture of tongues and colourful texts) TC 00:39:14.900 - 00:43:26.000

			Explanation of terms and/or concepts by a teacher TC 00:40:14.300 - 00:46:11.500	ST1 reads the text which is in English. TC 00:40:14.646 - 00:40:21.743	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- A picture of a segmented tongue to indicate different test) TC 00:43:30.500 - 00:47:14.300
				ST1 uses a cursor to point out different parts of a tongue and the text while describing a tongue. TC 00:40:22.049 - 00:43:27.737	
				ST1 explains different parts of a tongue by showing a picture that has segmented tongue to indicate different test receptors. TC 00:43:28.459 - 00:46:15.622	
		Pupil 'Is it that the part of the tounge that has sweet buds can't detect whatever sour we eat?'	Pupil teacher interaction TC00:46:12.393 - 00:47:04.200	A pupil asks a question if the sweet receptor can sense the sour taste. TC 00:46:15.678 - 00:46:22.278	

		ST1 'Yes, we feel that we know from all parts, but we know first from this part. When we eat, the food gets wet and liquid flows all over.'		ST1 shows the division of a tongue in a figure with the cursor. TC 00:46:22.469 - 00:47:15.568	
			Explanation of terms and/or concepts by a teacher TC 00:47:23.400 - 00:49:30.600	ST1 explains where different test receptors are by showing a picture of a tongue which is connected to the brain through nerves. TC 00:47:23.196 - 00:49:32.262	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- A picture that has a tongue through nerves and some colourful texts) TC 00:47:26.500 - 00:49:30.900
				ST1 asks if there is any other classes after her class. She plans to complete the lesson if there is none. TC 00:49:36.393 - 00:49:43.192	
Teachers' presentation	00:49:43.228 - 00:52:51.700		Explanation of terms and/or concepts by a teacher TC 00:49:43.228 - 00:50:28.900	ST1 deals with care and protection of a tongue. TC 00:49:43.242 - 00:50:20.360	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Colourful texts) TC 00:49:35.980 - 00:50:18.500

			Pupil teacher interaction TC 00:50:31.100 - 00:52:54.000	ET2 asks some questions related to a tongue. TC 00:50:30.496 - 00:52:53.885	A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - A picture of a segmented tongue and some colourful texts.), and a mic used by pupils. TC 00:50:26.100 - 00:51:19.100
					A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - A Picture of a tongue connected to brain through nerves and some colourful texts) TC 00:51:26.201 - 00:51:56.800
					A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - A cursor, a picture of a segmented tongue and some colourful texts.) TC 00:51:57.793 - 00:52:10.900

					A webcam, mic and a cursor used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - A picture of a segmented tongue and some colourful texts.)TC 00:52:11.666 - 00:52:51.700

Details of the session

Unique identifier for a classroom recording	School	Teacher	Subject	Class	Topic of a class	Platform used	No of pupils	Duration	Date	Time (IST) 24 hour clock
SC1SCO1	SC1	ST1	Science	9	Nose and tongue	Google Meet	65	53:09:00	Dec 10, 2020	09:15:00 - 10:08

Appendix D: Sample coding of classroom observations, focus groups and interviews

Codes	Extracts
Affordances of using technology for teaching and learning	
Educational affordances	
Bringing variety to lesson delivery	Files\\Classroom Observation\\English Classroom\\SC2ECO2 - § 4 references coded [23.29% Coverage] Reference 1 - 3.01% Coverage Seq: Playing a video clip CTC: 00:13:08.000 - 00:19:23.571 A/AS: Playing a video clip A des: ET1 plays a video related to 'preposition of place' but the learners cannot see anything. Only after some time, the picture appears in the clip. TC: 00:13:07.676 - 00:13:43.705 Reference 2 - 7.43% Coverage ET2: Okay, so everybody let's look at here. The preposition of place and then related with the preposition there are some pictures, everybody? So, I hope, un, through these pictures, you can get the idea of this preposition of places here, okay? We are not talking about the time and then we are not talking about movements and we are talking about only the place here. And then look at here where these actually these cats are here and then the position of the cats also just shown here through that the box and then the cat here. And the prepositions also. Look at here at, on, in, from, above, below, over, under, beside and next to. And then look at the first, look at in that the first picture, where is the cat? The cat is in the box. And in the second picture on the box A/AS: Explanation of a concept(s) by a teacher TC: 00:19:43.900 - 00:21:45.600 T/A: A picture of a cat sitting at different positions and the box is the reference point. 00:20:43.400 - 00:23:31.600 T/A: A mic used by a teacher and students, and a picture of a cat sitting at different positions and a box is a reference point. TC: 00:20:43.400 - 00:23:31.600 Reference 3 - 8.27% Coverage ET1: In the next slide, you can see some examples of preposition of places here. So, un, yes, look at here and everybody, I will like all of you please take the screenshot of the uses of, un, preposition of place here. Okay, so from here, indicating the point in space in time at which a journey or motion or action starts. The boy walked from his school to home and sorry above in extended space over and not touching at that time, we use above, for example, birds are flying above the sky, and below, when things are not directly, un, under another, then at that time we use below means something is below the table or let's say my book is below the table. Below 'means there is a difference between below and under, okay? What do you think is the difference?' Anybody can you tell me? What's the difference between below and under? 'Even though both indicate under something, can you tell me what kind of under? A des: ET1 asks the learners to take screenshots of this slide. This slide descries the uses of prepositions of location. TC: 00:30:56.300 - 00:31:05.800 Arts: A mic used by a teacher and a pupil, and a table in the slide that shows examples and use of prepositions of location 'above', 'below', 'under', 'over' etc. TC: 00:30:45.034 - 00:34:21.300

Codes	Extracts
	 Reference 4 - 4.58% Coverage Seq: Playing a video clip CTC: 00:37:24.311 - 00:39:31.643 A/AS: Playing a video clip TC: 00:37:24.311 - 00:39:31.643 A des: ET1 shows a video clip related to preposition of time. TC: 00:37:23.969 - 00:39:31.588 T/A: A video that explains preposition of time. TC: 00:37:23.969 - 00:39:31.588 Seq: Teacher's presentation CTC: 00:39:31.928 - 00:42:15.300 ET1: Okay, right now, have just watched that the small video related with the prepositions of time. So now, could you please tell me, un, or let's say just remember the slide or this video and tell me that the preposition of use of in where actually we use in. Right now, we are not talking about place, we are talking about time, okay? Files\\Classroom Observation\\English Classroom\\SC2ECO3 - § 4 references coded [23.67% Coverage] Reference 1 - 1.80% Coverage Seq: Teacher's presentation CTC: 00:02:38.109 -00:14:04.000 A/AS The teacher showing the slide. TC: 00:03:50.429 - 00:04:09.952 A des: ET1 is showing the slide related to preposition of time. TC: 00:03:50.429 - 00:04:09.952 A des: ET1 is showing a slide which has a table that incorporates prepositions, explanation and examples. TC: 00:04:20.720 - 00:05:22.410 Reference 2 - 2.46% Coverage Seq: Playing a video CTC: 00:14:27.197 - 00:16:01.355 A/AS: Playing a video TC: 00:14:26.920 - 00:15:16.355 A des: ET1 plays the video related to preposition of direction. TC: 00:14:26.920 - 00:15:16.355 T/A A video related to prepositions for direction TC: 00:14:27.004 - 00:16:01.444 A/AS: ET1 is explaining prepositions of direction. TC: 00:16:19.226 - 00:17:13.133 A/AS: ET1 is asking if students have any confusion regrading prepositions of direction. TC: 00:17:13.483 - 00:17:28.311 Reference 3 - 1.92% Coverage A des: ET1 shows different pictures (Pictures of a ball placed at different positions in reference to the object(s)) to explain preposition of movement. TC: 00:28:21.903 - 00:31:22.289 T/A: A mic used and PowerPoint slide shown by sharing a screen by the teacher (PPT slide - Pictures of a ball and different objects to clarify preposition of movement) TC: 00:27:03.239 - 00:28:31.911 Reference 4 - .....% Coverage ET1: Let's look at here the topic. Preposition of movements. Everybody, here are some

Codes	Extracts
	pictures and then some words, some group of the words which one is the preposition of movements are given here and what you have to do. You have to write down these words in the correct box looking at the picture and the arrow that actually where does this, let's say this 'along' in which box this 'along' is the suitable place. Just you have to put there and I already told I will keep this one in a MS Team and then please find out this one and write in this question answer. Oh sorry, not question answer, fill in the blanks. Okay everybody, please do this one. Un, we do not have a time. That's why, un, I did not talk much here. Okay, um, A/AS: A teacher is giving a task TC: 00:38:58.500 - 00:39:33.900 A des: ET1 gives a task such as 'Fill in the blanks' related to preposition of movement. TC: 00:38:58.500 - 00:39:33.900 T/A: A mic used and PowerPoint slide shown by sharing a screen by the teacher (PPT slide - pictures related to some prepositions of movement and a list of prepositions of movement which pupils have to relate to the picture. TC: 00:38:59.084 - 00:39:57.292 Files\\Classroom Observation\\English Classroom\\SC3ECO1 - § 1 reference coded [17.24% Coverage] Reference 1 - 17.24% Coverage OS: Warm-up exercise CTC: 00:02:18.681 - 00:18:56.090 A/AS: Engaging pupils in a warm-up exercise TC 00:02:18.681 - 00:18:56.090 SD: ET2 states that they will do a quick activity and she prepares to screenshare the activity the pupils are supposed to do. TC 00:02:18.961 - 00:02:46.769 Arts. A webcam and mic used by the teacher TC 00:02:18.961 - 00:02:46.769 SD: ET2 shares the Mentimeter link in the chat box. TC 00:03:08.272 - 00:03:30.596 Arts: A webcam and mic and chat option used by the teacher SD: ET2 shares the screen of Mentimeter and she checks the pupils who are in the Mentimeter in her mobile phone. TC 00:03:33.532 - 00:04:05.530 Arts.:A webcam and mic used, mentemeter white screen shown by the teacher TC 00:03:34.979 - 00:03:59.615 Arts.: A webcam, mic and cell phone used, Mentemeter white screen shown by the teacher TC 00:03:59.940 - 00:04:05.520 Arts.: A webcam and mic used, mentemeter white screen shown by the teacher TC 00:03:34.979 - 00:03:59.615 SD: ET2 asks the pupils to respond quickly.TC 00:04:48.346 - 00:05:17.961 SD Pupils complain that the screen is not visible. TC 00:05:18.325 - 00:05:39.576 Arts.: A webcam and mic used, Mentemeter white screen shown by the teacher TC 00:04:05.961 - 00:05:43.923 Arts.: A webcam and mic used, Mentemeter white screen shown by the teacher TC 00:04:05.961 - 00:05:43.923 ET2 Okay, leave it. So, I will share it again. Don't worry! So but you follow the link, you do the Pupil Came. came. ET2 Was it there? Pupil Bar graph came. Bar- bar Students are complaining that the screen is not visible. TC 00:05:18.325 - 00:05:39.576 ET2 Un, yes, I was showing that only. Let me once try it. Okay. There's only for two not for other two options. You are taking too long now. I think I will have to start the countdown. You've only one minute okay? Arts.: A webcam and mic used, bar diagram shown by the teacher

Codes	Extracts
	TC 00:05:56.499 - 00:06:13.307 Student(s) Okay ma'am Arts.: A webcam and mic used, bar diagram and timer shown by the teacher, and mic used by a pupil TC: 00:06:13.576 - 00:06:22.097 ET2 17 responses out of how many students? Out of 34 students. Not 34, 33. It's including me 34. SD: ET2 tracks time by starting the count down available in Mentimeter. TC 00:06:48.973 - 00:06:53.364 Arts.: A webcam and mic used, bar diagram and timer shown by the teacher, and mic used by a student TC 00:06:22.621 - 00:07:24.538 ET2 So maximum vote was there for nostalgic tone, right? Now, let me ask you one question. Files\\Classroom Observation\\English Classroom\\SC5ECO2 - § 1 reference coded [6.39% Coverage] Reference 1 - 6.39% Coverage Seq: Playing a video CTC: 00:03:50.577 - 00:05:59.088 A/AS: Playing a video TC: 00:03:50.544 - 00:05:59.111 A des The teacher briefly tells what the video is about such as the boy was sold to sweep the chimney by his father when he was young. TC: 00:05:59.195 - 00:06:06.203 Arts: A video is seen on all screens TC: 00:03:50.555 - 00:05:59.044 Files\\Classroom Observation\\Science Classroom\\SC1SC01 - § 3 references coded [14.01% Coverage] Reference 1 - 1.01% Coverage A des: ST1 explains functions of a nose by showing the slide that has colourful texts and the pictures of internal parts of a nose. TC: 00:21:41.296 - 00:22:03.5 Reference 2 - 1.92% Coverage A des: ST1 uses a cursor to point out different parts of a tongue and the text while describing a tongue. TC: 00:40:22.049 - 00:43:27.737 A des: ST1 explains different parts of a tongue by showing a picture that has segmented tongue to indicate different test receptors. TC: 00:43:28.459 - 00:46:15.6 Reference 3 - 11.08% Coverage Pupil: 'Is it that the part of the tongue that has sweet buds can't detect whatever sour we eat?' A/AS: Pupil teacher interaction A des: A pupil asks a question if the sweet receptor can sense the sour taste. TC: 00:46:15.678 - 00:46:22.278 ST1:'Yes, we feel that we know from all parts, but we know first from this part. When we eat, the food gets wet and liquid flows all over.' A des: ST1 shows the division of a tongue in a figure with the cursor. TC: 00:46:22.469 - 00:47:15.568

Codes	Extracts
	A/AS Explanation of terms and/or concepts by a teacher TC: 00:47:23.400 - 00:49:30.600 A des: ST1 explains where different test receptors are by showing a picture of a tongue which is connected to the brain through nerves. TC: 00:47:23.196 - 00:49:32.262 Arts: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- A picture that has a tongue through nerves and some colourful texts) TC: 00:47:26.500 - 00:49:30.900 ST1: 'How do they (the test receptor) know, where it goes? Bitter is in this part, sour is at back, salty is in this part and sweet here.' This is how it was shown earlier.' When a chemical of a substance dissolves, Substance 'means the food that we eat, and chemical substance means the food we eat. What happens to them? They get mixed with saliva. Mucus membrane produces saliva and they will'. When the chemical of a substance dissolves in the saliva, the dissolved chemicals stimulates taste receptors and later on the nerve fibers carry the taste sensation to the brain. Hence we get the real taste of the substance. 'Here the fluid will be produced which is called saliva which is produced by mucus membrane. What has this fluid? This fluid is dissolved with the food that we eat.' Files\\Classroom Observation\\Science Classroom\\SC1SC02 - § 3 references coded [9.32% Coverage] Reference 1 - 4.61% Coverage ST1: 'Please tell me what is happening,' Pupil(s): Small and big (student A), the black part is getting smaller and bigger (student B), the black eyeball is contracting and (Student C) ST1: Which one is contracting and expanding? Pupil(s): Ma'am xxx ST1: What do we call for the middle part of the eye? Just a second. A/AS: Teacher asking a student(s) a question(s). TC: 00:06:29.833 - 00:07:20.666 ST1 discusses a question why seats are not seen as soon as we enter a dark room from a bright area. TC: 00:06:29.833 - 00:07:20.666 T/A: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - GIF of an eye and colourful texts), and a mic used by students TC: 00:06:28.277 - 00:06:51.108 Reference 2 - 3.34% Coverage Pupil: Ma'am, which one is retina? ST1: It is called iris. What do we call it? ST1: 'What do we call the external one? We call it iris. Iris is getting contracted and expanded, right? This one, when it is contracted, pupil is getting smaller, right? When it is expanded, what happens. Look into the eye there. What is happening to the eye? The same thing happens when you go from sun-lit place to your room, you cannot see the things in the room properly.' Reference 3 - …% Coverage SD: She asks a question why people get dizzy when spinning. TC 00:12:22.405 - 00:12:46.054 Arts: A picture of internal ears and colourful texts. TC 00:12:32.783 - 00:12:51.567

Codes	Extracts
	A/AS: Explanation of terms and/or concepts by a teacher TC: 00:12:46.243 - 00:14:06.243 A des: She asks why people get dizzy when spinning by pointing at internal part of an ear. TC: 00:12:53.000 - 00:13:26.239 Files\\Focus Group Discussions\\TFGD - § 2 references coded [0.50% Coverage] Reference 1 - 0.31% Coverage अर्को कुरा त जस्तो अभ्यासहरू, अरु ठाउँमा भएका अभ्यासहरू त्यही poemलाई अर्को teacher ले कसरी पढाएको छ त, हैन, त्यो हामीले YouTubeबाट download गरेर छोटो छोटो clip देखाँउदाखेरी, अनी variety पाउने रहेछ **Translation:** The other thing is that, for example, when we showed them short YouTube video clips that other teachers have prepared while teaching the same poem, it brought variety in the classroom. Reference 2 - 0.20% Coverage त्यस्तै चाहिँ classroomमा चाहिँ विविधता ल्याउने कुरा, variety create गर्ने कुरा पनि यल्ले गर्‍यो र more resourceful हुने रहेछ, **Translation:** [ICT] it also brought variety in the classroom. It has been more resourceful. Files\\Interviews\\ETC:KAIETT2I - § 1 reference coded [0.45% Coverage] Reference 1 - 0.45% Coverage Yes, they have everlasting impression on their mind that they cannot forget the things they learnt through visual presentation, visual presentation. Files\\Interviews\\SC3ET2Idocx - § 1 reference coded [1.82% Coverage] Reference 1 - 1.82% Coverage Un, okay, um, actually, use of technology itself is challenging, you know. If we know it right, we can do it better, do better, yeah? If we do not know how to use that particular technology, we may not we'll do definitely better because we - if we don't know, we don't do it well. Un, so this technology that I have used or what I learnt and what I have been using in my classes actually have helped me modify my lessons, okay? Like sometimes, I simply have the discussion through the chat box and just to collect their responses. Sometimes I ask them, sometimes through PowerPoint presentation, I ask them do the things like shared what they have learnt and sometimes through MS forms or Google forms and even through Mentimeter, so different technologies we are using online, yes?
Clarifying terms and concepts	Files\\Classroom Observation\\English Classroom\\SC2ECO2 - § 2 references coded [15.48% Coverage] Reference 1 - 7.43% Coverage ET2: Okay, so everybody let's look at here. The preposition of place and then related with the preposition there are some pictures, everybody? So, I hope, un, through these pictures, you

Codes	Extracts
	can get the idea of this preposition of places here, okay? We are not talking about the time and then we are not talking about movements and we are talking about only the place here. And then look at here where these actually these cats are here and then the position of the cats also just shown here through that the box and then the cat here. And the prepositions also. Look at here at, on, in, from, above, below, over, under, beside and next to. And then look at the first, look at in that the first picture, where is the cat? The cat is in the box. And in the second picture on the box A/AS: Explanation of a concept(s) by a teacher TC: 00:19:43.900 - 00:21:45.600 T/A: A picture of a cat sitting at different positions and the box is the reference point. 00:20:43.400 - 00:23:31.600 T/A: A mic used by a teacher and students, and a picture of a cat sitting at different positions and a box is a reference point. 00:20:43.400 - 00:23:31.600 Reference 2 - 8.05% Coverage ET1: In the next slide, you can see some examples of preposition of places here. So, un, yes, look at here and everybody, I will like all of you please take the screenshot of the uses of, un, preposition of place here. Okay, so from here, indicating the point in space in time at which a journey or motion or action starts. The boy walked from his school to home and sorry above in extended space over and not touching at that time, we use above, for example, birds are flying above the sky, and below, when things are not directly, un, under another, then at that time we use below means something is below the table or let's say my book is below the table. Below 'means there is a difference between below and under, okay? What do you think is the difference?' Anybody can you tell me? What's the difference between below and under? 'Even though both indicate under something, can you tell me what kind of under? A des: ET1 asks the learners to take screenshots of this slide. This slide descries the uses of prepositions of location. TC: 00:30:56.300 - 00:31:05.800 Arts: A mic used by a teacher and a pupil, and a table in the slide that shows examples and use of prepositions of location 'above', 'below', 'under', 'over' etc. Files\\Classroom Observation\\English Classroom\\SC2ECO3 - § 5 references coded [7.87% Coverage] Reference 1 - 0.80% Coverage A/AS The teacher showing the slide. TC: 00:03:50.429 - 00:04:09.952 A des: ET1 is showing the slide related to preposition of time. TC: 00:03:50.429 - 00:04:09.952 Reference 2 - 2.46% Coverage Seq: Playing a video CTC: 00:14:27.197 - 00:16:01.355 A/AS: Playing a video TC: 00:14:26.920 - 00:15:16.355 A des: ET1 plays the video related to preposition of direction. TC: 00:14:26.920 - 00:15:16.355 T/A: A video related to preposition for direction TC: 00:14:27.004 - 00:16:01.444 A/AS: ET1 is explaining prepositions of direction. TC: 00:16:19.226 - 00:17:13.133 A/AS: ET1 is asking if students have any confusion regrading prepositions of direction. TC: 00:17:13.483 - 00:17:28.311 Reference 3 - 2.01% Coverage

Codes	Extracts
	ET1: Just look at the picture and then the arrow and past, past the house, past the car, past the tree. When you want to go to school, you have to past the police beat. A/AS: Explanation of terms and/or concepts by a teacher TC: 00:25:31.821 - 00:25:50.533 A des: ET1 asks pupils to look at the arrow in the picture and she explains how past is used in different contexts in the picture.TC: 00:25:31.821 - 00:25:50.533 Reference 4 - 0.92% Coverage A des: ET1 shows different pictures (Pictures of a ball placed at different positions in reference to the object(s)) to explain preposition of movement. TC: 00:28:21.903 - 00:31:22.289 Reference 5 - 1.67% Coverage A des: ET1 explains the preposition of directions by showing a picture that has caterpillars moving towards different directions and the reference for movement is an apple. TC: 00:36:29.330 - 00:37:19.700 A mic used and PowerPoint slide shown by sharing a screen by the teacher (PPT slide - A brief text) TC: 00:35:39.380 - 00:36:09.637 Files\\Classroom Observation\\Science Classroom\\SC1SC01 - § 1 reference coded [11.08% Coverage] Reference 1 - 11.08% Coverage Pupil: 'Is it that the part of the tongue that has sweet buds can't detect whatever sour we eat?' A/AS: Pupil teacher interaction A des: A pupil asks a question if the sweet receptor can sense the sour taste. TC: 00:46:15.678 - 00:46:22.278 ST1: 'Yes, we feel that we know from all parts, but we know first from this part. When we eat, the food gets wet and liquid flows all over.' A des: ST1 shows the division of a tongue in a figure with the cursor. TC: 00:46:22.469 - 00:47:15.568 A/AS Explanation of terms and/or concepts by a teacher TC: 00:47:23.400 - 00:49:30.600 A des: ST1 explains where different test receptors are by showing a picture of a tongue which is connected to the brain through nerves. TC: 00:47:23.196 - 00:49:32.262 Arts: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- A picture that has a tongue through nerves and some colourful texts) TC: 00:47:26.500 - 00:49:30.900 ST1: 'How do they (the test receptor) know, where it goes? Bitter is in this part, sour is at back, salty is in this part and sweet here.' This is how it was shown earlier.' When a chemical of a substance dissolves, Substance 'means the food that we eat, and chemical substance means the food we eat. What happens to them? They get mixed with saliva. Mucus membrane produces saliva and they will'. When the chemical of a substance dissolves in the saliva, the dissolved chemicals stimulates taste receptors and later on the nerve fibers carry the taste sensation to the brain. Hence, we get the real taste of the substance. 'Here the fluid will be produced which is called saliva which is produced by mucus membrane. What has this fluid? This fluid is dissolved with the food that we eat.'

Codes	Extracts
	Files\\Classroom Observation\\Science Classroom\\SC1SC02 - § 2 references coded [9.29% Coverage]
	Reference 1 - 5.65% Coverage
	A des: ST1 selects a laser pointer, the feature available in PowerPoint.TC: 00:08:21.916 - 00:08:32.025 Pupil: Ma'am which one is retina? ST1: It is called iris. What do we call it? ST1: 'What do we call the external one? We call it iris. Iris is getting contracted and expanded, right? This one, when it is contracted, pupil is getting smaller, right? When it is expanded, what happens. Look into the eye there. What is happening to the eye? The same thing happens when you go from sun-lit place to your room, you cannot see the things in the room properly.' A des: ST1: is pointing at different parts of the eyes using the laser pointer. TC: 00:08:49.187 - 00:09:03.112 T/A: A webcam and mic, red laser pointer used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - GIF of an eye and the colourful texts), and a mic used by students. TC: 00:08:24.999 - 00:09:00.055
	Reference 2 - 3.64% Coverage
	A/AS: Explanation of terms and/or concepts by a teacher TC: 00:12:46.243 - 00:14:06.243 A des: She asks why people get dizzy when spinning by pointing at internal part of an ear. TC: 00:12:53.000 - 00:13:26.239 Pupil: Ma'am, Kamana is asking to let her in the class. ST1:: 'Inertia of motion. Okay.' A/AS: Request for admitting students TC: 00:14:06.618 - 00:14:11.945 A des: One of the pupils asks the teacher to let Kamana join the class. TC: 00:14:06.728 - 00:14:11.889 T/A: Pictures of internal ears, laser pointer and colourful texts TC: 00:12:51.810 - 00:14:21.351
	Files\\Focus Group Discussions\\TFGD - § 3 references coded [0.84% Coverage]
	Reference 1 - 0.57% Coverage
	त्यहाँ त्यो बेलामा जुन लक डाउनको period मा मैले गऱ्या थिए, अब अहिले चाहीं मलाई त्यो गर्ने गरेर पढाउँदा खेरी अहिले class मा गएर as a ICT use गरेर projector use गरेर class लिदाँ खेरी विद्यार्थीलाई बुझाउन पनि मलाई एकदम सजिलो । आफैलाई पनि एकदमै easy भएको कारणले गर्दाखेरी चाहीं यो चाहीं ठीक छ जस्तो मैले feel गरेको कुरा । मलाई धेरै सजिलो भएको छ यो ICTको use गरेर class लिदाँ खेरी चाहिँ ।[1] I had used [ICT] during lock down, now at this time, when I teach in the same way, I feel so easy to make pupils understand by using projector - by using ICT. I also feel that use of ICT in teaching is good as I felt easy. I felt really easy to take classes using ICT.

Codes	Extracts
	Reference 2 - 0.14% Coverage
	अँ त्यो ICT बाट presentation गर्दाखेरी विद्यार्थीमा clear idea दिन सक्ने विषयवस्तु छन्नेर, Umm, while presenting through ICT [tools], we can make ideas clear. Reference 3 - 0.12% Coverage विषयवस्तुको concept मा चाहिँ clarity पनि उनीहरूले चाहि develop गरेको पाएँ, अँ, Umm, I found that they have gained clarity on contents. Files\\Interviews\\SC3SM2I - § 1 reference coded [1.90% Coverage] Reference 1 - 1.90% Coverage SM2: (२.५) अँ, ...फाइदा चाँहि जस्तो अब अँ केही कुरा जस्तो मानौ साइन्सकै एउटा टपिक पढाउनु पर्या मुटुको चित्रको बारेमा मैले एक्स्प्लेन गर्नुपर्या भने जति राम्रोसँग छर्लङ्ग हुने गरी टेक्नोलोजीले गर्न सक्छ त्यति डेफेनेट्ली मैले चाँहि मार्करले कोरेर अथवा चल्कले कोरेर त्यो गर्नै सकिदैन हैन? एज ए टिचर, त्यस्तै कुरा म्यापसँग रिलेटेड कुराहरु अब चाईना यता, नेपाल यता, नेपालको फलानो ठाउँ यता, से–फोक्सुण्डो यता, खप्तड राष्ट्रिय निकुन्ज यता, यस्मा यस्तो यस्तो छ विशेषता भन्ने कुरो त्यस्ता कुराहरु चाँहि टेक्नोलोजीकल नगरीकन सकिदैन । सकिंदैन भन्नाले टेक्नोलोजीको बढी इफेक्टीभ (xxx) देखिन्छ । अनि त्यस्तै अरु कुराहरुमा पनि जस्तो साइन्सका एक्पेरिमेन्टहरु पनि भए, साइन्सका केही प्रिन्सिपलहरु कसरी एप्लाई भाछन् डे टु डे लाइफमा भन्ने कुराहरु पनि त्यो टेक्नोलोजीले बढी फाइदा गर्छ त्यस्ता कुराहरु सिकाउनलाई । SM2: (2.5) Umm, ... the benefit is that definitely, I cannot explain very clearly using marker and a chalk to the extent, for example, I teach about the heart using technology very clearly. As a teacher, it is difficult to teach without technology the things related to map, for example, to show China is at this side, the specific place of Nepal is here, the other place of Nepal is there, Se-phoksundo is there, Khaptad National Sanctuary is there, the attributes are such here. What I mean by we cannot do is it can be effective if we use technology. Using technology, it will be also easy to teach how principles of science are applied in day-to-day life also the experiments of science. **Annotations**
Engaging learners in the tasks	Files\\Classroom Observation\\English Classroom\\SC2ECO3 - § 1 reference coded [3.72% Coverage] Reference 1 - 3.72% Coverage A des: ET1 asks the pupils to fill in the blanks that she displays on her slide using prepositions of direction such as 'to', 'toward', 'onto' or 'into' TC: 00:39:58.700 - 00:40:21:320 T/A: A mic used and PowerPoint slide shown by sharing a screen by the teacher (PPT slide - An exercise, fill in the gaps' related to prepositions of direction. TC: 00:39:57.682 - 00:42:34.219 SD: ET1 asks the pupils to fill in the blanks and the pupils supply the preposition that they think fit to those blanks and they discuss to find the most suitable prepositions in those contexts. She also explains contexts in which different prepositions are used in Nepali. TC: 00:40:21.800 - 00:42:34.200

Codes	Extracts
	Files\\Classroom Observation\\English Classroom\\SC3ECO1 - § 3 references coded [20.14% Coverage] Reference 1 - 7.49% Coverage Student(s) Ma'am, we will long answer or short answer? ET2: It's up to you. How does the poet describe once life in the later stage of life? Later stage of life, you understood what does it mean, yes? A des: ET2 reads the question 'How does the poet describe once life in the later stage of life?' TC: 00:09:16:613 - 00:09:22.254 A des: ET2 reads aloud some of the answers of pupils that she sees on her screen but it is not clearly audible and the pupils cannot see the answers. TC: 10:54.264 - 00:11:05.830 A des: One of the pupils mentions that she was absent for some days therefore she doesn't know which poem was that. In response, ET2 states that she could simply read answers of her friends. TC: 0011:06.548 -00:11:19.268 Arts: A webcam and mic used, white background shown by the teacher and mic used by pupils TC: 00:09:01.270 - 00:14:16.615 A des: ET2 shows students' answers in Mentimeter, and also she reads their answers. TC: 00:14:17.072 - 00:17:02.841 T/A: A webcam and mic used, and students' responses on mentimeter shown on screen by the teacher TC: 00:14:17.096 - 00:17:02.772 Reference 2 - 5.74% Coverage Now yes, most of you had written. I read all the answers and most of you had written that the later life is full of pain and stress and having less happiness and energy, yes? So you mean to say that the level of energy used to be high, unm, is high in the childhood days than in the later stage of life. Yes wonderful! And then, yes, you were correct again when you voted for the nostalgic tone. Yeah. T/A: A webcam and mic used, and students' responses on Mentimeter shown on screen by the teacher TC: 00:17:53.045 - 00:18:09.500 A des: ET2 summarises their responses. She says that the mood of the poem is nostalgic as the poet wished to go back to the time he had already spent, but soon the poet realised that it was not possible. TC: 00:18:08.205 - 00:18:53.545 T/A: A webcam and mic used by the teacher TC: 00:18:09.681 - 00:20:01.500[1] Reference 3 - 6.90% Coverage ET2: Classwork, classwork, un, because you are checking time. Let's do this one and then. Can you see the screen. This is simple classwork. Okay let me xxx A des: ET2 shows the task on her screen. The task is to match words with their meanings related to the poem. TC: 00:35:51.653 - 00:35:55.790 Arts: A webcam and mic used, and a matching task on Notes shown on the screen by the teacher TC: 00:35:51.091 - 00:37:15.454 ET2: Ignore this one okay 'hhgdff' whatever is there. Because if I delete it, it comes forward Yi. Adjust side. Do it in copy. Quickly. Match the following words with their

Codes	Extracts
	meanings. Robin, Laburnum, Lilac, Peeping, Borne away, Swallow, Fir, Heaven A des: ET2 asks the pupils to ignore the meaningless group of letters that she has typed in the 'Notes' application that she has used. She shows how the text shifts if she deletes. TC: 00:36:12.402 - 00:36:54.364 T/A: A webcam and mic used, and a matching task on Notes shown on the screen by the teacher. TC: 00:36:12.402 - 00:36:54.364 Files\\Classroom Observation\\English Classroom\\SC3ECO2 - § 3 references coded [24.50% Coverage] Reference 1 - 10.63% Coverage ET2: I have assigned you one task once you see there in the chat box. See that. Now following the similar structure, you are going to write, okay I forgot to mention there, I am sorry, in about 150 words, (she is typing as well) okay? You please do it. Recall and write about your past in comparison to present that how to include, what sort of things to include here is - include about your childhood, how it used to be like. A/AS: The teacher giving a task in a chat box TC: 00:05:08.730 - 00:06:51.420 T/A: A webcam, mic and chat option used by the teacher TC: 00:05:14.584 - 00:06:51.400 A des: She gives an assignment in the chat box - Recall and write about your past in comparison to present (include about your childhood, how you used to be, like, go to school, play, and also about place where you used to live and how it used to be like.) TC: 00:05:08.730 - 00:06:51.420 Arts: A webcam, mic and chat option used by the teacher TC: 00:05:14.584 - 00:06:51.400 ET2: Okay, did you get what to write? Student(s) Yes ma'am ET2: Please once you start, you write and then you will have to upload the pictures here. The majors of the work you have done and then like in the past, I will give you feedback and then others will also learn from your writing. Let's see who will be the first one to upload.[3] Reference 2 - 5.51% Coverage So others what about you? You are taking long time. A des: ET2 asks at what stage of writing other students are. TC: 00:21:05.987 - 00:21:52.411 T/A: A webcam and mic used by the teacher TC: 00:21:06.033 - 00:21:10.647 ET2: Okay, Sangyog has already sent. I can say it's been loaded. Okay? Pupil: Ma'am can you see it clearly? ET2: Ah, no, it's being loaded, wait. Once when it opens, I will let you know. Or maybe, my internet is also slow, I don't know. Un, Pupil: xxx little bit blur, I think ma'am. A des: ET2 informs everyone Sanyog has already uploaded the task. TC: 00:21:52.645 - 00:21:58.421 T/A: A webcam and mic used by the teacher TC: 00:21:52.670 - 00:22:32.294[4]

Codes	Extracts
	Reference 3 - 8.36% Coverage ET2: Other, has anyone sent except that this Sanyog? Other than Sanyog? What about you people, what are you doing? Hello! 10 B, am I audible? 10 B? Pupils: Yes ma'am (Student A) (Student B) ET2: So what about you? Have you done? Pupil: Yes ma'am ET2: xxx A des: ET2 checks what stage are other pupils, except Sanyog at.TC: 00:29:29.233 - 00:30:08.575 Pupil: No ma'am. I couldn't. Can I read it out loud? ET2: Okay. ET2: Okay Aakankshya, you can read aloud. A des: ET2 says that she cannot upload what she has written and she is asking the teacher if she could read it aloud. TC: 00:30:03.000 - 00:30:09.940 Pupil: In the past, I used to have a sweet tooth. Everything, I could eat - chocolate, sweet or another delicacies … In the past, in a less polluted city with neighbours so friendly that you would mistake them for family and now even when the population is increased and so as the pollution, I barely remember the face of the people living next to me. A des: d reads the text written by a pupil. TC: 00:30:22.826 - 00:31:32.852 Files\\Classroom Observation\\English Classroom\\SC5ECO1 - § 2 references coded [31.72% Coverage] Reference 1 - 9.03% Coverage Arts: Questions that pupils can see on their computer screen shared by the teacher (centrally controlled). TC: 00:00:08.950 - 00:00:33.311 Seq: Playing an audio recording CTC: 00:00:37.123 - 00:01:31.950 A/AS: Playing an audio recording TC: 00:00:37.123 - 00:01:31.950 A des: Pupils listen to the audio recording about the language function - watching a movie. TC: 00:00:36.850 - 00:01:31.974 T/A: Questions that pupils can see on their computer screen shared by the teacher (centrally controlled TC: 00:00:37.440 - 00:01:31.990 Seq: Giving pupils tasks CTC: 00:01:37.090 - 00:05:42. Reference 2 - 22.69% Coverage
Technological affordances	
Directing learners to the figures or texts while screensharing	Files\\Classroom Observation\\Science Classroom\\SC1SC01 - § 7 references coded [35.44% Coverage] Reference 1 - 6.21% Coverage

Codes	Extracts
	Seq: Teacher's presentation CTC: 00:10:08.459 - 00:38:37.100 ST1:: 'Okay, now we will study about a nose. Do you know what functions does a nose carry out?' Pupils: 'Yes, we know them.' (Student A and B) ST1: 'What does it do?' Pupils: 'I know, it smells' (Student A). 'It finds the smell' (Student B). A/AS: Student teacher interaction TC: 00:10:08.459 - 00:38:37.100 A des: ST1 explains the parts of a nose by moving the cursor. TC: 00:11:03.857 - 00:12:04.900 A/AS Explanation of terms and/or concepts by a teacher TC: 00:10:33.284 - 00:12:05.100 A des: She explains the functions and parts of the nose. TC: 00:10:33.284 - 00:12:05.100 T/A: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - Pictures of a nose and some colourful texts), and a mic used by students TC: 00:10:02.100 - 00:13:00.600 ST1: Who is coming? I have to connect your friend here. ST1: admits pupils in the class. TC:00:12:05.245 -00:12:15.738 Reference 2 - 2.18% Coverage ST1: 'What is the Nepali term for Cartilage? 'Kurkure Had. It is made up of Kurkure Had. The upper part is connected to the frontal bone. ' Student(s) 'Kurkure Had' A./AS: Explanation of terms and/or concepts by a teacher TC: 00:12:21.573 - 00:13:08.032 A des: ST1 uses her cursor to point out nasal bones. TC: 00:12:22.885 - 00:12:45.400 Reference 3 - 7.53% Coverage A/AS : Explanation of terms and/or concepts by a teacher TC: 00:13:22.114 - 00:38:37.100 T/A: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Pictures of external nose with labels and some colourful text) TC: 00:13:21.939 - 00:13:58.500 A des: ST1 explains parts of the nose without focusing on chat messages. TC: 00:13:21.200 - 00:13:58.500 Arts: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - Pictures of internal parts of a nose) TC: 00:13:58.800 - 00:15:25.900 ST1: 'I have shown that part. Okay, this is the part shown here. About this, the main function is to smell which is from this part. We know the smell from this part.' So it is called olfactory region. This part is called olfactory region. This part. A des: ST1 uses a laser pointer available in PowerPoint slides. TC: 00:15:26.100 - 00:15:26.200 A des: ST1 uses a laser pointer to point out different parts of a nose and explains their functions. TC: 00:15:26.100 - 00:15:26.200 A des: ST1 explains internal parts of the nose by pointing each part through a red laser pointer. TC: 00:19:23.500 - 00:20:16.700 Reference 4 - 0.84% Coverage A des: ST1 uses laser pointer to guide learners to the specific part of the figure and some texts. TC: 00:20:34.300 - 00:21:11.100 Reference 5 - 14.76% Coverage ST1: 'There is hairlike projection in olfactory region. This kind of hair is there, which is also called olfactory hair. Like this, there is hair. Like hair. We call them olfactory hairs.' A des: ST1 points out a hairlike projection in both pictures given on the slide with the help of a red laser pointer. TC: 00:22:29.623 - 00:22:43.800

Codes	Extracts
	ST1: 'Okay, we have some questions. For example, the capacity of olfaction decreases when one suffers from common cold, give reason. Olfaction decreases meaning what does olfaction mean? Olfaction means the process of taking the sense of smell through nerves to brain.' Pupil: 'bringing to the brain' ST1: 'It is olfaction. There are olfactory cells which sense and those senses are taken to the brain by nerve and this process is called olfaction. The capacity of olfaction decreases when we get cold. We get less smell when we are suffering from cold. It says to give reason for that. The question says that the capacity of olfaction decreases when one suffers from common cold, give reason.' Pupil(s): xxx ST1: 'It can't reach there.' ST1 presents questions and answers related to the topic. TC: 00:23:55.655 - 00:25:48.360 Arts: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Colourful texts) TC: 00:23:35.456 - 00:25:47.800 ST1: 'Here is mucus membrane. Here is mucus. Look at here. What is here? In this part, there is mucus membrane. When mucus membrane is swollen, it blocks the smell. As it cannot go further, what happens? We just sense a little bit. What happens during the time of cold, this gets swollen and it obstructs the smells.' Pupil: 'It stops.' ST1: For this region, we cannot know during other times. Pupil: It can't A des: ST1 points out different parts of a nose with a cursor and explains why olfaction decreases during common cold. TC: 00:25:51.00 - 00:26:37.213 Arts: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide- Pictures of internal parts of a nose and colourful texts) TC: 00:25:48.502 - 00:26:40.800 ST1: 'Compared to normal times, when we are suffering from cold, we smell less.' Due to this, smell does not reach inside the olfactory nerves and we cannot detect it. So we cannot smell the things and do not ge... Reference 6 - 0.88% Coverage A des: ST1 uses a cursor to point out different parts of a tongue and the text while describing a tongue. TC: 00:40:22.049 - 00:43:27.737 Reference 7 - 3.05% Coverage Pupil: 'Is it that the part of the tongue that has sweet buds can't detect whatever sour we eat?' A/AS: Pupil teacher interaction A des: A pupil asks a question if the sweet receptor can sense the sour taste. TC: 00:46:15.678 - 00:46:22.278 ST1:'Yes, we feel that we know from all parts, but we know first from this part. When we eat, the food gets wet and liquid flows all over.' A des: ST1 shows the division of a tongue in a figure with the cursor. TC: 00:46:22.469 - 00:47:15.568

Codes	Extracts
	Files\\Classroom Observation\\Science Classroom\\SC1SC02 - § 3 references coded [10.79% Coverage] Reference 1 - 6.07% Coverage TSI: ST1 What do you call for this side? A/AS: Pupil teacher interaction TC: 00:08:00.722 - 00:09:12.666 ST1 explains why seats are not seen as soon as we enter a dark room from a bright area. TC: 00:07:33.834 - 00:07:41.944 A des: ST1 selects a laser pointer, the feature available in PowerPoint.TC: 00:08:21.916 - 00:08:32.025 Pupil: Ma'am which one is retina? ST1: It is called iris. What do we call it? ST1: 'What do we call the external one? We call it iris. Iris is getting contracted and expanded, right? This one, when it is contracted, pupil is getting smaller, right? When it is expanded, what happens. Look into the eye there. What is happening to the eye? The same thing happens when you go from sun-lit place to your room, you cannot see the things in the room properly.' A des: ST1 is pointing at different parts of the eyes using the laser pointer. TC: 00:08:49.187 - 00:09:03.112 Reference 2 - 3.28% Coverage T/A: A webcam and mic used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - GIF of an eye and the colourful texts), and a mic used by students TC: 00:09:00.757 - 00:09:25.111 A des: ST1 leads the students in the text through her laser pointer.TC: 00:09:27.777 - 00:11:07.277 Arts: A webcam and mic, red laser pointer, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - GIF of an eye and the colourful texts), and a mic used by pupils TC: 00:09:25.480 - 00:11:03.555 Reference 3 - 1.44% Coverage Arts: A webcam, mic and cursor used, and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - Pictures of internal parts of an ear with some labels and some colourful texts) TC: 00:20:53.475 - 00:20:57.378
Sharing a screen	Files\\Classroom Observation\\English Classroom\\SC2ECO3 - § 2 references coded [7.37% Coverage] Reference 1 - 1.90% Coverage A/AS: Discussion around previous lessons TC: 00:01:46.233 - 00:02:02.990 A des: ET1 briefly mentions what the pupils learnt the day before. She mentions that they discussed preposition of time and preposition of place the day before. TC: 00:01:46.427 - 00:02:02.733 T/A: A mic used, and PowerPoint slides shown by sharing a screen by the teacher. TC: 00:01:46.276 - 00:02:21.866 Reference 2 - 5.46% Coverage ET1: Above, around beside. Beside means near to or let's say next to. And towards means like to and towards they are like 'Tira' we say in Nepali. Towards means 'Tira'. If there is a

Codes	Extracts
	purpose, without purpose or that one is we use towards. With purpose, we use to here. For example, the cow is running towards the house. That one is not a purpose there. Maybe towards the house or maybe somewhere other else. But the boy is going to the school. It is the purpose that confirm that the boy is going to the school. With the purpose, that's why to and towards both mean Tira but their uses are different here. And by, on, across, at, close to, up, inside, up, along, behind, over, down, near, pass, among, below, through, between, next to also we will go through. A des: ET1 is explains some of the prepositions of directions such as besides, towards with their meanings and examples. TC: 00:17:28.487 - 00:18:31.555 A des: ET1 mentions what they can see in the next slide. TC: 00:18:31.720 - 00:18:38.438 A des: ET1 reads example sentences from the slide - They were travelling towards London … TC: 00:18:38.777 - 00:19:15.400 Files\\Classroom Observation\\English Classroom\\SC3ECO1 - § 2 references coded [7.56% Coverage] Reference 1 - 1.52% Coverage A des: ET2 shares the screen of Mentimeter and she checks the pupils who are in the Mentimeter in her mobile phone. TC: 00:03:33.532 - 00:04:05.530 T/A:A webcam and mic used, Mentemeter white screen shown by the teacher Reference 2 - 6.04% Coverage ET2: Classwork, classwork, un, because you are checking time. Let's do this one and then. Can you see the screen. This is simple classwork. Okay let me xxx A des: ET2 shows the task on her screen. The task is to match words with their meanings related to the poem. TC: 00:35:51.653 - 00:35:55.790 Arts: A webcam and mic used, and a matching task on Notes shown on the screen by the teacher TC: 00:35:51.091 - 00:37:15.454 ET2: Ignore this one okay 'hhgdff' whatever is there. Because if I delete it, it comes forward Yi. Adjust side. Do it in copy. Quickly. Match the following words with their meanings. Robin, Laburnum, Lilac, Peeping, Borne away, Swallow, Fir, Heaven A des: ET2 asks the pupils to ignore the meaningless group of letters that she has typed in the 'Notes' application that she has used. She shows how the text shifts if she deletes. TC: 00:36:12.402 - 00:36:54.364 Files\\Classroom Observation\\English Classroom\\SC5ECO1 - § 1 reference coded [6.02% Coverage] Reference 1 - 6.02% Coverage Seq: Playing an audio recording CTC: 00:00:37.123 - 00:01:31.950 A/AS: Playing an audio recording TC: 00:00:37.123 - 00:01:31.950 A des: Pupils listen to the audio recording about the language function - watching a movie. TC: 00:00:36.850 - 00:01:31.974 T/A: Questions that pupils can see on their computer screen shared by the teacher (centrally controlled TC: 00:00:37.440 - 00:01:31.990 Files\\Classroom Observation\\English Classroom\\SC5ECO2 - § 1 reference coded [

Codes	Extracts
	18.50% Coverage]
	Reference 1 - 18.50% Coverage
	A/AS: Pupil teacher interaction TC: 00:00:00.617 - 00:00:16.247 A des: ET3 asks a pupil to raise a hand and tell the answer. TC: 00:00:09.010 - 00:00:15.559 ET3: Yes the person or the boy, the person who sweep - sweep the chimney. Sweep means make clean or wash or make clean. Yes, sit down. Okay, thank you. Yes, see. What can you see there? This is a chimney sweeper. You know the boy is a Chimney sweeper. You know a boy is very young. Why is a young boy used as a chimney sweeper? Because the big one xxx person cannot sweep the chimney because a small, you know A/AS: S Explanation of terms and/or concepts by a teacher TC: 00:00:16.247 - 00:01:25.264 A des: ET3 explains the chimney sweeper is a person who cleans the chimney. TC: 00:00:16.247 - 00:00:28.818 T/A: PPT on computers used by teachers and students centrally controlled by teachers TC: 00:00:08.976 - 00:00:31.644 A des: Pupils look at the slides that appear on the monitors in front of them. TC: 00:00:28.818 - 00:00:51.420 Files\\Classroom Observation\\Science Classroom\\SC1SC01 - § 1 reference coded [4.47% Coverage] Reference 1 - 4.47% Coverage A/AS: Preparing to begin a lesson TC: 00:08:40.500 - 00:10:01.723 A des: ST1 runs slides. TC: 00:08:40.606 - 00:09:32.278 T/A: A webcam and mic used, and PowerPoint slides shown by sharing a screen by the teacher. TC: 00:08:40.606 - 00:09:32.200 A des: ST1 admits pupils in the class. TC: 00:09:36.393 - 00:09:57.540 ST1: 'Is the slide being presented?' Pupil(s): 'Yes ma'am' (pupil A and B) A/AS: Basic technology checks TC: 00:10:01.723 - 00:10:08.409 A des: ST1 checks if her slide could be seen by her pupils. TC: 00:10:01.723 - 00:10:08.409 T/A: A webcam and mic used, and PowerPoint slides shown by sharing a screen by the teacher, and a mic used by students TC: 00:09:32.200 - 00:10:02.100 Files\\Classroom Observation\\Science Classroom\\SC1SC02 - § 1 reference coded [4.53% Coverage] Reference 1 - 4.53% Coverage Seq: Preparing to begin a lesson CTC: 00:03:35.398 - 00:04:40.972 ST1 Okay, now let's start the class. The remaining ones will keep on joining. A/AS: Preparing to begin a lesson A des: ST1 lets pupils join in the class. TC: 00:04:03.444 - 00:04:09.611 T/A: A webcam and mic used by the teacher TC: 00:03:34.900 - 00:03:57.166 A des: ST1 shares the screen of her PowerPoint slide that has information about eyes. TC: 00:04:10.611 - 00:04:26.833 A des: ST1 lets pupils join in the class. TC: 00:04:27.497 - 00:04:33.849 T/A: A webcam used and a PowerPoint slide shown by sharing a screen by the teacher (PPT slide - GIF of an eye, pictures of eyes with labels and the colourful texts)TC: 00:04:13.722 -

Codes	Extracts
	00:04:30.777
Showing answers in Mentimeter	Files\\Classroom Observation\\English Classroom\\SC3ECO1 - § 2 references coded [21.39% Coverage] Reference 1 - 10.15% Coverage A des Pupils complain that the screen is not visible. TC: 00:05:18.325 - 00:05:39.576 T/A: A webcam and mic used, Mentimeter white screen shown by the teacher TC: 00:04:05.961 - 00:05:43.923 T/A: A webcam and mic used, Mentimeter white screen shown by the teacher TC: 00:04:05.961 - 00:05:43.923 ET2: Okay, leave it. So, I will share it again. Don't worry! So but you follow the link, you do the Pupil: Came. came. ET2: Was it there? Pupil: Bar graph came. Bar- bar Students are complaining that the screen is not visible. TC: 00:05:18.325 - 00:05:39.576 ET2: Un, yes, I was showing that only. Let me once try it. Okay. There's only for two not for other two options. You are taking too long now. I think I will have to start the countdown. You've only one minute okay? T/A: A webcam and mic used, bar diagram shown by the teacher TC: 00:05:56.499 - 00:06:13.307 Student(s) Okay ma'am T/A: A webcam and mic used, bar diagram and timer shown by the teacher, and mic used by a pupil TC: 00:06:13.576 - 00:06:22.097 ET2: 17 responses out of how many students? Out of 34 students. Not 34, 33. It's including me 34. A des: ET2 tracks time by starting the countdown available in Mentimeter TC: 00:06:48.973 - 00:06:53.364 T/A: A webcam and mic used, bar diagram and timer shown by the teacher, and mic used by a student TC: 00:06:22.621 - 00:07:24.538 ET2: So maximum vote was there for nostalgic tone, right? Now, let me ask you one question. Can you see the second question as well? Reference 2 - 11.24% Coverage A des: ET2 reads the question 'How does the poet describe once life in the later stage of life?' TC: 00:09:16:613 - 00:09:22.254 A des: ET2 reads aloud some of the answers of pupils that she sees on her screen but it is not clearly audible and the pupils cannot see the answers. TC: 10:54.264 - 00:11:05.830 A des: One of the pupils mentions that she was absent for some days therefore she doesn't know which poem was that. In response, ET2 states that she could simply read answers of her friends. TC: 0011:06.548 -00:11:19.268 Arts: A webcam and mic used, white background shown by the teacher and mic used by pupils TC: 00:09:01.270 - 00:14:16.615 A des: ET2 shows students' answers in Mentimeter, and also she reads their answers. TC: 00:14:17.072 - 00:17:02.841 T/A: A webcam and mic used, and students' responses on mentimeter shown on screen by

Codes	Extracts
	the teacher TC: 00:14:17.096 - 00:17:02.772 A des: ET2 tracks time by starting the countdown available in Mentimeter TC: 00:17:02.894 - 00:17:15.139 T/A: A webcam and mic used, and students' responses on mentimeter and timer shown on screen by the teacher TC: 00:17:03.090 - 00:17:52.545 Now yes, most of you had written. I read all the answers and most of you had written that the later life is full of pain and stress and having less happiness and energy, yes? So you mean to say that the level of energy used to be high, unm, is high in the childhood days than in the later stage of life. Yes wonderful! And then, yes, you were correct again when you voted for the nostalgic tone. Yeah. T/A: A webcam and mic used, and students' responses on Mentimeter shown on screen by the teacher
Tracking time in Mentimeter	Files\\Classroom Observation\\English Classroom\\SC3ECO1 - § 2 references coded [5.25% Coverage] Reference 1 - 4.52% Coverage ET2: Un, yes, I was showing that only. Let me once try it. Okay. There's only for two not for other two options. You are taking too long now. I think I will have to start the countdown. You've only one minute okay? T/A: A webcam and mic used, bar diagram shown by the teacher TC: 00:05:56.499 - 00:06:13.307 Student(s) Okay ma'am T/A: A webcam and mic used, bar diagram and timer shown by the teacher, and mic used by a pupil TC: 00:06:13.576 - 00:06:22.097 ET2: 17 responses out of how many students? Out of 34 students. Not 34, 33. It's including me 34. A des: ET2 tracks time by starting the count down available in Mentimeter TC: 00:06:48.973 - 00:06:53.364 Reference 2 - 0.72% Coverage A des: ET2 tracks time by starting the count down available in Mentimeter TC: 00:17:02.894 - 00:17:15.139
Using chat option	Files\\Classroom Observation\\English Classroom\\SC3ECO1 - § 1 reference coded [3.73% Coverage] Reference 1 - 3.73% Coverage ET2: So maximum vote was there for nostalgic tone, right? Now, let me ask you one question. Can you see the second question as well? A des: ET2 is tries to show another question using Mentimeter but she failed to show the second question. TC: 00:07:26.762 - 00:08:01.121 T/A: A webcam and mic used, Mentimeter dashboard shown by the teacher TC: 00:07:27.594 - 00:07:34.130 A des: She pastes the link again to the chat box but she does not click on present option

Codes	Extracts
	therefore, she cannot show the second question. TC: 00:08:01.121- 00:08:15.588
	Files\\Classroom Observation\\English Classroom\\SC3ECO2 - § 4 references coded [21.15% Coverage]
	Reference 1 - 10.63% Coverage
	ET2: I have assigned you one task once you see there in the chat box. See that. Now following the similar structure, you are going to write, okay I forgot to mention there, I am sorry, in about 150 words, (she is typing as well) okay ? You please do it. Recall and write about your past in comparison to present that how to include, what sort of things to include here is - include about your childhood, how it used to be like. A/AS: The teacher giving a task in a chat box TC: 00:05:08.730 - 00:06:51.420 T/A: A webcam, mic and chat option used by the teacher TC: 00:05:14.584 - 00:06:51.400 A des: She gives an assignment in the chat box - Recall and write about your past in comparison to present (include about your childhood, how you used to be, like, go to school, play, and also about place where you used to live and how it used to be like.) TC: 00:05:08.730 - 00:06:51.420 Arts: A webcam, mic and chat option used by the teacher TC: 00:05:14.584 - 00:06:51.400 ET2: Okay, did you get what to write? Student(s) Yes ma'am ET2: Please once you start, you write and then you will have to upload the pictures here. The majors of the work you have done and then like in the past, I will give you feedback and then others will also learn from your writing. Let's see who will be the first one to upload.
	Reference 2 - 6.84% Coverage
	Pupil: xxx in chat. It's not opening at all. ET2: Sorry? Student(s) The chat is not working. I cannot open the chat box. ET2: Maybe due to slow internet. You could see the question there, no? You read the question, did you? Pupil: I just read the question. I recalled and write. After that there is no other messages. ET2: Un, you will have to wait. I am reconnecting at the dot. Your messages may be slow to receive. Pupil: I just missed writing ma'am. I didn't think you have written ET2: I did not write except the question because I, I, I'm expecting the answers now. Un, no problem. You wait, maybe it will appear to you in a while or you will have to, you know re-join sometimes that also works. Pupil: Okay ma'am A des: A pupil informs the teacher that she could not open the chat box and chat is not working. TC: 00:19:35.235 - 00:21:00.500
	Reference 3 - 2.28% Coverage
	ET2: Okay, Sangyog has already sent. I can say it's been loaded. Okay? Pupil: Ma'am can you see it clearly? ET2: Ah, no, it's being loaded, wait. Once when it opens, I will let you know. Or maybe, my internet is also slow, I don't know. Un, Pupil: xxx little bit blur, I think ma'am.

Codes	Extracts
	Reference 4 - 1.40% Coverage ET2: I can see other writing as well. Now, here I can see. This is of Ishu. A des: ET2 reads out the writing shared by a student in a chat option. TC: 00:32:04.029 - 00:33:34.529 Files\\Classroom Observation\\English Classroom\\SC3ECO4 - § 2 references coded [2.24% Coverage] Reference 1 - 1.11% Coverage A des: ET2 states that there is a question on chat box which learners need to answer but the pupils could not see the question. TC: 00:41:13.751 - 00:41:29.795 Reference 2 - 1.13% Coverage A des: ET2 types the exercise number in the chat box '2ii' and asks them to do. This exercise will be discussed in another class. TC: 00:49:53.798 - 00:50:06.817 Files\\Interviews\\SC3ET2Idocx - § 1 reference coded [1.18% Coverage] Reference 1 - 1.18% Coverage Un, so this technology that I have used or what I learnt and what I have been using in my classes actually have helped me modify my lessons, okay? Like sometimes, I simply have the discussion through the chat box and just to collect their responses. Sometimes I ask them, sometimes through PowerPoint presentation, I ask them do the things like shared what they have learnt and sometimes through MS forms or Google forms and even through Mentimeter, so different technologies we are using online, yes?
Zooming the text	She tells the pupils that if she zooms the text, she could not see it. TC: 00:25:29.911 - 00:26:45.970