CHAPTER I
INTRODUCTION

This section includes introduction of Relevancy of Online Classes in Mathematics Education, statement of the problem, objectives of the study, research questions, significance of the study, delimitations of the study and operational definitions of the key terms. These components are presented as following.

Background of the Study

Since December 2019, the world has witnessed a radical change in all spheres of life. From the time when the first case was recorded in Wuhan China, the current pandemic called Corona virus has become the first-class topic of debate amongst individuals, public, non-government institutions, on the social media, internet and in the news around the world. Unfortunately, statistic associated with the spread of the pandemic continues to rise in many countries like the United States of America, and Canada and in other continents including Europe, and Africa (World Health Organization, 2020; New York Times, 2020). This pandemic has brought many changes across various industries and about how people live, socializes, and run daily activities (Coulthard, 2020). With the quick response from many governments around the globe, almost everything is being cancelled, shutdown, and postponed. Schools, universities, all public, and private events are being prohibited; social distancing is observed as proactive efforts put in place to contain the further outbreak and spread of the Corona virus in more than one hundred countries of the world. Millions of the students in Nepal and around the globe became out of the face to face classroom by learning from home. It must be noted that with the outbreak of the virus, all things have changed; the teaching and learning practice has come into the home now. For these students to continue with their education, all classes went online, millions of students have begun learning through the internet and digital tools. Therefore, online education is considered as an essential tool for simplifying the teaching and learning process.

Technology is a vital component of teaching and learning in the 21st era. The expanding use of technology in teaching and learning has improved methods of teaching from traditional to the most flexible methods, (Sun & Chen, 2016; Onyema& Deborah, 2019). Technology influences remote education, virtual learning, distance

learning, mobile learning, cooperative learning and machine learning. Each aspect of education is adopting digital, and students, as well as education stakeholders, are challenged with the transition to online learning. The application of technologies in education increases the accessibility to learning resources such as online courses and many other programs to meet the need for distance learning (Onyema, 2019). Nguyen (2015) has defined online learning as a wide range of curriculums that practice by using the internet to facilitate instruction and provide materials as well as interactions between teachers and students or among the group of students. On the other hand, online education conceptualizing as a general way of teaching and learning online with the help of digital platforms and technology tools. Online education noted online teaching and learning originates from and distance learning and the development of digital technologies which facilitate instructional activities by using the internet. The success of learning online depends on digital skills, availability of educational technologies and good internet networks in the learning environment. There are many platforms or tools that educators and learners use in online learning. Some of these technologies are Zoom, WhatsApp.com, Skype.com, Youtube.com, and Google classroom. The application of these technologies in education influence online learning and accessibilities of learning and teaching materials through the internet. The internet has made teaching and learning conceivable, and many educators and scholars are interested in online learning to enrich accessibility of learning resources and improve students' learning, mainly in Higher learning (Horn &Staker, 2011), portrayed that online learning is a form of distance education which has been a practiced in America and has become the most important aspect of distance education in recent years. The development of online learning in higher learning does not happen overnight. There are main factors that influence higher learning institutions to offer online teaching and learning. These factors including meeting the need of students for the flexible program, shortage of educators and the need for increasing students enrollment (Sun & Chen, 2016). In another way, war, economic crisis as well as the outbreak of diseases can also be considered to be a great catalyst for the expansion of online education in higher learning institutions around the world.

In online mathematics courses, the display of the mathematical concepts, problems and process steps of the solutions and effective realization of the student-teacher interaction are two factors that affect learning outcomes (Karal et al., 2013).

In learning about ways of mathematical thinking, logical inference and discussion of alternative solutions via student-teacher interaction constitute the basic principles of mathematics education (Baki, 2006). In addition, writing is a must for doing mathematics (Artemeva& Fox, 2011). Radford (2008) emphasized that mathematical thinking occurs through a sophisticated semiotic coordination of speech, body, gestures, symbols, and tools. In online distance learning, students and teachers are integrated into the system via a computer; the computer screen is used for reading and the keyboard for writing (Bernhardt et al., 2004). It is difficult to achieve sufficient interaction in an online learning environment by displaying mathematical concepts and symbols, which play a significant role in mathematics education, solely through use of a keyboard. This seems to be a limitation in the process of learning mathematics by online learners. Prior research reveals that mathematics instructors can have difficulty when explaining mathematical concepts visually in blended and online distance mathematics course (Glass & Sue, 2008; Karal et al., 2013). This situation brings to mind that the pen-based technologies which digitize and computerize handwritten notes through the use of pen-based technologies as digital ink or digital handwriting. Pen-based technologies may have potential to solve many issues in online mathematics course (Karal et al., 2013). By using pen-based technology, online mathematics teachers can write digitally, save notes easily for archiving, and transfer the notes to the digital screen by software. When online teacher handwrites on any printed paper with digital pen, online students can see the handwriting synchronously in online learning environment. Therefore, studies need to be conducted on whether the limitations of online mathematics courses (such as interaction, feedback and symbol display limitations) can be eliminated via digital pen-based technologies.

With the beginning of the lockdown to control the Covid-19 outbreak, many educational institutions have started switching from traditional classroom teaching to online teaching to cope with the adverse situation. Tribhuvan University (TU), the largest and oldest university in Nepal, has also officially endorsed the virtual class model along with a guideline and circulated a notice among its institutions. Similarly, the Ministry of Education, Science and Technology has appealed to stakeholders to start classes through alternative systems. Various news media and relevant stakeholders have argued for the need for promoting such classes.

Nevertheless, there are some critical questions in the context of Nepal. Do all students have access to the quality internet to attend the classes without disturbance? Are the teachers well equipped and trained enough to run the virtual classes effectively? Moreover, are all the students able to use this opportunity of distance learning? By online classes learning mathematics is easy or difficult there is raises many questions. By online classes enhances the quality of mathematics. What are the student's attitudes towards: Online classes learning mathematics, teaching learning activities of online mathematics classes, availability of internet facilities and evaluation system of online mathematics classes?Most online education scholars have determined that because of the nature of online courses, communication is of primary importance to student success. They argue that effective communication between instructors and students must be established to motivate students to learn and to facilitate cognition processes in online environments (Brindley, Walti, &Blaschke, 2009; Jackson, Jones, & Rodriguez, 2010). The current literature suggesting the influence of the instructor on student success, the questions that remain are, what are student perceptions about online mathematics courses, and how can the results impact the development of pedagogy to create positive online learning environments that encourage mathematics students to learn? So, many researchers have concluded that mathematics online classes are more complex rather than other subject. Therefore, these profiles mentioned above help to measure the Relevancy of Online Classes in Mathematics Education**.**

Nowadays the students of mathematics education have been aware about the facilities and the academic excellence of the institutions. Students are not satisfied with the traditional teaching learning approach. There is a demand of ICT based teaching and learning. The academic achievement of students is decreasing day by day. In this context Tribhuvan University, the department of mathematics education should pay attention about the satisfaction of the students. Based on this reality this research has tried to identify the factors which affects the student’s satisfaction and it may be helpful to make strategic planning and to motivate the students of Tribhuvan University in the days to come.

Statement of the Problem

This research study attempts to find out to better understand student perceptions about online learning mathematics. Specifically, the purpose of this study

is to analyze student barriers to online learning in mathematics education in the context of Nepal. Moreover, a purpose is to analyze the opportunities do students entertain while taking online class in mathematics education. Nepal is a developing country, which is still behind in employing technology for learning mathematics. The government of Nepal emphasis integrating technology in online teaching and learning mathematics (MOE, 2072) and Tribhuvan University, the largest and oldest university in Nepal, has also officially endorsed the virtual class model along with a guideline and circulated a notice among its institutions. Similarly, the Ministry of Education, Science and Technology has appealed to stakeholders to start classes through alternative systems. What are the student's attitudes towards: Online classes learning mathematics, teaching learning activities of online mathematics classes, availability of internet facilities and evaluation system of online mathematics classes? Are the research problems of this study.

The advent of new technologies is providing educators with opportunities tocreate a variety of effective learning environments; however, many students still prefer traditional, academic settings. However, a major barrier to the growth of online courses is Low retention rate across all types of institutions (Allen & Seaman, 2013). As more students are growing up familiar and comfortable with internet-based technologies, many students are still opposed to taking online mathematics courses. A need exists to examine the challenges students perceive, and what can be done to meet student expectations. Students are increasingly being offered online educational experiences, whether through hybrid mathematics learning environments or a shift in greater use of technology even in the traditional classroom environment. Thus, a need to define the real difficulties that students have in taking online mathematics courses exists along with determining pedagogical approaches that can address those difficulties and increase the likelihood of a successful online teaching and learning. This current research identifies and builds upon specific areas of online mathematics education that students perceive to be unclear or ambiguous and thus present barriers for their successful learning.

This research also focuses on to analyzing student perceptions of online classes in mathematics education. Little research exists that provides an analysis of student approaches between these groups of students in a single study. The purpose of this study is to analyze student barriers to online classes in mathematics education in

the context of Nepal and to analyze the opportunities do students entertain while taking online class in mathematics educationand offer suggestions for improving the online learning environment.

Objectives of the Study

Every research needs the objectives. Without the destination, nothing can be achieved. Therefore, the researcher was keen interested to meet the following objectives.

i. To analyze student's barriers to online learning in mathematics education in the context of Nepal.
ii. To analyze the opportunities that students entertain while taking online class in mathematics education.

Research Questions

The Research questions of my study are:

i. What are the barriers do students encounters while taking online class in mathematics education?
ii. What are the opportunities that students entertain while taking online class in mathematics education?
iii. What is the student's perception about quality of online classes in mathematics education?

Significance of the Study

Each study is important for the institutions, scholars, professors and students. This study will reveal the relevancy of online classes in mathematics education. Similarly, it will also display student barriers to online learning in mathematics education in the context of Nepal. So, this research study will be significant to the students who are learning mathematics by online classes and the student to reform their way of learning. This study will also be useful to the researchers who want to conduct research works in the similar fields. Textbook writers, curriculum designers, methodologists can develop related idea while designing courses, textbook materials,and their study. At last, this study will be significant to the student teachers to develop the good way of teaching.

The use of online classes in mathematics education can make the teaching process more effective as well as enhance the student's capabilities in understanding basic and innovative ideas about every branches of mathematics. This study has following significance.

i. To understand the attitude of students towards online mathematics classes.
ii. To analyze student barriers to online learning mathematics in the context of current literature on online classes.
iii. To analyze the opportunities that students entertain while taking online class in mathematics education.
iv. It also helpful for improve the teaching learning situation in the context of negative attitude and further research towards online mathematics classes.
v. This study provides the important information to the instructor in applying online mathematics classes.
vi. It was helpful for national policy maker, mathematics curriculum, administrators, and all other concerned personal dents to it.

Delimitations of the Study

Delimitations are boundaries that are set by researcher to control the range of the study. The proposed study will be limited to the following aspects:

i. This study was limited in master level of Tribhuvan University in Nepal.
ii. This studywaslimited only the master level students of mathematics education.
iii. This study was limited to the relevancy of online classes in mathematics education.
iv. The study was limited to the data collect from questionnaires and interview.
v. It was limited to 100 (respondents) master level students of Tribhuvan University Nepal.

Operational Definitions of the Key Terms

Operational definitions are such types of terms which decide to measure the variables in the study. In another way operational definition is the articulation of operationalization (or statement of procedures) used in defining the term of a process

needed to determine the nature of an item or phenomenon and its properties. In this study the following are the operational terms of the study.

Hybrid course: A course in which the instructor deliberately replaces some face-to-face instruction with online activities.

Master Level Students: The persons who have studied in master level of Tribhuvan University department of mathematics education.

Online class: An online class is a course conducted over the Internet. They are generally conducted through a learning management system, in which students can view their course syllabus and academic progress, as well as communicate with fellow students and their course instructor.

Online course: "A course where the instructor has replaced all in-class instruction with online instruction. Students and instructors never come to class" (GVSU, 2015).

Relevancy: The tendency of fact offered as evidence in lawsuit to proves or disprovethetruth of a point in issue. In my research the meaning of relevancy is depend on conclusion if students had positive attitude towards my research then the online class is relevancy in mathematics education.

CHAPTER II

REVIEW OF RELATED LITERATURE AND CONCEPTUAL FRAMEWORK

Review of related literature is an essential part of the research for the researcher because related literature helps and guides researcher to meet the motto of the study. A summary of previous research and the writing of recognized experts provide evidence that the researcher is familiar with what is already known, and with what is still unknown and untested. Since effective research must be based upon past knowledge, this step helps to eliminate the duplication of what has been done and provides useful hypothesis and helpful suggestions for significant investigation. The review of related literature should conclude with the summary of area of agreement and disagreement in findings. Review articles, that summarize related study, are often useful ensuring time and effort. By understanding a literature review we can critically summarize the current knowledge in the area under investigation, identifying and strengths and weaknesses in previous work. By reading many different studies, we will begin to gain an impression about the important aspects of the topic, identify data sources that other researcher has used, identify,and become familiar with style of writing that is used-particularly within the ethos of the area that we are researching, identify ideas for further consideration and create our own reading and critiquing strategy.

So, I have collected some books, journal, seminar paper, thesis, articles, research which are related to relevancy of online classes in mathematics education. By deeply study of these resources, I am going to review the related literature as follows.

Review of Related Theoretical Literature

A theoretical framework guides research by sing ‘what work’ in the experience or exercise of doing something by those directly involved research studies. After reading literature, several theories have been developed from different perspective. The information has obtained from different literature is sorted under the main themes and stories:

Constructivist theory

The literature reviewed and the associated problems and possible solutions that answer to student perceptions about online mathematics classes align with the Constructivist theory and its teaching models. Murphy (1997) summarized 16 characteristics of Constructivism, three of which are primarily represented in this review of the literature:

i. Teachers serve in the role of guides, monitors, coaches, tutors and facilitators.
ii. Student problem-solving, higher-order thinking skills, and deep understanding are emphasized.
iii. Learning takes place in individual contexts and through social negotiation, collaboration, and experience. Koohang (2009) adapted Murphy's (1997) characteristics into an advanced model of Constructivism in e-learning environments.

The three components determined are:

1. Design of Learning Activities, which includes collaboration, cooperation, multiple representations of ideas, and social negotiations.
2. Instructor's Roles, which are mentoring, acknowledging, providing feedback, and assessing student learning.
3. Learning Assessment, either conducted by the instructor, through collaboration, or by the student himself.

Educational technologies are used not just to control learning, but the mainPurpose is to make the learning process easier by creating an effective learning environment (Jackson, Jones, & Rodriguez, 2010; Januszewski&Molenda, 2007). Thus, a Constructivist model applied to educational technology would encourage more creation within learning environments and avoid using technologies to control learning (e.g., presenting information and delivering drills and practice). Theoretically, technology is more useful when it is used by students to identify a problem with the appropriate tools for the purpose of supporting learning.

A Constructivist approach suggests that students bear the weight of making meaning from course content and their own learning. The literature suggests the role of the instructor as guide, mentor, facilitator, and coach needs to be reassessed and better determined (Grundmann, Wielbo, &Tebbett, 2010; Januszewski&Molenda,

2007; Zen, 2008). Based on these components of the Constructivist theory and the specific nature of online courses and e-learning environments, three areas that deserve special attention and which are addressed in this literature review are collaboration (i.e., between students and instructor and students to other students), methods of content delivery, and teaching approach models.

Research and Evaluation

Student Motivations

Several studies were done to understand the rationales behind students' success in online/hybrid learning mathematics. Duncan, Range, and Hvidston (2013) find that student perceptions of a rigorous curriculum provide the motivations for success. A rigorous curriculum is defined as having clear definitions of goals and learning outcomes. Literature also reveals that an instructor should consider different methods than those used in traditional settings to engage students in online learning (Brocato, Bonanno, &Ulbig, 2015). This research shows that a high level of frustration emerges when a course is organized poorly, and students spend too much time searching for necessary information. Unclear expectations or changing learning goals frequently during the class demotivates students and causes confusion about course objectives (Duncan, Range, &Hvidston, 2013). This research identifies the prerequisites for successful online learning, which are course clarity and organization.

Students also indicated engagement as a rigorous component of a course. According to the research, students' motivation increases in a class when they have an opportunity to interact with peers, as well as the instructor, and gain exposure to other perspectives (Duncan, Range, &Hvidston, 2013; Palmer, & Holt, 2010). Instructors must participate actively and engage with students, which means they must be available for learners and gain their trust and confidence (Brocato, Bonanno, &Ulbig, 2015). Student motivation increases when learners can construct relative knowledge and demonstrate learning. Thus, student motivations towards online learning mathematics are enhanced with clear organization, communication, interaction, and presence of the instructor.

Communication

Communication is an important part of any educational endeavor. Students need to collaborate with their instructor and their peers to be successful in an

academic course (Brindley, Walti, & Blaschke, 2009; Chen, Bennett, &Maton, 2008; Driscoll, Jicha, Hunt, Tichavsky, & Thompson, 2012). One of the primary and inherent features of an online course is the absence of a physical environment, which would more naturally encourage communication. An online course provides students with unique opportunities for building communities, in which students can ask questions, challenge each other, and also construct new knowledge (Bryant & Bates, 2015), which is imperative for a constructivist approach to learning. Therefore, a course designer is responsible for determining the collaborative tools that can be used for communication in an online course. In this section of the literature review, distinct challenges to determining and arranging the collaborative component of an online course are discussed, and possible solutions are explored.

Communication can occur synchronously or asynchronously. Synchronous communication means the communication is taking place in real time, as would be found in a traditional, face-to-face classroom. Methods of accomplishing similar communication in an online course would require videoconferencing or virtual sessions. Examples of programs that facilitate synchronous communication are Blackboard Collaborate, ooVoo, and Google Hangouts. Asynchronous communication happens when there is a time delay between initiated communication and subsequent responses between an instructor and students or between students. Examples of asynchronous communication methods are email and discussion boards. Both synchronous and asynchronous activities allow students to exchange ideas with other students and with the instructor, which is why better understanding of the barrier'sstudents face specifically related to communication and collaboration is important.

Communication and collaboration are considered the most important aspects of meaningful online mathematics learning and the most problematic (Brindley, Walti, &Blaschke, 2009; Chen, Bennett, &Maton, 2008; Durrington, Berryhill, & Swafford, 2006; Martin, Parker, & Allred, 2013; Martin & Parker, 2014). Because of the complexities involved, some researchers look only at synchronous tools (Martin & Parker, 2014; Wang & Reeves, 2007), others at solely asynchronous (Gao, Zhang, & Franklin, 2013; Licona, 2011; Wang, 2010), and a lack of research in terms of the effects of combinations of tools exists.

Synchronous communication

Real time communication between students and an instructor is supported in an online environment by many features such as audio, video, text-chat, interactive whiteboards, application sharing, instant polling, emoticons, and breakout rooms (Martin & Parker, 2014). However, there are no suggestions for implementing the whole array of functions available in educational tools to make a virtual class engaging for students. When given access to synchronous communication tools with a variety of functions, students tend to exploit the array of features, and when technical problems occur, they can easily go beyond the limits of what an instructor can troubleshoot (Warden, 2013). In fact, utilizing too many technical features ultimately creates a work overload for an instructor (Warden, 2013). Instructors benefit from determining technical features that are most beneficial to students and their learning, and not providing too many options.

Videoconferencing can be successful because it provides a platform for students and instructors to communicate with body language and nonverbal communication in addition to words and other traditional teaching techniques such as demonstrations, screen sharing, and presentations online (Wang & Reeves, 2007). However, care must be employed because students can become distracted or confused in a virtual environment (Warden, 2013). Although students are well versed in watching video on demand and playing immersive video games, they lack experience in formal synchronous learning environments (Cole, 2009). Warden (2013) describes the various issues that arise from students who passively engage with technology from failing to download material to not learning to use software prior to class. Instructor intervention is needed to provide students with technical support or instructions on receiving support elsewhere. Instructors and students benefit from understanding what to do if audio or video are not working properly (Martin, Parker, & Allred, 2013).

While research for synchronous video communication is lacking in the literature, relying solely on a videoconferencing tool creates an environment for passive participation, and a lack of alternative options for communication means students' technical problems can be difficult to solve or even explore (Warden, 2013). Wang and Morgan (2008) found the strongest effect of instant messaging in videoconferencing tools was that instant messaging promoted a higher degree of student cooperation. While technical problems are associated to a greater extent with

synchronous communication tools because of bandwidth requirements and commonly poor audio quality (Warden,2013), a few additional tools can be used, such as instant messaging and instructional slide presenters, to maintain student focus, promote cooperation, and allow for alternative means of communication.

Asynchronous communication

Participation in discussion boards, wikis, journals, and blogs is associated with a wide variety of cognitive and social activities (Gao, Zhang, & Franklin, 2013). Thus, most online courses utilize asynchronous communication tools. Gao, Zhang, and Franklin (2013, p. 472) explain that meaningful participation in a discussion board requires the following four characteristics:

1) Discuss to comprehend.
2) Discuss to critique.
3) Discuss to construct knowledge.
4) Discuss to share.

Thus, students should be able to contribute various perspectives and thoughts in an online setting, and in turn receive critique. Consequently, discussion should ensue to build knowledge and understanding. When any of these components are missing students are restricted in sharing their ideas, and this environment can quickly become superficial or artificial. The purpose of asynchronous communication is to promote peer interaction and facilitate the sharing and distribution of knowledge and expertise among a group of learners. Thus, creating online communities where students work together to achieve common academic goals and work towards objectives related to the coursework is a purpose of online teaching (Mackey, 2007).

Many studies offer insights into student perceptions regarding the use of discussion boards and wikis in online courses (Cole, 2009; Durrington, Berryhill, &Swafford, 2006; Gao, Zhang, & Franklin, 2013, Jun & Park, 2003). Students note an inability to start an initial topic in collaborative discussion boards as a restriction (Jun &Park, 2003). Self-confidence issues arise because of lack of preparation, which results in a failure to post informed responses. Although students are comfortable and familiar with interacting in an online environment, many studies suggest that they are specifically comfortable with passive social networking behaviors (Cole, 2009; Durrington, Berryhill & Swafford, 2006; Wang, 2010).

Some students require additional support with postings, articulation of ideas, and overall communication in the class. A student in Chen, Bennett, and Maton's (2008, p.315) study stated, "Everyone talked about their own situations and their opinions, and without the teacher's comments, I didn't know whom to listen to." When class discussion is taking place, the instructor must participate; otherwise, the forum can easily appear to be disorganized. For example, Licona (2011, p. 7) writes that, "Pedagogical practice is informed by the immediacy of action and presence of instructor in the online learning space, thus fostering collaboration in numerous ways." To increase student participation, an instructor can ask questions and provide feedback directly related to a student's contribution (Durrington, Berryhill, & Swafford, 2006). Instructors should participate in discussion boards to motivate and encourage students to continue to participate.

Several tools are needed to keep students engaged and motivated in collaboration with other students. When using collaborative tools as a form of measurement of participation, one tool can likely be too limiting (Gao, Zhang, & Franklin, 2013). Most students currently use social networking skills for fun or consumption purposes, not for engaging in communal learning behavior with other students (Cole, 2009, p. 145). As are instructors should create a space and exercises for students to practice editing, publishing, and posting content through any communication tool being utilized (Cole, 2009).

Asynchronous communication tools are much more prevalent in the literature compared to synchronous tools. This lack of research on synchronous tools may be the result of perceived technical challenges. Regardless of the communication structure, students' technical and personal constraints in addition to a general lack of interest, limit their participation and contributions to these virtual communication platforms (Cole, 2009).

Content delivery

"Not every situation benefits from becoming an open discussion or collaboration forum" (Cunningham &Leuf, 2001, p. 30 as cited in Cole, 2009). Virtual environments have several options available for instruction and other content and guidelines that need to be delivered. Content can be delivered through a variety of

ways using digital technologies. The platform used, whether learning management system or website, may determine the extent to which each can be utilized.

Broadcasting technologies (Pod-, vod-, and screen- casts) seem to be appropriate for developing effective learning environments. There is no answer about what combination of methods of content delivery works best for students. Experts recommend using various content delivery methods to meet student expectations and make it possible to implement different learning strategies (Brown, Brown, Fine, Luterbach, Sugar, &Vinciguerra, 2009). Additionally, using a combination of technologies and pedagogies tomotivate students to learn is recommended (Brocato, B. R., Bonanno, A., &Ulbig, S.2015; Zen, 2008).

Role of the instructor

Warden (2013) concluded that learning takes place best when the environment is centrally controlled by the instructor. This control minimizes many of the technical problems associated with online courses by providing training and advice to students on using the equipment properly (i.e., checking audio and video). Warden also concluded that students still have significant opportunities in these controlled environments to construct their learning, and as their technical capabilities develop, they can explore situations of greater student-centered control. An instructor is ultimately the main component behind the success of an online course (Zen, 2008).

Instructors cannot assume that students (Prensky, 2001) know how or are comfortable using formal educational technologies even though they are growing up with internet-based technologies. Even students seeking degrees in information technology need guidance and instruction on how to use these learning technologies (Cole, 2009). According to Zen (2008), the instructor is responsible for ensuring that students understand how to use any tool selected for learning. However, an instructor should not simply choose a tool without designing course content around the use of that tool (Cole, 2009). When developing the course, special attention should be given to deeper insight into the learning environment in terms of the needs of all learners, their access to resources and information, social and cultural involvement of the implementation of information technologies, alternative learning environments, and related policy development (Zhu, Valcke, &Schellens, 2009).

One-way instructors can guide students through formal educational technologies is by creating a separate space and exercises for students to practice peer-editing, publishing, and posting content through any combination of tools being utilized (Cole, 2009). Another approach is to require training or a prerequisite module that teaches and assesses students' use of all available tools. Course designers (and instructors) cannot assume that every student will successfully grasp the ability to understand technical terminology and acquire all technical skills during the first few online lessons.

The instructor's role in an online course includes activities related to setting up the collaboration area, developing and disseminating clear instruction for task completion, and facilitating learning activities during the course (Cho &Rathbun, 2013). The initial role of the instructor is to provide students with clear instructions and articulation of the tasks in a manner such that students know their expectations and are prepared for the knowledge they are going to be expected to learn. In response, students are expected to take control of their own learning and use their previous experiences to complete course tasks (Stansfield, McLellan, & Connolly, 2004).

Creating guidelines and instructions do not hinder student creativity and learning because this information helps students navigate through the course and provides students with needed explanations about course documents, assignments, and overall course expectations. Constructing a well-defined space for learning gives a strong foundation from which students can build their own learning and creativity. An instructor must first present the boundaries and guidelines to better enable student success.

Conclusion

The theory of Constructivism was chosen as a theoretical basis for examining student perceptions and barriers to online education and the opportunities that students entertain while taking online class in mathematics education. This theory suggests that students can effectively build their knowledge based on prior experience and class activities (Januszewski&Molenda, 2007). In this study the theory is based on using technology in the creation of effective learning environments. Building collaboration between the instructor and students is known to be a crucial component

of an online class (Durrington, Berryhill, & Swafford, 2006; Gao,Zhang, & Franklin, 2013; Martin & Parker, 2014). An instructor can use many supporting materials to deliver content. These tools can be created and disseminated using various technologies. Questions remain about the combination of tools that can make the learning process motivational and effective for students. The instructor or course designer should understand supporting materials to help students learn information clearly while successfully meeting the learning goals. The tools that students are comfortable using in an online course must continue to be examined. With stronger data about student perceptions to the relevance of online classes for learning mathematics education, instructors can gain knowledge about building more effective online mathematics courses and experiences that motivate students to learn and advances their knowledge and skills.

Social Constructivist Learning Theory

Social constructivist learning focuses on the effects of social interactions, language, and culture on learning. Vygotsky argued that all cognitive functions originate from social interactions. This interaction is very important in a learning process which connects well with online learning mathematics groups. Social constructivism explains the processes of learning in three concepts: the zone of proximal development, inter subjectivity and enculturation (C. T. Fosnot& R. S. Perry, 2005).

1. The zone of proximal development was defined by Vygotsky as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (L. S. Vygotsky,1978). This is applicable with learning groups since the more knowledgeable peers can help in scaffolding others. This is equally applicable when the facilitators extend help to the learning group members. Facilitators do this through provoking the learners within the groups through questioning to assist learning.
2. Inter-subjectivity is the mutual understanding that is achieved between people through effective communication. This agrees with online learning mathematics groups which require effective communication during interaction.

3. Enculturation is the process whereby the currently established culture enables an individual to learn the accepted norms and values of the culture or society in which the individual lives. Through social interaction, learners can co-create solutions in what is called collaborative working which leads to collaborative learning.

George Siemens' Connectivism Learning Theory

This paper will apply George Siemens' Connectivism Learning Theory (Siemens, 2005) to a variety of educational settings and illustrate ways in which educators and academics can and have used technology platforms to share their work and engage in public conversations. George Siemens' Connectivism Learning Theory was written on his blog, elearningspaces.org, originally in 2004. Over the next year he received feedback from other academics, and in 2005 updated the theory based on feedback from others. Today this learning theory has been adopted by institutions of learning and has created the Massive Open Online Courses (MOOC) movement. Many institutions of learning that understand the changing landscape of how people learn, where they learn, and what they want to learn, have created websites like Edx, https://www.edx.org/, where anyone can take a course and/or engage in public discourse around a given topic. These MOOCs create a community of learners who continue to push the conversation forward. Siemens' Eight Principles of the Connectivism Learning Theory:

1. Learning and knowledge rests in diversity of opinions.
2. Learning is a process of connecting specialized nodes or information sources.
3. Learning may reside in non-human appliances.
4. Capacity to know more is more critical than what is currently known.
5. Nurturing and maintaining a connection is needed to facilitate continual learning.
6. Ability to see connections between fields, ideas, and concepts is a core skill.
7. Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
8. Decision making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

While connectivism provides a useful lens through which teaching and learning using digital technologies can be better understood and managed, further development and testing is required. There is unlikely to be a single theory that will explain learning in technological enabled networks. Educators have an important role to play in online network learning.

Collaborative Learning

Collaborative learning refers to instructional methods that encourage students to work together and find a common solution to a task (Kukulska-Hulme& O. Viberg, 2018). Collaborative learning involves joint intellectual effort by groups of students who are mutually searching for meanings, understanding or solutions (Ashley, 2009). This approach is learner-centered rather than teacher-centered, and knowledge is viewed as a social construct, facilitated by peer interaction, evaluation and cooperation. This means that learning is not only active but interactive (S. R. Hiltz and R. Benbunan-Fich, 1997, pp. 432–436). The skills gained from collaborative learning are highly transferable to team-based work environments (S. Shaw, 2006). Anderson in his online learning framework argues that sufficient levels of deep and meaningful learning can be developed, if one of the three forms of interaction (student-teacher, student-student or student-content) is at a very high level. The other two may be offered at minimal levels or even eliminated without degrading the educational experience (T. Anderson, 2003, pp. 129– 144). Anderson'sonline mathematics learning framework is informed by the social constructivist learning theory. Based on the above, fourth and fifth generation distance learning can afford students to interact with one another. Student-student interaction is one of the major forms of interaction highlighted by (T. Anderson, 2003, pp. 129– 144) to increase learning. Therefore, careful integration of computer supported interaction can play a big role in increasing interaction among distance learning students. Collaborative learning is based on consensus building through interaction by group members, in contrast to competition. This can be very helpful for distance learner's majority of who are adults. Collaborative activities are essential for information sharing, knowledge acquisition, and skill development (C. George, E. Bonnie, H. Sarah, & T. Robert, 2000). Different ICTs have been adopted for collaborative learning in distance learning that takes the form of eLearning. Effective collaborative learning calls for high interactions among group members.

Therefore, all the domains of this research: Barriers of online class in mathematics education, the opportunities that students entertain while taking online class in mathematics education, teaching and learning activities in online class, availability of internet, learning strategies and tool and learning output are completely related to constructivism theory that emphasis the active role of learner and teacher role as an instructor or facilitator. All in all, online classes for learning mathematics supports constructivist pedagogy where student use technology to explore and reach understanding of mathematical concepts where it promotes higher order thinking and better problem-solving strategies.

Review of Related Empirical Literature

Every researcher needs to observe the fundamental background of the related subject and past studies. An empirical review in research methodology is when the write reviews the information and theories currently available concerning the topic and the historical background of the topic. The point is to do two things. First, it is to demonstrate through understanding of the field in which s/he is conducting research. Second, it is to show that the problem being studied has not to be done before or has not been done before in the way proposed by the writer.

This study provides information of previous research and other related literature on relevancy of online classes in mathematics education. The aim of reviewing the previous researches and literature (like Article, Journals, seminar paper, conference paper) is to explore what has already done before and what is left to be done in the very realm.

In the area of Mathematics Education, a study by Perienen (2020) investigated which factors significantly contributed to technology usage by mathematics teachers. This study confirmed that mathematics teachers were regular users of technology and participated in online activities more to learn well. Another study by Niess (2006), highlighted that “if technology is used to improve the learning of mathematics at all levels, students will be well prepared to use technology appropriately, fluently, and efficiently to do mathematics in technology-rich environments in which they will study and work in the future.” In another study (Burke, 2020) the authors posited that online learning and teaching require skills that need to be developed; we are on a steep learning curve and, from this report, we are doing well. We are being forced to

think in different ways, to solve problems together, to collaborate and to communicate in different ways, to educate and be educated in a different way. Due to COVID-19 global crisis, there is an increasing number of recent studies focusing on educational technology and technology this is because researchers around the world are trying to find possible alternatives that can work for students to have a paradigm shift from the face-to-face method of learning to online education due to the closures of schools in many parts of the world. A few other studies have been focused on the relevancy of online classes in mathematics education.

Brown and Liedholdm (2006) A study conducted with undergraduate microeconomics students at the University of Michigan showed online learners spend less time working on class materials than students who attend a face-to-face class, which could attribute to less success in an online learning environment.

Results of Brown and Liedholm's study (2006) showed students in the virtual environment who spent (on average) less time working on the course still understood basic concepts as well as their peers in the face-to-face course. Online students however, earned significantly lower scores on questions requiring application of concepts and a deeper understanding of the material. These results suggest spending more time on the task leads to deeper learning.Designing online courses that take advantage of student motivation could increase the amount of time online students spend studying course materials and in turn promote deeper understanding of concepts and improve student ability to apply information learned to real-life problem-solving situations.

Similarly, Tuladhar & Parajuli (2020) studied entitled "Study on the effectiveness of online classes for undergraduate medical and dental students of Gandaki Medical College during COVID 19 pandemic period in Nepal."

Pandemic situation of COVID 19 had an impact on medical education globally leading to cancellation of lectures, laboratory exercises, clinical postings, and exams. To continue with the academic program, the online classes are started in different academic streams in large scale. This came with challenges and new learning opportunities for medical students and potential to adopt some changes. The objective of this study is to find out the effectiveness of online classes for medical and dental students of Gandaki Medical College (GMC) during COVID 19 pandemic period in

Nepal with questionnaire-based survey distributed to the students attending the online classes.

This is a descriptive cross-sectional questionnaire based online survey. The questionnaires were distributed to the undergraduate medical and dental students of GMC, Pokhara, Nepal.

Amongst the students who responded, majority 205(98.1%) were attending online classes. The device used by most of the student to attend the classes was smart phone 156(74.6%). The strength of internet of the students was good in 41 (19.6%) and satisfactory in 99 (47.40%). The internet was disturbed by electricity cut down as responded by 66(31.6%) students. Almost 140(67%) of the respondents rated the online classes were interactive and 124(59.33%) rated the classes were not disturbing. Despite the classes being interactive and non-disturbing, 162(77.51%) of respondents rated that the online classes were not effective. The online classes with one to 51 number of students showed good interactions as compared to classes with 51 to 100 number of students ($p<0.01$). There were no differences seen in the effectiveness in online classes between these medical and dental students ($p=0.414$).

Good numbers of students had participated in online classes in medical and dental streams at GMC. The students faced problems in internet connectivity due to electricity cut down. The online classes were not that effective as classroom classes. In country like Nepal, various factors affecting the online education should be looked upon to make the online learning effective.

Moreover, Jones and Long (2013) compare final course grades over ten semesters of a business mathematics course and, in most of semesters analyzed, find no significant differences between mean scores for face-to-face and online students. Jones and Long gather final course grades from a mathematics course entitled “Quantitative Business Analysis I (QBA I)” at a “small, open-enrollment rural Appalachian college” over the course of ten semesters. In each semester, one section of the course was offered in an online format while the other was offered in an on-site format. This course is required for all Business majors, who usually take the course during their freshman year. While one instructor taught the online section consistently across all semesters, four different instructors who employed their own grading and assessment systems taught the on-site section.

In terms of descriptive statistics, 267 students took the on-site version of the course and 178 students took the online version, with the mean and median grades higher for the on-site than for the online sections (with this difference being statistically significant at the 95% confidence level). In both sections, there is a negative skew in the distribution of scores (which appears to be significantly non-normal) and similar levels of variance in final grades. However, on-site students had a larger range of scores compared to their online peers, as well as a greater spread of grades in the middle 50% of the data.

However, a semester-by-semester analysis of the grades reveals that the instructor teaching the on-site section during the first three semesters may have been more generous about grading than subsequent instructors. At the same time, grades in the online section may have been lower in the first few semesters due to some adjustment on the part of students to a new method of learning. As a result, the authors conduct another analysis that omits the first three semesters from their dataset and find, that this time, no significant difference was observed between the mean scores for onsite and online students.

While this study examines multiple semesters' worth of data on the efficacy of online and hybrid courses, it is not without its limitations. First, the authors do not try to randomize students across online and on-site formats, which mean that students self-select into their delivery format of choice. While the inability to conduct a fully randomized controlled experiment is understandable (given how complicated it can be to put together the experiment), it would have been desirable for the authors to control for observed and unobserved differences between students and classroom environments (from prior academic achievement and socioeconomic status to instructor quality) in each of the delivery formats. Not doing so results in myriad of threats to internal validity, including omitted variable and sample selection bias. As a result, even while Jones and Long may have set out to execute an observational analysis in this study rather than a stronger regression analysis, it is very difficult for one to conclude that the relationship observed in this study between delivery format and student outcomes is robust, let alone causal.

One of the biggest sources of bias in this study likely comes from the observation that the online course was taught by one instructor over this time, whereas the on-site section was taught by four different instructors-none of whom was the one

who taught the online section. As a result, instructional quality, course standards, course materials, and assessment mechanisms may have varied greatly both between formats and across semesters within the on-site format—with these factors likely confounding the study's results. In fact, Jones and Long find that omitting the observations from the first three semesters of the study (when the on-site instructor was known to have had more lenient grading standards) significantly changes the overall results. While it is reassuring to see the authors accounting for these "anomalies" in the analysis, they also raise questions about the possible existence of other instructor-related sources of bias when the inconsistencies are not as obvious.

In addition, Fish and Kang (2014) compare outcome data from 119 students divided between online and face-to-face sections of a stress management course and find no significant differences between delivery formats in the students' average score on three exams given during the term. However, the authors find that students who took the course in the online format earned higher scores on the final exam and that the difference is statistically significant. One section was taught in a face-to-face format, and the other was offered completely online. Both courses were taught over a 10-week period and featured the same instructor and consisted of identical assignments.

The sample sizes for each section are similar 56 students in the online section and 63 in the face-to-face section. In terms of additional similarities between the two course formats, the lectures, exams, and course requirements consisted of the same content and instructions. However, online students viewed and/or listened to recorded lectures, whereas face-to-face students listened to live lectures offered twice a week (with each session lasting for approximately 100 minutes). Face-to-face students also had opportunities to discuss questions in small groups and somewhat modify the substance of the lecture through in-class questions. Because attendance was counted as part of a student's grade in the face-to-face format, students in that section were incentivized to attend class. Finally, exams in the face-to-face section were administered in a proctored, in-class environment, while exams in the online version were offered via Blackboard in an un-proctored environment with various limitations (which included timing, randomization of questions, and inflexibility about question order).

Using a t-test, the authors find that no significant differences in exam scores between the delivery formats when all three exams given throughout the term were examined together. However, in analyzing exams one-by-one, Fish and Kang find that there was a statistically significant difference among scores for the third exam—in favor of the online format. Moreover, older students (particularly on the second exam) scored lower than younger students, and Latino students scored lower than Caucasian students. It may be useful to note that the exam scores were one of several dependent variables that the authors analyzed in their study, although the others were largely self-reported (on the part of students) and significantly less objective.

To their credit, Fish and Kang analyze the impact of various delivery formats in a nontraditional course that may present difficulties in evaluating student outcomes that are somewhat different from those well documented in the literature on more "traditional courses. However, there exist some methodological flaws in their research design that are worth pointing out. First, the authors fail to contend with two forms of sample selection bias. On a broader level, they acknowledge that the students who took the stress management course during the semester of interest did so voluntarily and under the knowledge that they were participating in a study. Therefore, there may have been a non-random group of students that chose not to take the course because of not wishing to participate in a study. Furthermore, the students themselves self-selected into each delivery format, as the authors are unable to randomize students into sections. Moreover, Fish and Kang admit that the sample sizes from which they draw their results are quite small.

While it is understandable that the sources of selection bias might come from factors outside of the researchers' direct control (e.g., having to attain full Institutional Review Board approval), the authors could have done more to control for variables correlated with student outcomes and delivery format. For example, the authors observe that students in the online course were slightly older than their counterparts in the face-to-face section. This distinction when unaccounted for may be particularly dangerous in this setting, as age would appear to be particularly correlated with the subject matter of this course (stress management). While the authors do present summary, statistics associated on how exam grades vary across students with different characteristics, it would have been far more valuable to incorporate these

characteristics as covariates in a multivariate regression of student outcomes on delivery format.

Hence, the online and face-to-face sections are not completely standardized, which means that the measures of student performance associated with each section may have been driven not so much by the format of the course delivery as by additional factors unique to each section. For example, exams in the face-to-face section were administered in a proctored, in-class environment, whereas exams in the online section were given online in an un-proctored setting. While the authors try to ensure that these environments are as standardized as possible, there may still have been some significant differences that impacted the validity of the evaluation. Furthermore, participation in the face-to-face course was counted as part of the course grade, while Fish and Kang do not give evidence that a similar grading structure was implemented in the online section. As a result, students in the face-to-face course may have been more incentivized to "attend" lectures, thereby inflating the exposure they had to instruction (relative to the students in the online course) that thus provided potentially positive effects for their performance. The authors also state that the online learning model used in this course was relatively "bare-bones," and without much "multimedia, discussion boards, or videos." This may provide limitations to the external validity of this study, particularly in settings where the online courses are developed with more sophistication.

Finally, the study, Xu& Jaggars (2014) examine the performance gap between online and face-to-face courses and how this gap varies across subgroups of students and academic subjects. They use an administrative dataset covering enrollment in nearly 500,000 online and face-to-face courses taken by more than 40,000 degree-seeking students who initially enrolled in 34 community or technical colleges in Washington State during Fall 2004. The dataset contains a rich variety of information for each student on demographics, socioeconomic status, academic background, and wage records. Xu and Jaggars follow each student for five full academic years through Spring 2009 and focus primarily on assessing the impact of delivery format on course persistence and grade.

In their regression analyses, the authors first use an ordinary least squares (OLS) model that regresses some indicator of course performance (i.e., persistence or grade) on a binary independent variable indicating course delivery format and a set of

student-level covariates and term- and subject-fixed effects. To deal with variation in grading standards within a particular subject area, Xu & Jaggars convert course grade into a standardized z-score that represented a student's performance relative to that of other students in standard deviation units. The authors then incorporate individual-fixed effects to account for unobserved factors that may affect an individual student's likelihood of choosing online coursework, as well as a covariate for the average persistence rate of a given course to deal with course-level variation in instructional quality that might be correlated with student outcomes. Finally, Xu and Jaggars conduct a series of additional robustness checks to examine whether individual differences that varied across time may have biased their initial results.

Xu & Jaggars then proceed to examine any heterogeneous effects of delivery method on different subgroups of students and subjects. While they find negative effects of online learning across every subgroup, men had stronger negative estimates than women for both course persistence and course grade, and black students were twice as likely as Asian students to be negatively affected by an online course (in terms of grade). Furthermore, younger students had stronger negative coefficients for online learning than older students, although these estimates were statistically significant in both cases. The authors also find that students with a stronger academic background had narrower gaps in online performance, whereas students with weaker skills had wider gaps (compared with students in the face-to-face courses). Finally, Xu and Jaggars observe negative coefficients for online learning across every subject area, although there are variations in statistical significance (with education, mass communication, and health and physical education having insignificant estimates) and magnitude (with weaker coefficients in natural science and stronger estimates in English). Furthermore, these performance gaps become wider when students took subjects that enrolled more online, at-risk peers.

This study was executed in a very complete and ambitious manner, and Xu and Jaggars are to be commended for rigorously analyzing the impacts of online courses in community colleges, an important but often overlooked research avenue. Especially impressive is the fact that they can exploit student-level outcomes across such a wide range of course enrollments, in addition to following individual students longitudinally to assess how delivery formats are associated with longer-term outcomes like retention. Furthermore, the authors' analyses of heterogeneous effects

across different student groups are particularly strong and speak to the value of disentangling average effects into more precise relationships with actionable implications.

Finally, one major methodological shortcoming in this study pertains to the authors' inability to distinguish between modes of delivery within online courses. In other words, hybrid and fully online courses were all included within the "online" classification, with Xu and Jaggars giving no indication about what the online courses encompassed and what sorts of variations existed between these courses. This is particularly concerning, given that the large size and diversity of the institutions and courses sampled almost certainly result in substantial differences in formats between online courses. Were the observed effects of online courses driven primarily by formats that were fully online, or were they driven more by technology-enabled courses with more substantive face-to-face formats? Without these more precise distinctions, it becomes difficult to conclude to what extent Xu and Jaggars' findings are applicable to certain types of technology-enhanced courses.

Summary

I have reviewed many journals, articles, reports, thesis, seminar paper, conference paper and related academic writing of the relevancyof online classes in mathematics education.Online class is one of the important aspects of academic development and learning mathematics, it ensures the teachers' capacity, quality of mathematics education, special learning opportunities for student, professional development and knowledgeable, skillful and qualified teacher.

On the basis of literature review, I have found,thatthe authors identify trends in the ongoing development of online mathematics education at the college and university level, including: rising online enrollments, experience in making online profitable, changing organizational structures to accommodate online learning, and focus on improved quality metrics to evaluate online learning. The continuing conversation about quality involves more than simply comparing the performance of students in online and on-campus courses. Ultimately, it must focus on what students learn, not where they learn, and what types of learning environments, technologies, and resources foster student learning.Research now includes more and more studies of

the continuing growth of online learning within and across countries, making it a global phenomenon.

Moreover, there remains a need for further research on the costs associated with online classes in mathematics education and the features of online instruction that drive their impacts on learning outcomes. We need to research about relevancy of online classes in mathematics education, what types of barriers and opportunities faced by the student and how online and hybrid delivery formats can be implemented feasibly and most effectively. Finally,various researched have been carried in the field of online classes and very few researches on Learning Mathematics. But there has not been any research conducted on “Relevancy of Online Classes in Mathematics Education ". Thus, the present study is a new Endeavour as it attempts to explore relevance of online classes is important aspect of learning mathematics. I have chosen this topic for generating various causes of difficulty faced by student in learning mathematics by online classes. I claim that, the topic is new and oriented in the research process.

Conceptual Framework

The study is on “Relevancy of Online Classes in Mathematics Education "was based on following conceptualframework.

CHAPTER III

METHODS AND PROCEDURES

The researcher will be adopted the following methodological procedures to achieve the objective of the study.

Design of the Study

The research which I had carryout is one of the instances of survey research authenticated by interview data. Since the research question and overall methodology under corresponds to the survey research design.

Survey is one of the cross–sectional studies. It generally addresses a large group of population. In other words, a large number of populations are involved in the study to make the sample representative and to make the findings generalizable. The main aim of the survey is to generalize the findings of the research. It is the superficial study of an issue or phenomena. In this regard survey is widely being used in educational research as well. "The main purpose of a survey research is to obtain a snapshot of condition attitudes and events at a single point of time" Nunan (1992, P.140). He mention that a survey is an overview of a phenomenon, event, issue or situation, selection of a representative population is a difficult but very important and sensitive task for the representative of the total population. Real and original result will not be reveled which may cause waste of time and effort.

The main purpose of this kind of research is to find out peoples' attitudes, opinions in the selected field. This research is carried out to find out public operation on certain issues and trends of daily conduct and behaviors/attitudes of different professionals towards certain events, issues, or phenomena.

This kind of research usually addresses the large group of population and sampling is necessary to carry out investigation. The sample should be representatives in this kind of study. Data for the research will be collected only at a single time using structured tools. It is a cross- sectional and hypothetic -deductive study. Findings are generalizable in this research.

Survey research design directly addresses my topic because the main purpose of the survey research design is to find out peoples' attitude, opinion and the specified

behavior on certain issues, phenomena, or situation. Thus, to fulfill my research objective survey research design is appropriate.

Population and Sample

The population of my study was the Master level students in Nepal. The sample was 100 students for questionnaire and 10 students for interview they were studying at first and fourth semesters of master'sdegree in mathematics education during academic year 2077.The researcher made the list of Master levelCampusof Tribhuvan University. From the list there are 4 Master level campus selected by the method of random sampling.

Name of the Campus	Number of students (For Questionnaire)	Number of students (For Interview)
Tribhuvan university central campus, Kirtipur	45	4
Mahendra Ratne Multiple Campus, Tachal	25	3
Sanothimi Multiple Campus, Bhaktapur	15	2
Sudurpashim Multiple Campus, Dhangadhi	10	1
Total	100	10

Sampling Procedure

The research area of the study was the population consists of Master level students in mathematics education. For the feasibility of the study, I had selected the master level (mathematics education) students studying at first and fourth semester during academic year 2077by using probability proportional sampling (PPS) procedure.

Data / Information Collection Tools

Tools are important factors for collecting the data. There were different types of tools for collecting data which are follows:

Questionnaire."Questionnaire is a device consisting of a series of questions dealing with some psychological, social, educational topic sent or gives to an

individuals or a group of individual with the object of obtaining data with regarded to some problems under investigation"(Koul, 2000, as cited in Khanal, 2015). Since the research is quantitative research, so tool of this research is questionnaire. Questionnaire was used for the collection of data containing close-ended and open-ended questions. Questionnaires were distributed to the students to find out their views on relevancy of online classes in mathematics education.

Interview. Interview is two-way interaction between two or more persons. It is a data collection procedure including verbal communication between the researcher and respondent by telephone or face to face situation. The interview sequence follows the same progression-one usually starts by engaging the consultant in an open-ended interview guideline (open ended interview questions) basedon the suggestion from supervision and the study of research book. Interview is a kind of widely used data collection method of educational method. It is also a kind of oral questionnaire which help us to understood participant's perception reaction view and her/his facial expression about the view towards the relevancy of online classes in mathematics education.

Validity and Reliability of Tools

For the validation of tools researcher will construct the questionnaire form and interview guideline which will be based on conceptual framework. To ensure the validity of the instrument, the researcher will consult with the thesis supervisor. The tools will be fixed for the final study. Its reliability will ensure by taking pilot test among thirty students, which will not include in this study. For reliability, obtained data were calculated using the statistical package for Social Science (SPSS) programmer, version 21.0 setting at 0.05. The Cronbach's α reliability coefficient was found 0.93.

Data / Information Collection Procedure

Data is the foundation and mirror of the research. It shows the opinions, concept, and attitude of the respondents. Therefore, collection of reliable data is very essential for all kind of research.

Questionnaires.To collect the authentic data after the determination of the pre-requisites, I had visited Campus and established rapport with the Depart head mathematics education. After clarification of the purpose and getting approval, I

hadvisited the mathematics students and handed questionnaires to them appealing to complete them with a week as per the constrained time. Then, the questionnaires were collected from the respondents for further steps.

Interview.To collect the data, first the research tool (i.e., questionnaire for students) was developed. Then the researcher talks to the authorities and take permission to apply the research tools for collecting data. After that, the researcher-built rapport with the interviewer and explained the detail about the research to the target interviewer. Then, the researcher applied research tools for collecting data. Finally, the researcher collected required information from the interviewer. Then the researcher noted points of interviewer and mentioned in paragraph.

Analysis and Interpretation of Data

In this study, when collecting the data from questionnaire then the data were analyzed descriptively and statistically. Statistical tools such as measures of frequency and percentile, mean, standard deviation, chi-square test, t-test and chart bar graphwere used to analyze and interpret data. To identify the perceptions of students towards the online classes in mathematics education the researcher used chi-square test at 0.05 level of significance and percentage of each statement.

When collecting the responses from interviewwas recorded then the data were scrutinized in general and transcribed under different headings. After that, the sub-headings for data analysis were developed and the data were analyzed descriptively. Finally, the data wereanalyzed, explain, and interpret on the basis of the responses given by the interviewer.

Ethical Consideration

Ethical consideration is one of the most valuable ornaments of the researcher. All information collected about the individual was kept confidential and private. The researcher was the only person who had access to the data after the collected questionnaire and interview from participant. I was not mentioning the names of participants are used. I was used pseudo name or code for identification of the participants and schools.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

This thesis is quantitative conduct on Tribhuvan University. The main purpose of this study was to find out the perceptions towards the online classes in mathematics education. This chapter is mainly concerned with the analysis and interpretation of data, which was collected from one hundred students from Tribhuvan University who studied mathematics education. The data gathered from different sources were analyzed and interpreted under five profiles: Barriers of online classes, opportunities of online classes Teaching Learning Activities of online classes, Learning strategies and tool and availability of internet facilities.

A set questionnaire which is given in appendix-A consisting fifty of closed ended question was developed as a research tool. The close ended questions related to the relevancy of online classes in mathematics education were to be analyzed with five alternatives: strongly agree, agree, neutral, disagree, and strongly disagree. This part deals with statistical analysis and interpretation of the data. For Analyzing the data, mean, percentage, standard deviation, chi-square test and t-test were used. The researchers summarizing the response collected from the open-ended questions and explain them. While analyzing the data the total number of responses of the students were counted and changed into percentage. If the responses were fifty percentages or above it was considered as positive relevancy and below, it was considered negative relevancy. The relevancy was analyzed under the following heading.

Barriers of online classes in mathematics education

In this domain there were statements (1-6) related to the barriers of online classes in mathematics education. Among them, 3 and 5 statements are negative. The following table consists the number of responses of students' attitude and corresponding percentage and their chi-square ($\chi 2$) value of questionnaire.

Table 1: Percentage, Mean, S.D and chi-square values.

S.N	Statements	SA %	A %	N %	D %	SD %	Mean	S.D	$\chi 2$	D
1.	Lack of the adequate Internet access.	25	28	14.5	16.5	16	3.39	1.42	50.9	P
2.	Using new technology not easy without training.	26	25.5	22	14	12.5	3.43	1.54	85.9	P
3.	Lack of the timely feedback from the instructor.	34	15	20	13	18	3.18	1.39	111.1	P
4.	Lack of the technical and academic skill in mathematics education	29	20	18	19	15	3.59	1.69	96.8	P
5.	Instructors do not know how to teach online mathematics subject.	12	17	24	23	24	2.69	1.38	58.4	P
6.	Unfamiliar with online mathematics learning technical tools and online learning technology costs too much.	23	27	24	15	11	3.65	1.59	56.9	P
	Average	24.83	21.75	21.19	19	18.5	3.61			

$\chi 2 \leq 9.49$(Non-Significant)

Statement 1 "Lack of the adequate Internet access." In this statement 25% of students are strongly agreed and 28% student are agree and 14.5% of students are undecided and 16.5% of students are disagree and only 16% students are strongly disagree about this statement. The mean score of the statement is 3.39, the standard deviation is 1.42 and the $\chi 2$-value is 85.9 at 0.05 level of significance. This indicates that the students have positive attitude this statement.

Statement 2 "Using new technology not easy without training." A total 26% of students are strongly agreed and 25.5% of student agrees and 22% of students are undecided and 14% of students are disagreeing and only 12.5% of students strongly disagree about this statement. The mean score of the statement is 3.43, the standard

deviation is 1.54 and the χ2-value is 85.9 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 3 "Lack of the timely feedback from the instructor." A total 34% of students are strongly disagreed and 15% of student disagrees and 20% of students are undecided and 13% of students are agreeing and only 18% of students strongly agree about this statement. The mean score of the statement is 3.18, the standard deviation is 1.39 and the χ2-value is 111.1 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 4 "Lack of the technical and academic skill in mathematics education." A total 29% of students are strongly disagreed and 20% of student disagrees and 18% of students are undecided and 19% of students are agree and only 15% of students strongly agree about this statement. The total mean score of the statement is 3.59, the standard deviation is 1.69 and the χ2-value is 96.8 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 5 "Instructors do not know how to teach online mathematics subject." A total 12% of students are strongly disagreed and 17% of student disagrees and 24% of students are undecided and 23% of students are agree and only 24% of students strongly agree about this statement. The mean score of the statement is 2.69, the standard deviation is 1.38 and the χ2-value is 58.4 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 6 "Unfamiliar with online mathematics learning technical tools and online learning technology costs too much." A total 23% of students are strongly disagreed and 27% of student disagrees and 24% of students are undecided and 15% of students are agree and only 11% of students strongly agree about this statement. The mean score of the statement is 3.65, the standard deviation is 1.59 and the χ2-value is 56.9 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Table 2: Mean result of Barriers of online classes in mathematics education.

S.N.	Statement	Name of the college				Total
		Central campus T.U	Mahendra Ratna Campus	Sanothimi Campus	SPA Campus	
1	Lack of the adequate Internet access.	3.68	3.25	3.21	3.19	3.39
2	Using new technology not easy without training learning.	3.39	3.69	3.23	3.30	3.43
3	Lack of the timely feedback from the instructor	2.86	2.95	3.50	2.93	3.18
4	Lack of the technical and academic skill in mathematics education	3.27	3.35	2.95	3.13	3.59
5	Instructors do not know how to teach online mathematics subject	2.69	2.86	2.45	3.13	2.69
6	Unfamiliar with online mathematics learning technical tools and online learning technology costs too much.	3.18	3.25	3.05	3.03	3.65
	Overall mean result of Student attitudes towards eLearning resources	3.18	3.23	3.08	3.03	3.32

***Figure 1:*Mean result of Barriers of online classes in mathematics education.**

Statement 1 “Lack of the adequate Internet access” In this statement according to the data, T.U Central Campus students have mean score is 3.68, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.21, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.19 and t-test value is 0.807 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.39 and the standard deviation is 1.42.

Statement 2 “Using new technology not easy without training learning.” In this statement according to the data, T.U Central Campus students have mean score is 3.39, Mahendra Ratna Campus, Tahacal students have mean score is 3.69, Sanothimi Campus, Bhaktapur students have mean score is 3.23, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.30 and t-test value is 0.827 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based on campus. The total mean score of the statement is 3.43 and the standard deviation is 1.54.

Statement 3 “Lack of the timely feedback from the instructor.” In this statement according to the data, T.U Central Campus students have mean score is 2.86, Mahendra Ratna Campus, Tahacal students have mean score is 2.95, Sanothimi Campus, Bhaktapur students have mean score is 3.50, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.93and t-test value is 0.782 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.18 and the standard deviation is 1.39.

Statement 4 “Lack of the technical and academic skill in mathematics education.” In this statement according to the data, T.U Central Campus students have mean score is 3.27, Mahendra Ratna Campus, Tahacal students have mean score is 3.35, Sanothimi Campus, Bhaktapur students have mean score is 2.95, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.13 and t-test value is 0.423 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.59 and the standard deviation is 1.69.

Statement 5 “Instructors do not know how to teach online mathematics subject.” In this statement according to the data, T.U Central Campus students have mean score is 2.69, Mahendra Ratna Campus, Tahacal students have mean score is 2.86, Sanothimi Campus, Bhaktapur students have mean score is 3.45, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.13 and t-test value is 0.268 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.69 and the standard deviation is 1.38.

Statement 6 “Unfamiliar with online mathematics learning technical tools and online learning technology costs too much.” In this statement according to the data, T.U Central Campus students have mean score is 3.18, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.05, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.619 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.65and the standard deviation is 1.59.

The researcher had prepared six statements related to barrier of online class. There were six statements related to barrier on which two are negative statements and remaining are positive statements. On all positive statements agree percentage is high and regarding 2 negative statements disagree percentage is high; the overall mean score of all the related statements is 3.32. This means a lower than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.18, Mahendra Ratna Campus, Tahacal students have mean score is 3.23, Sanothimi Campus, Bhaktapur students have mean score is 3.08, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.201 and significance level is 0.05. So we can conclude, there is no significant difference on students' attitude toward the statements based oncampus. Based onof the overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

Opportunities of online classes in mathematics education

There are six statements (7-12) related to Opportunities of online classes in mathematics education. All statements are positive. The following table consists the student's relevancy and its corresponding $\chi 2$ - value of the questionnaire.

Table 3: Percentage, Mean, S.D and chi-square values.

S.N	Statements	SA %	A %	N %	D %	SD %	Mean	S.D	$\chi 2$	D
7.	I think that taking an online class in mathematics education would be an interesting experience.	27	36	20	11	6	3.61	1.17	65.6	P
8.	More flexibility in time management between school and work.	24	21	12	26	17	3.74	1.97	52.2	P
9.	Easier to concentrate on mathematics education.	29	35	19	11	6	3.81	2.16	87.7	P
10.	It is more convenient for me than commuting for every class.	30	26	17	17	10	3.99	1.93	60.7	P
11.	Teachers can practice technology and can design various flexible programs for students' better understanding mathematics.	23	26	24	15	12	3.35	1.29	86.3	P
12.	Online classes enhance problem-solving skills, critical thinking abilities, and adaptability among the mathematics students.	27.50	26.50	19	13	14	3.61	1.36	87	P
	Average	19.61	22.16	20.61	21.30	16.56	3.54			

$\chi 2 \leq 9.49$(Non-Significant)

Statement 7 "I think that taking an online class in mathematics education would be an interesting experience." In this statement 27% of students are strongly agreed and 36% student are agreeingand 20% of students are undecided and11% of students are disagree and only 6% students are strongly disagree about this statement. The mean

score of the statement is 3.61, the standard deviation is 1.17 and the χ2-value is 65.6 at 0.05 level of significance. This indicates that the students have positive attitude this statement.

Statement 8 "More flexibility in time management between school and work." A total 24% of students are strongly agreed and 21% of student agrees and 12% of students are undecided and 26% of students are disagreeing and only 17% of students strongly disagree about this statement. The mean score of the statement is 3.74, the standard deviation is 1.97 and the χ2-value is 52.2 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 9"Easier to concentrate on mathematics education." A total 29% of students are strongly disagreed and 35% of student disagrees and19% of students are undecided and 11% of students are agreeing and only 6% of students strongly agree about this statement. The mean score of the statement is 3.81 and the standard deviation is 2.16 and the χ2-value is 87.7 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 10"It is more convenient for me than commuting for every class." A total30% of students are strongly disagreed and 26% of student disagrees and 17% of students are undecided and 17% of students are agree and only 10% of students strongly agree about this statement. The total mean score of the statement is 3.99, the standard deviation is 1.93 and the χ2-value is 60.7 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 11"Teachers can practice technology and can design various flexible programs for students' better understanding mathematics." A total 23% of students are strongly disagreed and 26% of student disagrees and 24% of students are undecided and 15% of students are agree and only 12% of students strongly agree about this statement. The mean score of the statement is 3.35, the standard deviation is 1.36 and the χ2-value is 86.3 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 12"Online classes enhance problem-solving skills, critical thinking abilities, and adaptability among the mathematics students." A total 27.50% of students are strongly disagreed and 26.50% of student disagrees and 19% of students are undecided and 13% of students are agree and only 14% of students strongly agree about this statement. The mean score of the statement is 3.61, the standard deviation is 1.36 and the $\chi 2$-value is 87 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Table 4: Mean result of Opportunities of online classes in mathematics education

S.N.	Statement	Name of the college				Total
		Central campus T.U	Mahendra Ratna Campus	Sanothimi Campus	SPA Campus	
7	I think that taking an online class in mathematics education would be an interesting experience.	3.38	3.35	4.65	3.13	3.61
8	More flexibility in time management between school and work.	3.19	3.54	3.34	3.33	3.74
9	Easier to concentrate on mathematics education	3.65	2.97	3.75	2.59	3.81
10	It is more convenient for me than commuting for every class.	3.47	3.25	2.75	3.16	3.59
11	Teachers can practice technology and can design various flexible programs for students' better understanding mathematics	2.68	2.89	2.85	2.90	3.35
12	Online classes enhance problem-solving skills, critical thinking abilities, and adaptability among the mathematics students.	3.41	3.08	3.04	3.07	3.61
	Overall mean result of Student attitudes towards eLearning resources	3.29	3.18	3.39	3.03	3.68

Figure 2 **Mean result of opportunities of online classes in mathematics education**

Statement 7 “I think that taking an online class in mathematics education would be an interesting experience” In this statement according to the data, T.U Central Campus students have mean score is 3.38, Mahendra Ratna Campus, Tahacal students have mean score is 3.35, Sanothimi Campus, Bhaktapur students have mean score is 3.65, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.13 and t-test value is 0.481 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.61 and the standard deviation is 1.17.

Statement 8 “More flexibility in time management between school and work.” In this statement according to the data, T.U Central Campus students have mean score is 3.19, Mahendra Ratna Campus, Tahacal students have mean score is 3.54, Sanothimi Campus, Bhaktapur students have mean score is 3.34, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.33 and t-test value is 0.612 and significance level is 0.05. So, we can conclude, there is no significant difference on

students' attitude towards the statement based oncampus. The total mean score of the statement is 3.74 and the standard deviation is 1.97.

Statement 9 “Easier to concentrate on mathematics education.” In this statement according to the data, T.U Central Campus students have mean score is 3.65, Mahendra Ratna Campus, Tahacal students have mean score is 2.97, Sanothimi Campus, Bhaktapur students have mean score is 3.75, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.59and t-test value is 0.314 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.81 and the standard deviation is 2.16.

Statement 10 “It is more convenient for me than commuting for every class.” In this statement according to the data, T.U Central Campus students have mean score is 3.47, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 2.75, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.16 and t-test value is 0.718 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.59 and the standard deviation is 1.93.

Statement 11 “Teachers can practice technology and can design various flexible programs for students’ better understanding mathematics.” In this statement according to the data, T.U Central Campus students have mean score is 2.68, Mahendra Ratna Campus, Tahacal students have mean score is 2.89, Sanothimi Campus, Bhaktapur students have mean score is 3.85, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.90 and t-test value is 0208 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.69 and the standard deviation is 1.29.

Statement 12 “Online classes enhance problem-solving skills, critical thinking abilities, and adaptability among the mathematics students.” In this statement according to the data, T.U Central Campus students have mean score is 3.41, Mahendra Ratna Campus, Tahacal students have mean score is 3.08, Sanothimi Campus, Bhaktapur students have mean score is 3.04, Sudurpashim Academy

Campus, Dhangadhi students have mean source is 3.07 and t-test value is 0.316and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.61 and the standard deviation is 1.36.

The researcher had prepared six statements related to opportunities of online classes in mathematics education. There were 5 statements on which all are positive statements. On all positive statements agree percentage is high the overall mean score of all the related statements is 3.68. This means agreater than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.29, Mahendra Ratna Campus, Tahacal students have mean score is 3.18, Sanothimi Campus, Bhaktapur students have mean score is 3.39, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.366 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude toward the statements on the basis of campus.Based onof the overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

Relevancy of Teaching Learning Activities of online class in mathematics education

There are ten statements (13-18) related to Relevancy of Teaching Learning Activities of online class in mathematics education. One statement (16) is negative, and others are positive. The following table consists the student's relevancy and its corresponding $\chi 2$ - value of the questionnaire.

Table 5: Percentage, Mean, S.D and chi-square values.

S.N	Statements	SA %	A %	N %	D %	SD %	Mean	S.D	$\chi 2$	D
13.	Use of online class in mathematics education would make the subject matter more interesting.	28.50	35	19.50	10	7	3.81	1.56	91.3	P
14.	Online classes can increase collaboration (Co-operation) between students.	24	19.5	11.5	26	19	3.04	1.47	132.2	P
15.	My confidence in mathematics is more increased by taking online class activities in mathematics learning.	18	20	24	23	15	2.94	1.3	112.0	P
16.	I think that the taking online classes restrict the creativity of the students.	16	18.5	21.5	28.5	15.5	3.01	1.34	81.5	P
17.	Involving in technologically enhanced learning activities i can visualize mathematical object.	14	18	24	17.50	26.50	2.95	1.48	103.5	P
18.	We have administrative support for adopting online classes into learning process.	28	35.5	19.5	10	7	3.71	1.36	88.6	P
	Average	18.91	21.98	20.01	20.23	17.02	2.84			

$\chi 2 \leq 9.49$(Non-Significant)

Statement 13"Use of online class in mathematics education would make the subject matter more interesting." In this statement 28.50% of students are strongly agreed and 35% student are agree and 19.50% of students are undecided and 10% of students are disagree and only 7% students are strongly disagree about this statement. The mean score of the statement is 3.81, the standard deviation is 1.56 and the $\chi 2$-value is 91.3

at 0.05 level of significance. This indicates that the students have positive attitude this statement.

Statement 14"Online classes can increase collaboration (Co-operation) between students." A total 24% of students are strongly agreed and 19.50% of student agrees and 11.50% of students are undecided and 26% of students are disagreeing and only 19% of students strongly disagree about this statement. The mean score of the statement is 3.04, the standard deviation is 1.47 and the χ2-value is 132.2 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 15"My confidence in mathematics is more increased by taking online class activities in mathematics learning." A total 18% of students are strongly disagreed and 20% of student disagrees and 24% of students are undecided and 23% of students are agreeing and only 15% of students strongly agree about this statement. The mean score of the statement is 2.94, the standard deviation is 1.3 and the χ2-value is 112.0 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 16 "I think that the taking online classes restrict the creativity of the students." A total 16% of students are strongly disagreed and 18.50% of student disagrees and 21.50% of students are undecided and 28.50% of students are agree and only 15.50% of students strongly agree about this statement. The total mean score of the statement is 3.01, the standard deviation is 1.34 and the χ2-value is 81.5at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 17 "Involving in technologically enhanced learning activities i can visualize mathematical object." A total 14% of students are strongly disagreed and 18% of student disagrees and 24% of students are undecided and 17.50% of students are agree and only 26.50% of students strongly agree about this statement. The mean score of the statement is 2.95, the standard deviation is 1.48 and the χ2-value is 103.5 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 18 "We have administrative support for adopting online classes into learning process." A total 28% of students are strongly disagreed and 35.50% of student disagrees and 19.50% of students are undecided and 10% of students are agree and only 7% of students strongly agree about this statement. The mean score of the statement is 3.71, the standard deviation is 1.36 and the $\chi 2$-value is 88.6 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Table 6: Mean result Relevancy of Application of Tools of online class in mathematics education

S.N.	Statement	Name of the college				Total
		Central campus T.U	Mahendra Ratna Campus	Sanothimi Campus	SPA Campus	
13	Use of online class in mathematics education would make the subject matter more interesting.	3.52	3.27	3.46	3.22	3.81
14	Online classes can increase collaboration (Co-operation) between students.	3.56	3.68	2.88	3.34	3.04
15	My confidence in mathematics is more increased by taking online class activities in mathematics learning.	3.42	2.96	3.56	2.93	2.94
16	I think that the taking online classes restrict the creativity of the students.	3.00	3.35	3.05	3.63	3.01
17	Involving in technologically enhanced learning activities i can visualize mathematical object.	2.89	2.99	2.85	2.60	2.95
18	We have administrative support for adopting online classes into learning process.	3.67	3.25	3.95	3.03	3.71
	Overall mean result of Student attitudes towards eLearning resources	3.34	3.25	3.58	3.13	3.25

Figure 3: **Mean result of Relevancy of Teaching Learning Activities of online class in mathematics education**

Statement 13 "Use of online class in mathematics education would make the subject matter more interesting." In this statement according to the data, T.U Central Campus students have mean score is 3.52, Mahendra Ratna Campus, Tahacal students have mean score is 3.27, Sanothimi Campus, Bhaktapur students have mean score is 3.46, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.22 and t-test value is 0.392 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.81 and the standard deviation is 1.56.

Statement 14"Online classes can increase collaboration (Co-operation) between students." In this statement according to the data, T.U Central Campus students have mean score is 3.56, Mahendra Ratna Campus, Tahacal students have mean score is 3.68, Sanothimi Campus, Bhaktapur students have mean score is 2.88, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.34 and t-test value is 0.577 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.04 and the standard deviation is 1.47.

Statement 15“My confidence in mathematics is more increased by taking online class activities in mathematics learning.” In this statement according to the data, T.U Central Campus students have mean score is 3.42, Mahendra Ratna Campus, Tahacal students have mean score is 2.96, Sanothimi Campus, Bhaktapur students have mean score is 3.56, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.93and t-test value is 0.311 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.94 and the standard deviation is 1.30.

Statement 16 “I think that the taking online classes restrict the creativity of the students.” In this statement according to the data, T.U Central Campus students have mean score is 3.00, Mahendra Ratna Campus, Tahacal students have mean score is 3.35, Sanothimi Campus, Bhaktapur students have mean score is 3.05, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.63 and t-test value is 0.192 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.01 and the standard deviation is 1.34.

Statement 17 “Involving in technologically enhanced learning activities i can visualize mathematical object.” In this statement according to the data, T.U Central Campus students have mean score is 2.89, Mahendra Ratna Campus, Tahacal students have mean score is 2.99, Sanothimi Campus, Bhaktapur students have mean score is 2.85, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.60 and t-test value is 0.278 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.95 and the standard deviation is 1.48.

Statement 18 “We have administrative support for adopting online classes into learning process.” In this statement according to the data, T.U Central Campus students have mean score is 3.67, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.95, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.334and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.71 and the standard deviation is 1.36.

The researcher had prepared six statements related to Relevancy of Teaching Learning Activities of online class in mathematics education. There were six statements on which one statement is negative remaining all are positive statements. On all positive statements agree percentage is high the overall mean score of all the related statements is 3.25. This mean is greater than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.34, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.58, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.13 and t-test value is 0.388 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude toward the statements based oncampus. So, based onthe overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

Relevancy of Application of Tools of online class in mathematics education

The researcher included five statements (19-23) in this section to identify the Relevancy towards the Application of ICT Tools of online class in Mathematics Education. Among them statement 23 is negative, and other are positive. The following table consists the student's relevancy and its corresponding $\chi 2$ - value of the questionnaire.

Table 7: Percentage, Mean, S.D and chi-square values

S.N	Statements	SA %	A %	N %	D %	SD %	Mean	S.D	$\chi 2$	D
19.	Online classes increase the motivation of students by taking it as an instructional tool.	19	28	23	17	13	3.35	1.38	60.7	P
20.	I have no difficulty in operating the basic functions of Zoom and MS Teem.	32	28	15	14	11	3.54	1.65	87.6	P
21.	I can use ICT tools like Web Camera, power point, geogebra, for my own learning.	18	22	16	30	14	2.99	1.45	64.7	P
22.	ICT tools make online learning easier.	14	19	24	17	26	3.84	1.69	34.8	N
23.	I am not happy with the software programs in my learning mathematics.	15.50	15	20.50	21	28	2.67	1.87	86.3	N
	Average	19.15	22.30	19.95	19.85	18.15	3.46			

Statement 19 "Online classes increase the motivation of students by taking it as an instructional tool." In this statement 19% of students are strongly agreed and 28% student are agree and 23% of students are undecided and 17% of students are disagree and only 13% students are strongly disagree about this statement. The mean score of the statement is 3.35, the standard deviation is 1.38 and the $\chi 2$-value is 60.7 at 0.05 level of significance. This indicates that the students have positive attitude this statement.

Statement 20 "I have no difficulty in operating the basic functions of Zoom and MS Teem." A total 32% of students are strongly agreed and 28% of student agrees and 15% of students are undecided and 14% of students are disagreeing and only 11% of students strongly disagree about this statement. The mean score of the statement is 3.54, the standard deviation is 1.65 and the $\chi 2$-value is 87.6 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 21 "I can use ICT tools like Web Camera, power point, Geogebra, for my own learning." A total 18% of students are strongly disagreed and 22% of student disagrees and 16% of students are undecided and 30% of students are agreeing and only 14% of students strongly agree about this statement. The mean score of the statement is 2.99, the standard deviation is 1.45 andthe $\chi 2$-value is 64.7 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 22 "ICT tools make learning easier." A total 14% of students are strongly disagreed and 19% of student disagrees and 24% of students are undecided and 17% of students are agree and only 26% of students strongly agree about this statement. The total mean score of the statement is 3.84, the standard deviation is 1.69 and the $\chi 2$-value is 34.8 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 23 "I am not happy with the software programs in my learning mathematics." A total 15.50% of students are strongly disagreed and 15% of student disagrees and 20.50% of students are undecided and 21% of students are agree and only 28% of students strongly agree about this statement. The mean score of the statement is 2.67, the standard deviation is 1.87 and the $\chi 2$-value is 86.3 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Table 8: Mean result Relevancy of Application of Tools of online class in mathematics education

S.N.	Statement	Name of the college				Total
		Central campus T.U	Mahendra Ratna Campus	Sanothimi Campus	SPA Campus	
19	Online classes increase the motivation of students by taking.	3.44	3.85	3.43	3.29	3.35
20	I have no difficulty in operating the basic functions of Zoom and MS Teem.	3.69	3.79	3.55	3.30	3.54
21	I can use ICT tools like Web Camera, power point, geogebra, for my own learning.	3.06	2.95	3.45	2.93	2.99
22	ICT tools make online learning easier..	3.27	3.55	3.35	3.13	3.84
23	I am not happy with the software programs in my learning mathematics.	2.69	2.99	2.45	2.60	2.67
	Overall mean result of Student attitudes towards eLearning resources	3.03	3.43	3.25	3.05	3.28

Figure 4:**Mean result of Relevancy of Application of Tools of online class in mathematics education.**

Statement 19 “Online classes increase the motivation of students by taking.” In this statement according to the data, T.U Central Campus students have mean score is 3.44, Mahendra Ratna Campus, Tahacal students have mean score is 3.85, Sanothimi Campus, Bhaktapur students have mean score is 3.43, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.29 and t-test value is 0.901 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based on campus. The total mean score of the statement is 3.35 and the standard deviation is 1.38.

Statement 20 “I have no difficulty in operating the basic functions of Zoom and MS Teem.” In this statement according to the data, T.U Central Campus students have mean score is 3.69, Mahendra Ratna Campus, Tahacal students have mean score is 3.79, Sanothimi Campus, Bhaktapur students have mean score is 3.55, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.30 and t-test value is 0.722 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.54 and the standard deviation is 1.65.

Statement 21 “I can use ICT tools like Web Camera, power point, Geogebra, for my own learning.” In this statement according to the data, T.U Central Campus students have mean score is 3.06, Mahendra Ratna Campus, Tahacal students have mean score is 2.95, Sanothimi Campus, Bhaktapur students have mean score is 3.45, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.93and t-test value is 0.279 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.99 and the standard deviation is 1.45.

Statement 22 “ICT tools make online learning easier.” In this statement according to the data, T.U Central Campus students have mean score is 3.27, Mahendra Ratna Campus, Tahacal students have mean score is 3.55, Sanothimi Campus, Bhaktapur students have mean score is 3.35, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.13 and t-test value is 0.456 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude

towards the statement based on campus. The total mean score of the statement is 3.84and the standard deviation is 1.69.

Statement 23"I am not happy with the software programs in my learning mathematics." In this statement according to the data, T.U Central Campus students have mean score is 2.69, Mahendra Ratna Campus, Tahacal students have mean score is 2.99, Sanothimi Campus, Bhaktapur students have mean score is 2.45, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.60 and t-test value is 0.157 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.67 and the standard deviation is 1.87.

The researcher had prepared five statements related to Relevancy of Application of Tools of online class in mathematics education. There were 5 statements on which one is negative statements and remaining are positive statements. On all positive statements agree percentage is high and regarding one negative statements disagree percentage is high. The overall mean score of all the related statements is 3.28. This means a lower than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.03, Mahendra Ratna Campus, Tahacal students have mean score is 3.43, Sanothimi Campus, Bhaktapur students have mean score is 3.25, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.05 and t-test value is 0.267 and significance level is 0.05. So we can conclude, there is no significant difference on students' attitude toward the statements based oncampus. Based onthe overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

Relevancy towards Use of Internet of online class in mathematics education

The researcher included five statements (24-28) in this section to identify the Relevancy towards Use of Internet of online class in mathematics education. Among them statement 26 is negative and other are positive. The following table consists the student's relevancy and its corresponding $\chi 2$ - value of the questionnaire.

Table 9:Percentage and chi-square values

S.N	Statements	SA %	A %	N %	D %	SD %	Mean	S.D	$\chi 2$	D
24.	I use internet for my daily class work.	29.50	26.50	18.25%	15.25%	10.50	3.49	1.63	141.3	P
25.	Internet facilitates learning more attractive inside and outside of the class.	23	26.75	23.75	15	11.50	3.35	1.59	88.7	P
26.	Internet isolates students by discouraging social interactions among their friends.	27.25	26.50	18.50	14.75	12.75	3.41	1.36	96.8	P
27.	Internet improves my learning satisfaction in mathematics education.	18.50	21	21	24	15.50	2.98	1.65	79.56	P
28.	Internet develop learning through sharing culture in mathematics	15	18.50	22	33.50	11%	2.84	1.28	83.9	P
	Average	22.65	23.85	20.70	20.50	12.2	3.21			

$\chi 2 \leq 9.49$(Non-Significant)

Statement 24 "I use internet for my daily class work." In this statement 29.50% of students are strongly agreed and 26.50% student are agree and 18.25% of students are undecided and 15.25% of students are disagree and only 10.50% students are strongly disagree about this statement. The mean score of the statement is 3.49, the standard deviation is 1.63 and the $\chi 2$-value is 141.3 at 0.05 level of significance. This indicates that the students have positive attitude this statement.

Statement 25 "Internet facilitates learning more attractive inside and outside of the class." A total 23% of students are strongly agreed and 26.75% of student agrees and 23.75% of students are undecided and 15% of students are disagreeing and only 11.50% of students strongly disagree about this statement. The mean score of the statement is 3.35, the standard deviation is 1.59 and the $\chi 2$-value is 88.7 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 26 "Internet isolates students by discouraging social interactions among their friends." A total 27.25% of students are strongly disagreed and 26.50% of student disagrees and 18.75% of students are undecided and 14.25% of students are

agreeing and only 12.75% of students strongly agree about this statement. The mean score of the statement is 3.41, the standard deviation is 1.36 and the χ2-value is 96.8 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 27 "Internet improves my learning satisfaction in mathematics education." A total 18.50% of students are strongly disagreed and 21% of student disagrees and 21% of students are undecided and 24% of students are agree and only 15.50% of students strongly agree about this statement. The total mean score of the statement is 3.98, the standard deviation is 1.65 and the χ2-value is 79.56 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 28 "Internet develops learning through sharing culture in mathematics." A total 15% of students are strongly disagreed and 18.50% of student disagrees and 22% of students are undecided and 33.50% of students are agree and only 11% of students strongly agree about this statement. The mean score of the statement is 2.84 , the standard deviation is 1.28 and the χ2-value is 83.9 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Table 10: Mean result of Relevancy towards Use of Internet of online class in mathematics education

S.N.	Statement	Name of the college				Total
		Central campus T.U	Mahendra Ratna Campus	Sanothimi Campus	SPA Campus	
24	I use internet for my daily class.	3.68	3.25	3.45	3.19	3.49
25	Internet facilitates learning more attractive inside and outside of the class.	3.49	3.69	3.08	3.30	3.35
26	Internet isolates students by discouraging social interactions among their friends.	3.15	2.95	3.65	2.93	3.41
27	Internet improves my learning satisfaction in mathematics education.	3.37	3.35	3.55	3.13	2.98
28	Internet develops learning through sharing culture in mathematics.	2.69	2.99	2.25	2.60	2.84
	Overall mean result of Student attitudes towards eLearning resources	3.27	3.25	3.19	3.03	3.22

Figure 5:**Mean result of Relevancy towards Use of Internet of online class in mathematics education.**

Statement 24 “I use internet for my daily class.” In this statement according to the data, T.U Central Campus students have mean score is 3.68, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.45, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.19 and t-test value is 0.722 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.49 and the standard deviation is 1.63.

Statement 25 “Internet facilitates learning more attractive inside and outside of the class.” In this statement according to the data, T.U Central Campus students have mean score is 3.49, Mahendra Ratna Campus, Tahacal students have mean score is 3.69, Sanothimi Campus, Bhaktapur students have mean score is 3.08, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.30 and t-test value is 0.428 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.35 and the standard deviation is 1.59.

Statement 26 “Internet isolates students by discouraging social interactions among their friends.” In this statement according to the data, T.U Central Campus students have mean score is 3.15, Mahendra Ratna Campus, Tahacal students have mean score is 2.95, Sanothimi Campus, Bhaktapur students have mean score is 3.65, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.93and t-test value is 0.254 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.41 and the standard deviation is 1.36.

Statement 27 “Internet improves my learning satisfaction in mathematics education.” In this statement according to the data, T.U Central Campus students have mean score is 3.37, Mahendra Ratna Campus, Tahacal students have mean score is 3.35, Sanothimi Campus, Bhaktapur students have mean score is 3.55, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.13 and t-test value is 0.345 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.98 and the standard deviation is 1.65.

Statement 28“Internet develops learning through sharing culture in mathematics.” In this statement according to the data, T.U Central Campus students have mean score is 2.69, Mahendra Ratna Campus, Tahacal students have mean score is 2.99, Sanothimi Campus, Bhaktapur students have mean score is 2.25, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.60 and t-test value is 0.268 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.84 and the standard deviation is 1.28.

The researcher had prepared five statements related to Relevancy towards Use of Internet of online class in mathematics education. There were 5 statements on which one is negative statements and remaining are positive statements. On all positive statements agree percentage is high and regarding one negative statements disagree percentage is high; the overall mean score of all the related statements is 3.22. This means is greater than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.27, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean

score is 3.19, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.378 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude toward the statements based oncampus. Based onthe overall percentage, the agreed percentage is higher in the related statement. So the attitudes of the students can be said to be positive.

Relevancy on Evaluation System of online class in mathematics education

The researcher included five statements (29-33) in this section to identify the Relevancy on Evaluation System of online class in mathematics education. Among them statement 30 is negative and other are positive. The following table consists the student's relevancy and its corresponding $\chi 2$ - value of the questionnaire.

Table 11: Percentage and chi-square values

S.N.	Statements	SA %	A %	N %	D %	SD %	Mean	S.D.	$\chi 2$	D
29.	Online class helps an individuals' self-evaluation.	26	26.5	14.5	18	16	3.89	1.82	94.9	P
30.	I feel insecure about my utilization of software ability.	27	26	22	13	12	3.93	1.74	109.7	P
31.	Practical skills only measured by ICT based evaluation.	32.5	17.5	19.5	14.50	19	3.78	1.89	130.6	P
32.	I feel my skills and knowledge in ICT are adequate for learning with online.	19.5	21.5	19.5	25.50	16	2.79	1.85	124.7	P
33.	Online class helps me to finish work at a time.	12	17	23.50	22.50	25	2.69	1.64	90.7	P
	Average	24.54	21.85	22.28	19.75	18.27	3.41			

$\chi 2 \leq 9.49$(Non-Significant)

Statement 29 “Online class helps an individuals' self-evaluation.” In this statement 26% of students are strongly agreed and 26.50% student are agreed and 14.50% of students are undecided and 18% of students are disagree and only 16% students are strongly disagree about this statement. The mean score of the statement is 3.89, the

standard deviation is 1.82 and the χ2-value is 94.9 at 0.05 level of significance. This indicates that the students have positive attitude this statement.

Statement 30 "I feel insecure about my utilization of software ability." A total 27% of students are strongly agreed and 26% of student agrees and 22% of students are undecided and 13% of students are disagreeing and only 12% of students strongly disagree about this statement. The mean score of the statement is 3.93 the standard deviation is 1.74 and the χ2-value is 109.7 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 31"Practical skills only measured by ICT based evaluation." A total 32.50% of students are strongly disagreed and 17.50% of student disagrees and 29.50% of students are undecided and 14.50% of students are agreeing and only 19% of students strongly agree about this statement. The mean score of the statement is 3.78 the standard deviation is 1.89 and the χ2-value is 130.6 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 32 "I feel my skills and knowledge in ICT are adequate for learning with online." A total 19.50% of students are strongly disagreed and 21.50% of student disagrees and 19.50% of students are undecided and 25.50% of students are agree and only 16% of students strongly agree about this statement. The total mean score of the statement is 2.79 the standard deviation is 1.85 and the χ2-value is 124.7 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Statement 33 "Online class helps me to finish work at a time." A total 12% of students are strongly disagreed and 17% of student disagrees and 23.50% of students are undecided and 22.50% of students are agree and only 25% of students strongly agree about this statement. The mean score of the statement is 2.69, the standard deviation is 1.64 and the χ2-value is 90.7 at 0.05 level of significance. It indicates to the researchers that the student has a positive attitude towards this statement.

Table 12: Mean result of Relevancy on Evaluation System of online class in mathematics education

S.N.	Statement	Name of the college				Total
		Central campus T.U	Mahendra Ratna Campus	Sanothimi Campus	SPA Campus	
29	Online class helps an individuals' self-evaluation..	3.28	3.25	3.22	3.19	3.89
30	I feel insecure about my utilization of software ability.	3.59	3.69	3.32	3.30	3.93
31	Practical skills only measured by ICT based evaluation	3.05	2.95	3.15	2.93	3.78
32	I feel my skills and knowledge in ICT are adequate for learning with online..	3.27	3.35	3.35	3.13	2.79
33	Online class helps me to finish work at a time	2.69	2.99	2.95	2.60	2.69
	Overall mean result of Student attitudes towards eLearning resources	3.17	3.25	3.39	3.03	3.42

***Figure 6:*Mean results Relevancy on Evaluation System of online class in mathematics education**

Statement 29 “Online class helps an individuals’ self-evaluation.” In this statement according to the data, T.U Central Campus students have mean score is 3.28, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.22, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.19 and t-test value is 0.842 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.89 and the standard deviation is 1.82.

Statement 30 “I feel insecure about my utilization of software ability” In this statement according to the data, T.U Central Campus students have mean score is 3.59, Mahendra Ratna Campus, Tahacal students have mean score is 3.69, Sanothimi Campus, Bhaktapur students have mean score is 3.32, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.30 and t-test value is 0.317 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement on the basis of campus. The total mean score of the statement is 3.93 and the standard deviation is 1.74.

Statement 31 “Practical skills only measured by ICT based evaluation” In this statement according to the data, T.U Central Campus students have mean score is 3.05, Mahendra Ratna Campus, Tahacal students have mean score is 2.95, Sanothimi Campus, Bhaktapur students have mean score is 3.15, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.93and t-test value is 0.143and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 3.78 and the standard deviation is 1.89.

Statement 32 “I feel my skills and knowledge in ICT are adequate for learning with online.” In this statement according to the data, T.U Central Campus students have mean score is 3.27, Mahendra Ratna Campus, Tahacal students have mean score is 3.35, Sanothimi Campus, Bhaktapur students have mean score is 3.35, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.13 and t-test value is 0.456 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.79 and the standard deviation is 1.85.

Statement 33"Online class helps me to finish work at a time." In this statement according to the data, T.U Central Campus students have mean score is 2.69, Mahendra Ratna Campus, Tahacal students have mean score is 2.99, Sanothimi Campus, Bhaktapur students have mean score is 2.95, Sudurpashim Academy Campus, Dhangadhi students have mean source is 2.60 and t-test value is 0.379and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude towards the statement based oncampus. The total mean score of the statement is 2.69 and the standard deviation is 1.64.

The researcher had prepared five statements related to Relevancy on Evaluation System of online class in mathematics education. There were 5 statements on which one is negative statements and remaining are positive statements. On all positive statements agree percentage is high and regarding one negative statements disagree percentage is high; the overall mean score of all the related statements is 3.42. This means is greater than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.17, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.39, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.267 and significance level is 0.05. So we can conclude, there is no significant difference on students' attitude toward the statements based on campus. Based onthe overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

Analysis of interview and Open-Ended questions towards relevancy of online class in mathematics education

The first part of the research shows that there is positive attitude towards online class in mathematics education. Why it is positive? What is the reason behind it? To investigate the factors of Online Class to be positive the researcher used interview guideline. The sample of the study (Ten Students) for interview was selected by using probability proportional sampling (PPS) procedure.

In this part, so the data analysis was based on student's views who were participated in the second phase of data collection. Using interview guideline, the information from the open-ended questionnaires provided from the experience of students the researcher was able to conclude the decision. The respondent opinions were recorded the transcribed under headings and then they were concluded in themes

and categories that emerged and as well as the researcher used two open-ended questions to collect data from respondents on online opportunities and challenges. In which the Online Learning opportunities from the first question and the challenges of Online Learning from the second question were collected. The researcher has collected the answer from the open-ended question by considering the double and the same answer as one and removing the irrelevant answer and summarized them and explained them.

Barriers of Online class in mathematics education.

To investigate the factors of online class to be positive the researcher used interview guidelines. In this section i asked many questions according to interview guideline related to the barrier of online class in mathematics education.

One of the respondents said that, "*From my point of view, the university provides us Ms teem id for online learning. But i faced many difficulties to use this application and firstly i do not know, how to share screen, how to raise hand use other* dif*ferent tools.At that time i was in home, i faced so many problems sometimes i faced problem of reliable net, environment, electricity, loud sound, and teacher unable to connect me in class, such kind of problem faced and i did not understand clear concept about the mathematics in online class. i have not proper knowledge about the ms teem at that time i use the YouTube for knowing about the ms teem and zoom. Those are my barriers while taking online class."*

Barrier related open-ended question on online class was distributed to 100 students and all students responded.Open-ended question is "What type of the barriers you face while taking online class?". After collecting the response from all the students, researcher has taken some representative topics which have received a lot of response. Which are unstable network, lack of Motivation, lack of technical knowledge, notification distraction and useless notification, shortage of devices, unnecessary advertisement, expensive**,** Learner's capability & confidence level**,** Time Management**,** Distractions, frustration, anxiety & confusion**,** lack of personal/physical attention and complexity.

Lack of Technical knowledge. Lack of technical knowledge is also one of the main problems faced by students while taking online class. 65 students out of 100 students responded on lack of technical knowledge, which includes lack of knowledge about software while attending online class, unable to use live classes, unable to

submit online assignment. Due to this COVID pandemic collages were closed and because of which collages are competed to conduct online classes and lack of technical knowledge is one of the frequently faced problem by students at this pandemic period while attending online classes.

Unstable Network and Internet connectivity. Main challenges faced by students while online mathematics class is unstable network and unstable internet connectivity. Out of 100 students 80 students, which is 80 % responded on unstable internet, expensive internet, and expensive data charges. Most of the students are facing these issues while attending online class at lockdown period. Nepal is developing country; every student does not have wifi connectivity. Most of the students use mobile data for their online classes so it is expensive and unstable due to which students cannot continue their online class.

Lack of Motivation. Lack of motivation is also one of the important challenges faced by students in online class in mathematics education. Due to lack of motivation, students did not complete their online classes and courses. Out of 100 students 69 students responded that they are facing motivation issue on online class. Lack of self-motivation among students continues to be one of the primary reasons why students fail to complete online courses. For many students, one of the biggest challenges of online learning is the struggle with focusing on the screen for long periods of time. With online learning, there is also a greater chance for students to be easily distracted by social media or other sites, so motivation need for student while taking online class.

Time Management. Time management is also one of the barriers faced by students in online class in mathematics education.Out of 100 students 56 students responded that they are facing time management issue on online class. One of the biggest issues that impacts online learners is poor time management. Lack of a schedule, too many distractions and multitasking can lead to poor time management. Another factor that may lead to poor time management is the lack of a designated workspace. Students need to find a way to balance the flexibility of online learning with a disciplined schedule to be successful online learners, so time management is the one of the barrier of online class.

Distractions, frustration, anxiety & confusion. Distractions, frustration, anxiety &confusionis also one of the barriers faced by students in online class in

mathematics education.Out of 100 students 53 students responded that they are facing Distractions, frustration, anxiety & confusion issue on online class. Students say that we are not habitual with online class, so we distract and confusion about the online study. Some students do not feel comfortable while learning online, leading to increased frustration and confusion. Inadequate compatibility between the design of the technology and component of psychology required by the learning process. So, this one is the one of the biggest barriers of online class.

According to student's opinions after collecting the response from all the students, researcher has taken some representative barriers while taking online class in mathematics education which have received a lot of response. Which is unstable network, lack of Motivation, lack of technical knowledge, notification distraction and useless notification, shortage of devices, unnecessary advertisement, expensive**,** Learner's capability & confidence level**,** Time Management**,** Distractions, frustration, anxiety & confusion**,** lack of personal/physical attention and complexity?The most frequent barrier respondents noted was the lack of reliable internet at home.

Opportunities of Online class in mathematics education.

To investigate the factors of online class to be positive the researcher used interview guidelines which were given in (Appendix D). In this section i asked many questions according to interview guideline related to the opportunities of online class in mathematics education.

One of the respondents said that, "From the online class i got many benefits and opportunities like, improve technical skill,learning by *visualize method, time saving, improve communication skill, i learn many more thing from online class i feel more comfortable than physical class and my technical and communication skills improve by the online classes that is the great opportunities for me. i habitual with e-mail communication helping us our professor, online classes help to us for finishing our course in time and especially online class getting me opportunities to communicate with my colleagues. I can confidently say that online class can develop learning ability".*

This section covers the extracted themes that were derived from the analyses of data; each theme converses opportunities related online class in mathematics education and reflects the perspectives of students regarding online class.The first open-ended question is "What are the opportunities of while taking online classes? ".

These are the opportunities for the student to know and understand about online class in this question. Opportunity-related open-ended question was distributed to 100 students and all students responded. After collecting response from all the students, researcher has taken some representative topics which have received a lot of response. Which is Time flexibility, Location flexibility, Scope for Innovation & digital development, wide availability of courses & content, immediate feedback, with no any boundaries and self-learning.

Flexibility. Students have the freedom to juggle their careers and school because they are not tied down to a fixed schedule. In a traditional classroom setting, class meeting times are set, and the student has no power over this, forcing them to work their schedules around these dates. Most people who choose online learningtend to have other commitments and prefer this mode of learning as it gives them power over how they will delegate their time towards their different project. They can learn at their own convenience anytime, anywhere sitting at any place. The students can be trained from all the countries, places whether in the remote areas or countryside areas where education facilities are not available. Students who study online can plan their own time schedule, without having to make personal sacrifices to meet the class attendance requirements of teachers and traditional universities.

There are responses from 46 out of 100 students, which is 46 percent. As per students online learning helps them to learn anywhere, at any time, without any geographical barrier. The flexibility of online education is often the most appealing factor, contributing to many students choosing to optional for this route over a more conventional education. Whilst it promises things like convenience and more freedom, flexibility itself also has a positive impact on the student's overall learning.

Self-Learning. Self-learning is anything you learn outside a classroom environment by yourself without a set curriculum or examinations. Many students have pointed to self-learning as an opportunity for eLearning. There are responses from 82 out of 100students, which is 80 percent. Self-learning is a main feature or facility of online class in mathematics education. Students consider self-learning as the main opportunity to learn according to the needs and desires of the student. The additional benefit of online class is that it is student centered and focuses on self-learning.

Online class takes into consideration the differences of individual learners, and it allows students to practice their own individual learning styles. All students have different learning styles and there will never be a one-size-fits-all type of solution which will match all students at once. That is why individualistic learning methods are some of the greatest advantages of online class.

Improve communication skills. Students cananalyze problems and explore ideas as well as develop concepts. Not only they are able to acquire knowledge together, but students are also able to share diverse learning experiences to express themselves and reflect on their learning. Online class makes many opportunities for education institutions, business organizations and learners. These opportunities are effective use of information and communication technologies, delivery of educational services anywhere, anytime and to anyone, substantial cost savings, just-in-time access to timely information, personalized learning (Milovanovic, 2010).

There are responses from 49 out of 100students, which is 49 percent agree that improve communication skill is a main feature or facility of online class in mathematics education. Taking online courses force you to up your game when it comes to virtual and written communication. You learn to ask specific questions to get the answers you need and make compelling arguments through written language. Learning virtual etiquette can help you in your professional life, as well.

Study according to your learning style. Many of the student reported the same factors flexible, resources are available from anywhere and at any time, no any boundaries, simpler, easier, scalable, and more effective, self-study, save time, creativity, user-friendly, enhance knowledge, get international degree, quality education, skill base learning, student-centered learning, cost effective, availability, accessibility, effective use of information and communication technologies, personalized learning, improved collaboration and interactivity. Online learning has completely transformed the way in which learning is imparted to students. The student has said a lot about the online learning opportunity.

There are responses from 43 out of 100students, which is 49 percent agree that improve study according to your learning style is a main opportunities or facility of online class in mathematics education. Online class enables students to communicate, share and work collaboratively anywhere and anytime. Several students indicated in

the questionnaire that online learning has a significant role to play in supporting and enhancing their communication with their peers.

Immediate feedback. Students taking online class find that they are often required to learn difficult materials in a comfortable home setting without any of the added pressure normally associated with traditional colleges. As a result, keeping up with regular deadlines during online studies can become difficult for those students who lack strong self-motivation and time management skills. There are responses from 48 out of 100students, which is 48 percent agree that improve study according to immediate feedback is a main opportunities or facility of online class in mathematics education. In traditional classrooms, teachers can give students immediate face-to-face feedback. Students who are experiencing problems in the curriculum can resolve them quickly and directly either during the lecture or during the dedicated office hours. Personalized feedback has a positive impact on students, as it makes learning processes easier, richer, and more significant, all the while raising the motivation levels of the students.

After collecting response from all of the students, researcher has taken some representative opportunities while taking online class which have received a lot of response. Which isTime flexibility, Location flexibility,Scope for Innovation & digital development, wide availability of courses & content, immediate feedback, with no boundaries andself-learning are the opportunities while students taking online class of mathematics education.

From the above interview about opportunities and barriers of online class in mathematics education concludes that there are many barriers and opportunities to taking online class in mathematics education. Response from the students shows that opportunities encounter the barriers of online class. Online class provides great opportunity for universities in developing countries to improve their teaching and learning processes. From the student’s response the online classes in mathematics education is positive but they faced many types of barriers when they are adjusting in online classes. After taking online class they were habitual with online classes now they feel comfortable with online class. Based on overall open-ended question and interview we can conclude that students have positive attitude towards online class this show that relevancy level is high of online class.

CHAPTER V
SUMMARY, FINDINGS, CONCLUSION AND RECOMMENDATIONS

In this chapter, I have presented the summary of the research, finding of the research, conclusion of the research and the recommendation of the study based on presentation, analysis and interpretation of the collected data. The followings summary, finding, conclusions and recommendation of the study have been drawn based on the analyzed data. I have presented the summary of study, findings, conclusions, and recommendation in the separate headings so that it will be comprehensible.

Summary of the Study

Summary of the Study In this study, the researcher was selected a relevancy of online classes in mathematics education. Under this topic, the researcher was established the objectives to find student's barriers to online class in mathematics education in the context of Nepal and to analyze the opportunities that students entertain while taking online class in mathematics education.

In order to achieve this goal, a campus by the name of Tribhuvan University central campus, Mahendra Ratna multiple Campus and Sanothimi Multiple Campus, sudurpashim multiple campus was visited for a week-long to conduct the study. Survey research approach among quantitative research design method was adopted for this study. The data were collected through questionnaire and interview. 100 students for questionnaire and 10 students for interview they are studying mathematics education during the academic year 2077 were selected as the purpose of the study.

This study was survey design. The researcher himself developed questionnaire under the guidance of supervisor. The questionnaire, interview were main tools of this study. The responses were collected from mathematics education students of Tribhuvan University Central Campus, Mahendra Ratna multiple Campus and Sanothimi Multiple Campus, sudurpashim multiple campus selected by probability proportional sampling (PPS) procedure. The researcher collected the data by the tool of questionnaire under the 'Likert' five attitude scales and open-ended question in survey design of quantitative method. 10 students were selected for interview. A set of 33 (positive and negative) Opinionnaire were developed as the tool for collection

data. The Opinionnaire had five levels of statements strongly agree, agree undecided, disagree, and strongly disagree of Likert scale. The x^2 -test, mean, standard deviation, attitude score, chart and percentage were used to determine the relevancy of online class in mathematics. Lastly, the researcher found that master level students had positive attitude towards online class in mathematics education.

Findings

The responses were received from 100 students: 45% from Tribhuvan University Central Campus, 25% from Mahendra Ratna multiple Campus and 15% from Sanothimi Multiple Campus, 10% from sudurpashim multiple campus. The responses received were from first semester 46%, and fourth semester 54%. Only few numbers of students 22% had an experience of online classes before the COVID 19 pandemic situation. Amongst the students who responded majority 93% of them were attending online classes. The online platform being used by all the responders to attend the online classes were Zoom, Ms Teem and Google Meet. Majority of the students 86% used WiFi. The strength of internet as rated by the students were good in 19% and satisfactory in 56%. The internet was disturbed by electricity cut down in 76% of responders. In the study, the researcher was selected Tribhuvan University as a research field for the objectives of the study. To identify relevancy of online classes in mathematics education Likert's five point's scale, questionnaire was developed in different domains which are already mentioned above. When the data was collected and tabulated then analyzed by using $\chi 2$-test, percentage, mean, Chart and Standard Deviation. On the basic of analysis of the data the major finding of the study were summarized as below

i. From the Chi-square test, all statement is significant at 0.5 level of significance.
ii. Among the 33 statements, 27 statements have positive, and 6 statements have a negative attitude towards online class in mathematics education.
iii. Overall, the Master level students had a positive attitude towards online class in mathematics education.
iv. The mean score of each statement shows that most of the students had positive attitude towards online class in mathematics education.

v. Overall mean related to barrier of online class. There were six statements related to barrier of online class.The overall mean score of all the barrier-related statements is 3.32. This means a lower than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.18, Mahendra Ratna Campus, Tahacal students have mean score is 3.23, Sanothimi Campus, Bhaktapur students have mean score is 3.08, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.201 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude toward the statements based on campus. So, we can conclude that students have positive attitude towards online class. So the attitudes of the students can be said to be positive.

vi. Overall mean related to opportunities of online classes in mathematics education. There were 5 statements on which all are positive statements. On all positive statements agree percentage is high the overall mean score of all the resources-related statements is 3.68. This means agreater than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.29, Mahendra Ratna Campus, Tahacal students have mean score is 3.18, Sanothimi Campus, Bhaktapur students have mean score is 3.39, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.366 and significance level is 0.05. So we can conclude that, there is no significant difference on students' attitude toward the statements based on campus. Based on overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive

vii. Overall mean related to Relevancy of Teaching Learning Activities of online class in mathematics education. The overall mean score of all the resources-related statements is 3.25. This mean is greater than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.34, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.58, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.13 and t-test value is 0.388 and significance level is 0.05. So we can conclude, there is no significant difference on students' attitude toward the statements based on campus. So, based on the overall percentage, the agreed percentage is higher

in the related statement, so the attitudes of the students can be said to be positive.

viii. Overall mean related to Relevancy of Application of Tools of online class in mathematics education. There were 5 statements on which one is negative statements and remaining are positive statements. The overall mean score of all the resources-related statements is 3.28. This means a lower than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.03, Mahendra Ratna Campus, Tahacal students have mean score is 3.43, Sanothimi Campus, Bhaktapur students have mean score is 3.25, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.05 and t-test value is 0.267 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude toward the statements based on campus. Based on overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

ix. Overall Mean related to Relevancy towards Use of Internet of online class in mathematics education. The overall mean score of all the resources-related statements is 3.22. This means is greater than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.27, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus, Bhaktapur students have mean score is 3.19, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.378 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude toward the statements based on campus. Based on overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

x. Overall Mean related to Relevancy on Evaluation System of online class in mathematics education. There were 5 statements on which one is negative statements and remaining are positive statements. On all positive statements agree percentage is high and regarding one negative statements disagree percentage is high; the overall mean score of all the related statements is 3.42. This means is greater than the averages mean score. According to the data, T.U Central Campus students have mean score is 3.17, Mahendra Ratna Campus, Tahacal students have mean score is 3.25, Sanothimi Campus,

Bhaktapur students have mean score is 3.39, Sudurpashim Academy Campus, Dhangadhi students have mean source is 3.03 and t-test value is 0.267 and significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude toward the statements based on campus. Based on overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

xi. The Barriers faced by students while they taking Online class, according to student's opinions after collecting the response from all the students, researcher has taken some representative barriers while taking online class in mathematics education which have received a lot of response. Which is unstable network, lack of Motivation, lack of technical knowledge, notification distraction and useless notification, shortage of devices, unnecessary advertisement, expensive**,** Learner's capability & confidence level**,** Time Management**,** Distractions, frustration, anxiety & confusion**,** lack of personal/physical attention and complexity.The most frequent barrier respondents noted was the lack of reliable internet at home.

xii. The Opportunities entertain students while take online class, after collecting response from all of the students, researcher has taken some representative opportunities while taking online class which have received a lot of response. Which isTime flexibility, Location flexibility,Scope for Innovation & digital development, wide availability of courses & content, immediate feedback, with no boundaries andself-learning are the opportunities while students taking online class of mathematics education.

xiii. Response from the students shows that opportunities encounter the barriers of online class. Online class provides great opportunity for universities in developing countries to improve their teaching and learning processes. From the student's response the online classes in mathematics education is positive

Conclusion

The purpose of this study is to examine the barriers and opportunities that students have towards online learning. Regarding the first research question, “To find student's barriers to online learning in mathematics education in the context of Nepal” and analyze the opportunities that students entertain while taking online class in mathematics.

The researcher found the Barriers faced by students while they taking Online class are unstable network, lack of Motivation, lack of technical knowledge, notification distraction and useless notification, shortage of devices, unnecessary advertisement, expensive**,** Learner's capability & confidence level**,** Time Management**,** Distractions, frustration, anxiety & confusion**,** lack of personal/physical attention and complexity. The most frequent barrier respondents noted was the lack of reliable internet at home and the opportunities entertain students while taking online class are Time flexibility, Location flexibility,Scope for Innovation & digital development, wide availability of courses & content, immediate feedback, with no boundaries andself-learning are the opportunities while students taking online class of mathematics education.

Overall, the research indicates the opportunities of online class outweigh the barriers that students face. Further research on a larger scale, involving more students, Professors and online class are needed to better evaluate the opportunities, challenges, and useful strategies of successful students. It could be that student respondents to this survey had a uniquely different experience than their counterparts taking online class elsewhere. The review of constructivist perspective emphasizes an active learning environment that may incorporate learner's centered and problem-based learning in which students are actively engaged in critical thinking activities. So online class is based upon the assumptions of constructivism where teachers should play role of instructor and students are actively participating in class.

In the conclusion the opportunities of online class outweigh the barriers that students face. Online class provides great opportunity for universities in developing countries to improve their teaching and learning processes. Moreover, the findings of this study states that master level students of mathematics education had positive opinion towards the online classes in mathematics education. From all the finding the researcher concludes that online class is relevant for the students of mathematics education in Tribhuvan University.

Recommendations

Since the present study was limited in master level Tribhuvan University, so finding of the study can be generalized for the same University. But it can't be generalized to all level and other universities. So, considering these limitations the following recommendations had been made.

i. To establish the findings, similar study should be carried out other universities.
ii. Online based teaching learning activities should be given priority in mathematics education.
iii. The students recommended that the teachers need training on how to take online classes. The barriers for the online teaching can be minimized if the teachers are trained for online education system.
iv. Online teaching education if integrated with traditional classroom lectures for selected topics could be beneficial to the students.
v. Internet facility is necessary and should be improved to learn online in mathematics education effectively.
vi. Policy makers should provide additional planning time for students to experiment with new ICT-based approaches.
vii. There must be well designed course, sufficient materials and equipment's in online class, internet access, trained teachers and evaluation system to be positive attitude.

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APPENDICES

APPENDIX-I

Questionnaire

Dear sir/ Madam,

This questionnaire is a part of my research study entitled "Relevancyof Online Classes in Mathematics Education" as a partial fulfillment of Master's Degree in Mathematics education under the supervision of Dr. Bed Prasad Dhakal Assistant professor of Department of Mathematics Education, T.U Kirtipur. You are kindly requested to give your responses through the following questionnaire. The correct information provided by you will be of great help for completing my research. I sincerely assure that your responses will remain confidential and used only for research purpose.

Researcher
Bishnu Bahadur Badaila
badailabishnu3@gmail.com

Participant Name:

Level:

College:

Semester

Barriers of online classes in mathematics education

S. N	Statements	SA	A	N	D	SD
1.	Lack of the adequate Internet access.					
2.	Using new technology not easy without training.					
3.	Lack of the timely feedback from the instructor.					
4.	Lack of the technical and academic skill in mathematics education					
5.	Instructors do not know how to teach online mathematics subject.					
6.	Unfamiliar with online mathematics learning technical tools and online learning technology costs too much.					

Opportunities of online classes in mathematics education

S.N	Statements	SA	A	N	D	SD
7.	I think that taking an online class in mathematics education would be an interesting experience.					
8.	More flexibility in time management between school and work.					
9.	Easier to concentrate on mathematics education.					
10.	It is more convenient for me than commuting for every class.					
11.	Teachers can practice technology and can design various flexible programs for students' better understanding mathematics.					
12.	Online classes enhance problem-solving skills, critical thinking abilities, and adaptability among the mathematics students.					

Relevancy of Teaching Learning Activities of online class in mathematics education

S.N	Statements	SA %	A %	N %	D %	SD %
13.	Use of online class in mathematics education would make the subject matter more interesting.					
14.	Online classes can increase collaboration (Co-operation) between students.					
15.	My confidence in mathematics is more increased by taking online class activities in mathematics learning.					
16.	I think that the taking online classes restrict the creativity of the students.					
17.	Involving in technologically enhanced learning activities i can visualize mathematical object.					
18.	We have administrative support for adopting online classes into learning process.					

Relevancy of Application of Tools of online class in mathematics education

S.N	Statements	SA	A	N	D	SD
19.	Online classes increase the motivation of students by taking it as an instructional tool.					
20.	I have no difficulty in operating the basic functions					

	of Zoom and MS Teem.					
21.	I can use ICT tools like Web Camera, power point, geogebra, for my own learning.					
22.	ICT tools make learning easier.					
23.	I am not happy with the software programs in my learning mathematics.					

Relevancy towards Use of Internet of online class in mathematics education

S.N	Statements	SA %	A %	N %	D %	SD %
24.	I use internet for my daily class work.					
25.	Internet facilitates learning more attractive inside and outside of the class.					
26.	Internet isolates students by discouraging social interactions among their friends.					
27.	Internet improves my learning satisfaction in mathematics education.					
28.	Internet develop learning through sharing culture in mathematics					

Relevancy on Evaluation System of online class in mathematics education

S.N	Statements	SA	A	N	D	SD
29.	Online class helps an individuals' self-evaluation.					
30.	I feel insecure about my utilization of					

	software ability.					
31.	Practical skills only measured by ICT based evaluation.					
32.	I feel my skills and knowledge in ICT are adequate for learning with online.					
33.	Online class helps me to finish work at a time.					

Note:

SA- Strongly Agree A-Agree

N-Neutral D-Disagree SD-Strongly Disagree.

Open-ended question

Q1. Please provide any comments you would like to shareabout barriers you have encountered when taking online classes.

.....

.....

.....

Q2. Please provide any comments you would like to share about opportunities you have entertain while taking online classes.

.....

.....

.....

Q3. Please provide any additional comments describing if you want to take online classes in future then why you want to take an online class in the future?

.....

.....

.....

Thank You

APPENDIX-II

Students Interview Guideline

1. Students Name
2. Students Age
3. Students Gender
4. Students Grade
5. Do you have a taking online class?
   i) Yes ii) No
6. Do you use your mobile or any other digital tools at home for taking online class?

   .....

The main question of the research was an investigation of relevancy of online class in mathematics educationand specially focuses on opportunities and barriers of online class in mathematics education. To get answer of these questions were asked:

1. What is current status of internet access in your home?
2. How online class being practiced in mathematics education?
3. How many students taking online class in your class?
4. What are the opportunities of takingonline class in mathematics education?
5. What type of the barriers encounter while taking online class in mathematics education?
6. Which software you use for taking online class?
7. Do you want to take online classes in future?
8. Which methods apply for evaluation in online class?
9. How do you feel while taking online class?
10. What do you want to say about online class is relevancy or not?