Exploring Bhutanese Geography Teachers' Perception on the Use of Information and Communications Technology in Teaching before, during and Beyond Pandemic

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

Original Research Article

ABSTRACT

The study was conducted to explore the perception of geography teachers on the use of ICT in teaching before, during and beyond the pandemic. The study was carried out for the secondary geography teachers in the western region of Bhutan. The researcher employed pragmatism paradigm and sequential explanatory design in this study. The quantitative data were collected through survey questionnaire from 84 secondary geography teachers and focus group discussions with 12 teachers. The quantitative data were analysed using Descriptive statistics, SPSS 22 and the qualitative data were analyzed using thematic analysis. The collation of quantitative and qualitative results indicated the positive perception of teachers in using ICT in teaching and learning. The study revealed that the use of ICT enhances teaching and learning geography. Further, the study revealed the challenges of using ICT in teaching and learning. The study communicated that teachers use of ICT in teaching Geography was minimal before the Pandemic,

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however due to online teaching and learning the use of ICT expedited during Pandemic. The use of ICT in teaching enhanced teachers knowledge and skills as it was more of exploratory and experiential learning.

ABBREVIATIONS

DEO   : Dzongkhag Education Officer
DCPD   : Department of Curriculum and Professional Development
ICT   : Information Communication and Technology
MOE   : Ministry of Education
NNC   : New Normal Curriculum
SD   : Standard Deviation
RGOB   : Royal Government of Bhutan
RUB   : Royal University of Bhutan
SPSS   : Statistical Package for Social Science
TPSD   : Teacher Professional Support Division
TEO   : Thromday Education Officer
UNICEF : United Nations International Children's Emergency Fund
UNESCO : United Nations Educational, Scientific and Cultural Organisation
TEO   : Thromde Education Office
FGD   : Focused Group Discussion

1. INTRODUCTION

"Globally, Information and Communication Technologies (ICT) are now at the center of education reform in line with the technological development of the 21st century. ICT supported education in promoting the acquisition of the knowledge and skills will empower students for lifelong learning" [1]. "In this digital era, the use of ICT in the classroom is important for students to learn and apply the required 21st century skills" [2].

According to Lhendup (2020), "ICT leads to a paradigm shift that benefits all the people". According to Sonmez et al. [3], "ICT provides the educational content which helps to achieve knowledge without questioning the location and time". "ICT-integrated curricula and interdisciplinary digital pedagogy facilitates collaboration among educators and learners. It provides learners with personalized and active learning experiences through the use of digital resources" [4].

In addition, the subject like geography can be studied effectively with the use of ICT. The outbreak of COVID-19 Pandemic has brought about a major shift in teaching and learning practices in the schools and higher education institutions globally. Teaching learning transitioned from contact teaching and learning

to online teaching and learning mode. In Bhutan, schools and higher education institutions migrated to full online teaching and learning from March 2020 after the closure of these institutions. During the school closure period, ICT helped in conducting online classes. Although ICT has many benefits in teaching and learning geography, there is limited research being done to show how ICT is used in Bhutanese school system. Therefore, this study aims to find out the perceptions of teachers on the use of ICT for teaching and learning geography effectively in schools.

1.1 Problem statement

According to Earle [5], an important part of geography in secondary education consists of abstract knowledge, and therefore, it is crucial for teachers to use appropriate information technologies to convey geographical information to students.

Despite all challenges, it is essential to incorporate ICT in teaching and learning to meet the requirements of the fast changing world. Further, ICT has proven to be reliable alternatives for uninterrupted teaching and learning during the outbreak of the pandemic such as COVID-19. While the role of technology and computers in student learning shifts from "learning from technology" to "learning with

technology", the professional educator's role changed from being a presenter to facilitator or coach [6]. The focus and intention of education in the present days is more of learner-centered and the pedagogy preferred for 21st century education is experiential and experimental learning.This has made teachers and students vulnerable during the COVID-19 pandemic and adversely affected education sector the most, particularly in Bhutan. In addition, Jamtsho and Marck [7] have stated that teachers in our country encounter the difficulties like lack of trained and competent ICT teachers, technical difficulties, low bandwidth and other infrastructural capacity in teaching and learning. Teachers need sufficient ICT skills to implement the technology and to have high confidence level to use it in a classroom setting. Besides, teachers require insight into the pedagogical role of ICT, in order to use it meaningfully in their instructional process [8]. Therefore, there was an urgent need to study teachers' use of ICT in Bhutanese schools including their perceptions of benefits and challenges of using ICT in teaching and learning in relation to COVID-19 pandemic.

1.2 Aim and Objectives

1.2.1 Aim

To explore the perception of geography teachers on the use of ICT in teaching before, during and beyond the pandemic.

1.2.2 Objectives

1. Examine the teachers' use of ICT in teaching geography before and during the pandemic.
2. Analyze the teachers' perception on the use of ICT in teaching and learning.
3. Explore the challenges teachers face in using ICT in their teaching.

1.3 Research Questions

1.3.1 Primary question

How do geography teachers perceive the use of ICT in teaching before, during and beyond the pandemic?
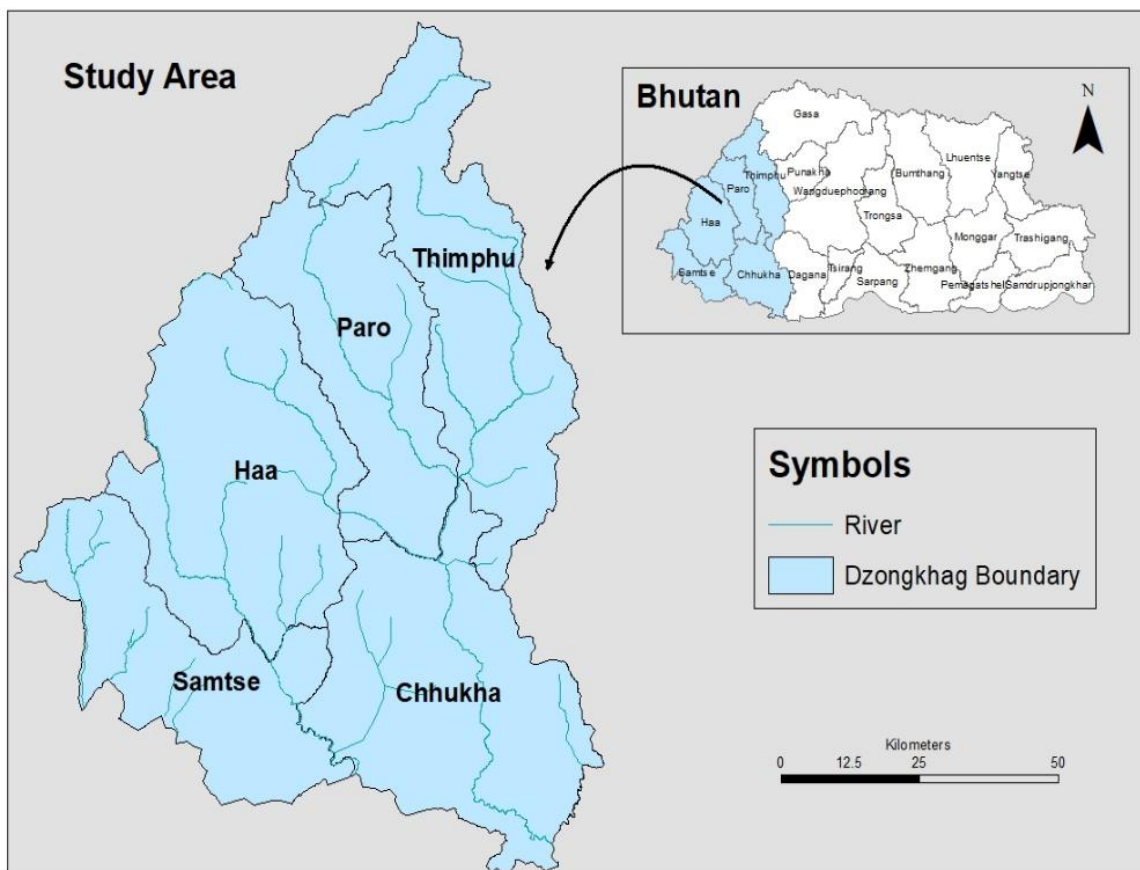

Fig. 1. Study area

1.3.2 Sub-research questions

1. How did the geography teachers use ICT in their teaching before and during Covid-19 pandemic?
2. What are the teachers' perception on the benefits of using ICT in teaching and learning?
3. What challenges do teachers face in using ICT in their teaching?

1.4 Study Area

The study was conducted in the five western Dzongkhags of the country, namely Chukha, Haa, Paro, Samtse and Thimphu. From the five Dzongkhags, a total of 42 secondary schools were selected. The western region has more number of secondary schools in the country. It also has the maximum number of teachers and students. The region also has an equal representation of secondary schools by level (lower, middle and higher secondary) and type (semi- urban and urban).

2. LITERATURE REVIEW

2.1 Information and Communication Technology and Education

The use of ICT has become a motivational instrument in advancing education across the globe. Claro [9] reports that the use of ICT in education helps to facilitate teaching and learning in the school settings. Similarly, Lloyd [10] described ICT as an important instrument in information and knowledge management. In 21st century, teachers need to be empowered to use digital technologies so that we produce lifelong learners and responsible globalized citizens. In addition, Shulman [11] posited that teachers work with a range of different kinds of knowledge, including content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners, knowledge of educational contexts and knowledge of educational ends, purposes and values. Therefore, ICT competency skills and knowledge is essential for teachers and students to be globally competent. Further, Kevin [12] states that technology can transform the classroom into an interactive learning environment.The teaching profession is experiencing drastic changes in the recent times. Furthermore, technology gives opportunities to collaborate with peers resulting in learning from each other. It also promotes communication skills.

2.2 Information and Communication Technology and Geography Education

According to Earle [5], an important part of geography in secondary education consists of abstract knowledge, and therefore it is crucial for teachers to use appropriate information technologies to convey geographical information to students. major influences on the process of map making and geographic information." The nature of the subject and the way data is collected demands that concepts should be taught using various ICT tools such as videos, images, simulations and pictures. According to studies cited by Yadav [13] learners perform better in geography where multimedia has been used. Consequently, the need for teachers to integrate ICT in the teaching of geography is crucial. Further, Kozma [14] insists that good pedagogy is enhanced by the planned and effective use of various forms of digital technology available to the teacher. The geography teacher is expected to bring practical examples, provide audio-visual materials and very important, close the gap between the learner knowledge of the world and the examples expected in class. Some concepts in geography are so abstract and beyond the cognition of many learners therefore, teachers need to make these difficult concepts simpler by bringing teaching and learning aids that simulate reality.

Furthermore, Phuntsho [15] stated, some subjects like geography, English, science and mathematics can be studied excessively comprehensive with ICT facilities. Thus, the learning outcomes and achievements are directly related to the use of ICT facilities.

2.3 Perception of Teachers on the Use of Information and Communication Technology

Perception is the process of receiving information and stimuli from the surrounding environment, then interpreting the information, analysing and categorizing it in the framework of knowledge appropriately. However, Thoha (as cited in Mahdum & Safriyanti, 2019) argues that perception is more complex and broad compared to the sensing process because perception includes difficult interactions from selection,

compilation and interpretation activities. Further, perception also depends on sensing which then occurs as a cognitive process of filtering, simplifying, and changing or perfecting the information received [16].

The COVID-19 pandemic provided with an opportunity for digital learning. E-learning tools have played a crucial role during this pandemic, helping schools and universities facilitate student learning during the closure of universities and schools [17]. The sudden transitioning from traditional face-to-face learning to online learning was an entirely different experience for the learners and the teachers, which they had to adapt with little or no other alternatives available.

Therefore, teachers' perceptions explain the beliefs that teachers have about the relevance of integrating ICT in teaching and learning, and the perceived obstacles that are associated with using ICT in Education [18].

2.4 Benefits of using Information and Communication Technology

The use of ICT tools help the students to access information available in the digital space effectively. As Brush et al. [19] have stated, ICT is used as a tool for students to discover learning topics, solve problems, and provide solutions to the problems in the learning process. ICT makes knowledge acquisition more accessible, and concepts in learning areas are understood while engaging students in the application of ICT. Further, ICT enhances, student-centered and self-directed learning .Students are now more frequently engaged in the meaningful use of computers [20]. Through the access of information online, students are able to build new knowledge. They become more capable to interpret and critically analyze information from various sources. ICT promotes creative learning environment. Further, people can communicate and learn from one another form a distant place, country and continent through various social networking platforms [21].

2.5 Challenges of Using Information and Communication Technology

The diffusion of ICT is still a growing phenomenon in the education sector. It is not surprising that, although it is a leading exercise, its integration within the educational sector is faced with numerous challenges. Gebremedhin and Fenta [22] have admitted that ICT integration into education is faced with numerous

challenges. Similarly, they identified the challenges as a shortage of resources or technological tools, lack of technical support, poor ICT preparation for teachers and lack of encouragement for teachers which may have negative implications on the teachers' perceptions towards the use of ICT in teaching and learning. Similarly Jamtsho and Bullen (2018), in their study Distance education in Bhutan, pointed out that, improving access and quality through ICT use have stated the similar challenges related to Bhutanese context. Furthermore, designing of ICT incorporated lesson require skills, knowledge and strategies.

3. METHODOLOGY

3.1 Research Paradigm

The study was guided by a pragmatism research paradigm since its aim was to explore the Bhutanese Geography Teachers' Perception on the Use of ICT in Teaching Before, during, and Beyond Pandemic. Pragmatism was selected for this study as the researcher employs both inductive and deductive reasoning to investigate the multiple, plural views of the problem and the research questions [23]. Therefore, Owing to its numerous benefits, the researcher has chosen pragmatism to carry out this study.

3.2 Research Approach

Research approaches are plans and the procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation [24]. Therefore, mixed methods research approach was administered for the study so that the research problem is addressed satisfactorily. The researcher specified survey questionnaire for quantitative data collection and focus group discussion for the qualitative data collection in this study.

3.3 Research Design

This study specifically used explanatory sequential mixed methods research design. The intent for this approach is that the quantitative data and results provide a general picture of research problem; more analysis specifically through qualitative data collection is needed to refine, extend or explain the general picture [25]. Creswell et al. [26] state that, this design consists of first collecting quantitative data and then collecting qualitative data to help explain or elaborate on the quantitative results.
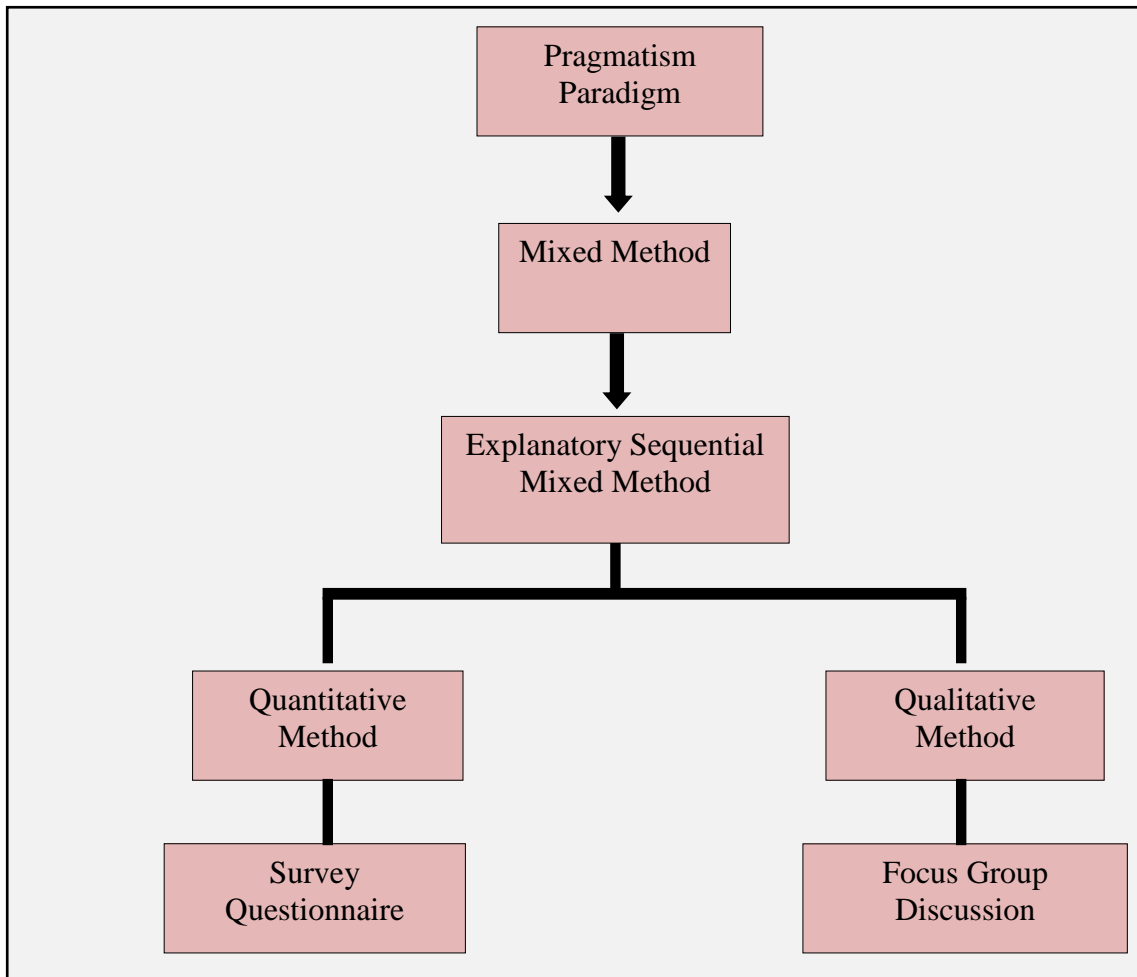
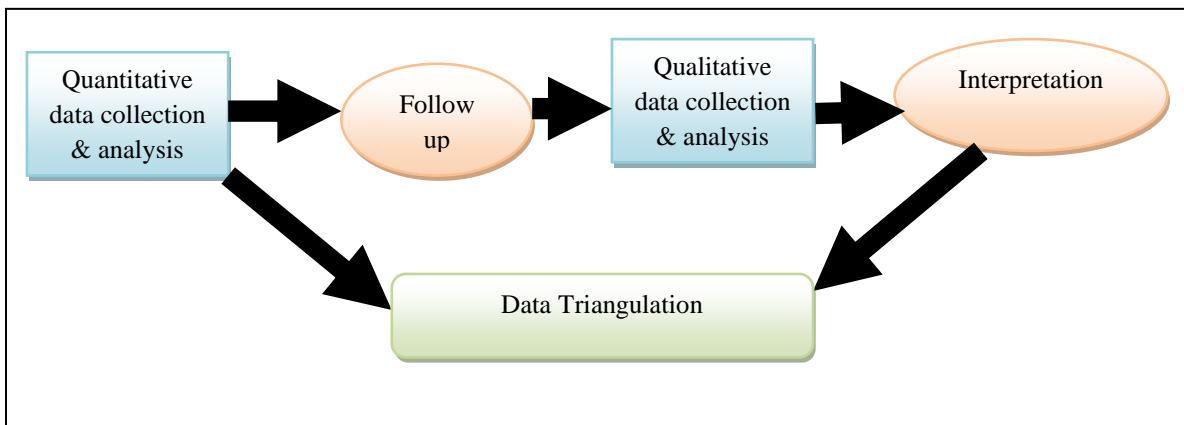**Fig. 2. Conceptual map of research design**

Fig. 2. Explanatory sequential mixed method, adapted from Creswell [25]

3.4 Data Analysis

3.4.1 Quantitative data

The quantitative data collected using questionnaires were analysed using Statistical Package for the Social Sciences-22 (SPSS 22). Before analysing, the data were cleaned for statistical analysis. The selected software (SPSS-22) tool is easy-to-use for quantitative data analysis for coding, annotating, retrieving and reviewing textual data. The software was

utilized to assist the researcher in managing the large numbers of documents of this research, which have combined numerical and categorical information. The quantitative data to find geography teachers use of ICT in their teaching before and during the COVID-19 pandemic were analysed using the Descriptive Statistics in SPSS 22 (Mean and Standard Deviation). Likewise, to find the teachers' perception on the benefits of using ICT in teaching and learning the researcher used Descriptive statistics in SPSS 22 (Mean and Standard Deviation).

3.4.2 Qualitative data

The data collected from FGD were analysed thematically. Thematic analysis is a method for systematically identifying, organizing, and offering insight into, patterns of meaning across a dataset [27] (Patton, 2002).

3.5 Target Population

The total of 84 participants were taken for survey questionnaire, of which 40 are male and 44 are female. 6 male and 6 female (12 teachers) were selected for FGD.

3.6 Research Instrument

According to Creswell [28], an instrument is a tool for measuring, observing or documenting quantitative data that contains specific questions and response possibilities that is developed in advance of the study. In this study, the researcher had used survey questionnaires and focus group discussion as the research instruments.

3.7 Pilot Study

Pilot study was carried out by the researcher to determine the validity and reliability of the instruments. The instruments were piloted to the first year students who are pursuing Masters in Geography. The pilot study contributed in finding recurrence and inappropriate items in the survey questionnaire. It guided the researcher to carry out the coding system which in turn led to evaluation and improvement of the questionnaires as stated by Srinivasan and Lohith [29].

3.8 Reliability and Validity of Instruments

The validity and reliability of the instrument is critical for the research to be authentic [28]. The construct validity of the study is assured in consultation with the principal supervisor. The researcher used various strategies to maximize the reliability and validity of the data collection instruments which consequently impacted the overall quality of the study. The survey questionnaire and FGD guiding questions were vetted by a multiple experts to ensure their reliability and validity, and confirmability and trustworthiness. The instruments were pilot-tested with required size of homogeneous participants. Cronbach reliability test was run on survey items and those items with the alpha value of less than 0.7 was either deleted or modified. The internal consistencies of the questionnaires were measured using Cronbach Alpha coefficient [30]. Initially the result of the Cronbach Alpha coefficient for some themes was less than 0.6 indicating a weak result reliability of the test. As a result, few items were modified which yielded a more positive Cronbach Alpha coefficient of 0.7 and more for all the themes. To maintain the authenticity, originality and reliability of qualitative data the researcher applied member checking process to avoid or decrease the incidence of incorrect data and incorrect interpretation of data.

3.9 Ethical Considerations

All ethical issues that need to be addressed in the whole process of this research were dealt and adhered stringently as per the ethical or research code of conduct and regulations of the Royal University of Bhutan, 2014. The ethical consideration during data collection is considered important. It is important to respect the site in which the study takes place and respect by availing permission before entering a site, with minimal disturbance at the site during a study, and by viewing oneself as a guest at the site [28]. Furthermore, pseudonyms were used, where necessary, to represent teachers in the research narratives.

4. RESULTS AND DISCUSSION

Research question 1: Teachers' use of ICT before and during COVID-19 pandemic

The first item, "I regularly used ICT for my lesson planning", had the highest mean *(M=5.02, SD=1.16)* and *(M=5.24, SD=0.72)* for both before and during the pandemic respectively. The item, "I regularly used ICT to provide feedback to my learners", had the lowest mean (*M=3.85, SD=1.27*) and (*M=4.25, SD=1.29*) for both before and during the pandemic respectively. The

overall Mean for the use of ICT before and during COVID-19 pandemic were (*M=4.57, SD=1.15*) and (*M=4.79, SD=0.99*) respectively indicating that the use of ICT by teachers improved during the pandemic. The Mean had improved across all the items during the pandemic. The teachers had used various digital tools and online platforms for teaching and learning before and during the pandemic respectively.

The qualitative finding revealed that the use of ICT is important in teaching geography as it broadens the horizon of the learners as well as assists the teachers to teach effectively. Teachers had used various digital tools and online platforms in teaching and learning. However, some teachers shared that the use of ICT in teaching geography before the pandemic was minimal but improved during the pandemic due to online teaching and learning. It was due to the paradigm shift of transitioning from traditional face-to-face learning to online learning. Bhutan first declared closing of schools and institutions and reduction of business hours during the second week of March 2020 [31] and the complete nationwide lockdown was implemented from 1 August 2020 [32]. Several schools, colleges and universities discontinued face-to-face teaching and started with online classes. There was a need to innovate and implement alternative educational and assessment strategies. The COVID-19 pandemic has provided us with an opportunity to pave the way for introducing digital learning [33].

4.1 ICT Tools and Platforms Used by Teachers

The quantitative and qualitative findings revealed that teachers used social networking sites for effective teaching and learning especially during the pandemic. Additionally, all the teachers expressed the use of Wechat to send questions for home works for the content taught in the classroom. However, FG 1 stated:

We elaborated the use of flipped classroom as an instructional strategy and a type of blended learning.

The study findings showed that this strategy is found to be effective as it enhances students' engagement and learning skills. It is in consistent with a study by Hunley [34], that mentioned, recently a growing number of teachers have flipped their traditional lecture classrooms and implemented the flipped classroom instructional model to adapt to the changing needs of students in this 21st- century. However, all teachers agreed on the use of Google Classroom during pandemic as it was the most widely used platform and supports both synchronous and asynchronous lessons. FG 1 shared:

We used online platforms like Google Classroom as it supports both synchronous and asynchronous lessons.

Table 1. Use of ICT before and during COVID-19 pandemic

Sl.No	Items	N	Before		During	
			Mean	SD	Mean	SD
1	I regularly used ICT for my lesson planning	84	5.02	1.16	5.24	0.72
2	I regularly used multimedia like images, audios, animations and graphics in my teaching	84	4.61	1.12	4.92	0.96
3	I regularly used Microsoft applications like Word, PowerPoint and Excel in my teaching	84	4.95	1.1	5.07	0.93
4	I regularly used one of the social networking sites from among Face book, Messenger, WeChat, WhatsApp, Blogs , Wikis and Telegram in my teaching	84	4.95	1.11	5.06	0.97
5	I regularly used virtual learning platform like Google classroom in my teaching.	84	4.49	1.16	4.82	0.95
6	I regularly used web based learning applications like maps and interactive websites in my teaching	84	4.14	1.17	4.31	1.09
7	I regularly used online academic materials regularly in my teaching	84	4.55	1.01	4.77	0.91
8	I regularly used mobile applications in my teaching.	84	4.73	1.14	4.87	0.95
9	I regularly used ICT to assess learners learning	84	4.38	1.31	4.62	1.15
10	I regularly used ICT to provide feedback to my learners	84	3.85	1.27	4.25	1.29
	Overall mean		4.57	1.15	4.79	0.99

Likewise, "it has been used effectively for uploading assignments, classroom management, and communication with the students" [35]. Using Google classroom also promotes higher order thinking skills and development of problem solving skills in students. Meanwhile, Mastoni and Rahmawati [36] mentioned that the use of the Google Classroom application can help to facilitate the scholars and students in carrying out the learning process in-depth.

Research question 2: Benefits of using ICT

The ICT incorporated lessons generate more stimulating learning environment making the learning process entertaining and innovative.

The overall Mean (*M=5.27, SD=0.78)* indicates that the use of ICT in teaching and learning enhances the subject knowledge of teachers. Many teachers agreed that the use of ICT makes the understanding of geographical concepts easier with the highest Mean (*M=5.39, SD 0.73).*

Similarly, FG data suggested that the use of ICT in teaching enhances the subject knowledge. The teachers shared, during the pandemic the skills and content knowledge of teachers in ICT enhanced as it was more of exploratory learning.

FG 3 expressed, "The use of ICT really enhances our knowledge as it helps us to remain updated with latest information and current geographical knowledge". The findings revealed that ICT helped in enhancing the subject knowledge of teachers through exploratory and experiential learning. It also revealed that ICT makes the understanding of geographical concepts easier for teachers. This finding is in agreement with the findings of Tatipamul [37].

4.2 Perception of Teachers on Subject Skills

The teachers have agreed with the overall Mean (*M=4.48, SD=0.7)* that the use of ICT enhances subject skills. The second item, "The use of ICT enhances my creativity and innovation skills," has the highest mean of greater than 5.26 suggested that using ICT in teaching enhances teachers' creativity and innovative skills in teaching geography. FG 1 added, "During Pandemic we learnt by self-exploration and our communication and collaborative skills were developed as we had to work as team helping each other. Many of us gained ICT skills along with subject skills. It also promotes communication skills. These factors lead to a positive influence on learning and motivation [12].

Table 2. Perception of teachers on subject knowledge

Sl.No	Items	N	Mean	SD
1	The use of ICT enhances my knowledge of time and space.	84	5.25	0.77
2	The use of ICT enhances my knowledge of physical environment.	84	5.11	0.82
3	The use of ICT enhances my knowledge of people and environment.	84	5.17	0.86
4	The use of ICT enhances my knowledge of essential geographical skills.	84	5.24	0.82
5	The use of ICT helps me to remain updated with latest and emerging geographical knowledge.	84	5.38	0.73
6	The use of ICT makes my understanding of geographical concepts easier.	84	5.39	0.73
7	The use of ICT makes my understanding of geographical processes and relationships easier.	84	5.32	0.73
Overall mean			5.27	0.78

Table 3. Perception of teachers on subject skills

Sl. No	Items	N	Mean	SD
1	The use of ICT enhances my critical and problem solving skills.	84	5.06	0.91
2	The use of ICT enhances my creativity and innovation skills.	84	5.26	0.84
3	The use of ICT enhances my social skills.	84	4.99	0.90
4	The use of ICT enhances my communication skills.	84	5.04	0.83
5	The use of ICT enhances my lifelong learning skills.	84	5.25	0.77
6	The use of ICT enhances my spatial analysis skills.	84	5.13	0.72
7	The use of ICT enables me to use essential geographical skills in my daily life.	84	5.12	0.72
8	The use of ICT enhances my collaborative skills.	84	5.05	0.79
Overall |Mean			4.48	0.7

Similarly, the qualitative data findings indicated that using ICT in teaching geography enhances subject skills. All the teachers asserted using ICT in teaching boost creative thinking, enquiry skills and spatial analysis skills. FG 1 added, "During Pandemic we learnt by self-exploration and our communication and collaborative skills were developed as we had to work as team helping each other. Many of us gained ICT skills along with subject skills."Similarly FG 1 and FG 3 added:

> We carried out blended teaching with self made videos using Camtesia and that really made our lesson interesting. Students were motivated to learn. It was an opportunity for us to enhance our skills on video editing, presentation, communication and creativity. ICT skills help to investigate, organize, edit and present geographical information in different ways.

Research question 3: Challenges Faced by Teachers in Using ICT in Teaching

4.3 Inadequate Resources and Facilities

The research findings revealed that all the teachers expressed their concern of many challenges that they are facing in using ICT in teaching and learning. It is evident from the qualitative data that most schools lack resources for effective use of ICT in teaching and learning. For instance FG 1 and FG 2 pointed, "Resources are one of the greatest challenges in the schools. We do not have enough computers, laptops, projectors, cameras; software to carry out our teaching productively. It really hinders the smooth conduct of classes."On the similar note FG 3 added, "Internet bandwidth is relatively low with lesser access points, and data packages are costly thus making accessibility and affordability inadequate." The finding is in consistent with the finding of Empirica's [38] where European study found that lack of access is the largest barrier and different challenges to using ICT in teaching were reported by teachers, for example lack of computers and lack of adequate material.

4.4 Time Constraint

The study findings showed that time constraint was one of the most important factors that affected the use of ICT in teaching. All the teachers expressed, "One of the most important factors is time as most of the schools have just 40 minutes class and it's not sufficient to teach ICT integrated lessons." On the similar note, FG 3 added, "Inorder to make interesting and interactive lessons incorporating ICT, it takes a lot of time in preparing it. This is because we lack skills and knowledge."

According to Sicilia [39], the most common challenges reported by all the teachers was the lack of time to plan technology lessons, explore the different internet sites, or look at various aspects of educational software.

4.5 Affordability

All the respondents shared that they could not support students' education, purchasing mobile, recharging data. Many academically excellent students could not perform well during pandemic as their parents could not afford smart phone. The study revealed that one of the inhibiting factors in using ICT in teaching and learning is the affordability. The socio- economic status of the student's families have a direct correlation with the online learning participation. [40]. Further, not having a right tool like computer or laptop makes the learning process painful and strenuous, as access is only through the smart phones that too are sometimes shared with parents [41]. Online learning is directly influenced by the availability and accessibility like internet connections and data packages which further depends on the financial resource of the family. Weak internet connection and sharing gadgets for those students who have more than one sibling in a family is a nightmare for online learning [42-46].

5. CONCLUSIONS

The study explored the Bhutanese geography teachers' perception on the use of ICT in teaching before, during and beyond pandemic. In this digital world, it is very important for students to learn and acquire 21st century skills. In order to be globally competent, students need to have ICT skills and knowledge. So, in order to fulfill the needs and demands of the students, the use of ICT in teaching and learning is crucial. The study explored some of the uses and benefits of ICT for teachers and students.

In general, the teachers have positive perception for the use of ICT in teaching and learning. The use of ICT in teaching and learning enhanced during the pandemic as the series of lockdown has made online education indispensable to continue the education for schools and colleges in the lockdown region of Bhutan to keep students meaningfully engaged.

6. AREA OF FURTHER RESEARCH

I would suggest that further research can be done on the same topic including all the teachers of secondary schools across the country. Students, parents and other relevant stakeholders can be included to obtain valid and authentic information. The other area for further research could be finding out recommendations and suggestions from teachers to strengthen ICT usage in schools in teaching and learning. Further, implement appropriate Professional Development programmes and training for geography teachers on the effective use of ICT in teaching and learning.

7. SIGNIFICANCE OF THE STUDY

This findings of the study would help geography teachers to understand the importance of incorporating ICT in teaching and learning. At a national level, the findings of this study would have huge potential in providing directions for formulation of policies regarding the use of digital technology. Furthermore to the Ministry of Education and DCPD to provide more information on teachers' perception, opportunities, challenges for further strategic planning at times of Education in Emergency on the use of ICT. Finally, the findings of the study besides adding to the existing knowledge and literature on technology driven teaching and learning practices would pave ways for future researchers to venture into research and scholarly exercises in the use of digital technology in teaching, learning and assessment across all levels of education in Bhutan.

8. LIMITATIONS OF THE STUDY

There is limited literature on the use of ICT in teaching learning geography in Bhutanese schools due to the paucity of previous studies. The literature used for this study were mostly drawn from other countries and contexts. Since the data were collected from the secondary geography teachers of the western region of the country, the findings of the study would not represent the views of teachers from other regions. Further, besides teachers, the findings donot include the views of school leaders, students, and other relevant stakeholders.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

All ethical issues that need to be addressed in the whole process of this research were dealt and adhered stringently as per the ethical or research code of conduct and regulations of the Royal University of Bhutan, 2014.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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