

Perceptions towards Online System of Teaching and Learning Mathematics

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<p>Article info: Received: February 11, 2024 Revised: March 12, 2024 Accepted: March 27, 2024</p> <p>Keywords: <i>COVID19, MATLAB, GeoGebra, FORTRAN, video conferencing.</i></p>	<p>Abstract: This research paper discusses on the online mode of teaching/learning mathematics especially during the period of COVID-19. The main objective of the study was to analyze the perceptions of students' and teachers' towards online system of teaching/learning mathematics. The study was carried out using case study. Four students studying mathematics at B. Ed. level and two teachers teaching at the same level were the participants of this study. Findings of the study showed that online class was less Interactive and there were complications due to Poor Connections. On the other hand, Flexible Learning and Opportunity to Learn in Self Pacing were found to be positive aspects of the system. At the same time, the research concluded two major challenges: challenge of Immediate Feedback and challenge Monitoring Students' Activities during the class.</p>
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Introduction

The whole world including Nepal was suffered from the effect of Novel Corona Virus, named as COVID-19. Each and every part of human life had been badly paralyzed with the deadly disease. All the factories, corporate houses, government and non-government offices, educational institutions were partly or entirely affected by the pandemic. As a result, the government of Nepal announced to work through alternative ways during pandemic including education. The substitute way was related to the use of different electronic devices and working technique was virtual as far as possible. This was an alternate of physical presence of human being in the work place so that the crowd could be reduced. With the emergence of this situation, as per the government policy of Nepal, Tribhuvan University authority has decided to conduct the classes through online mode. The University developed different online instruction guidelines for successful conduction of the program. For this, University created official mail in Microsoft Teams for all the teachers and students for the purpose of online instruction. With this mechanism, the University started to conduct classes through Microsoft Teams all over the country. The situation was not so favorable because neither the teachers nor the students were prepared to employ such online activities. Besides that, the teacher and students were not accessible with digital devices, resources and internet access. This is the age of digital world. In the last few years, the uses of ICT have been taken a great attention to the teachers in teaching and learning of mathematics in schools and colleges (Banerjee, 2014).

In fact, people from the different parts of the globe are sharing their thoughts, findings and discoveries to each other by means of the technology. But the scenario of Nepal is different. It is true that Nepalese people have been using social media intensively. But in the field of teaching/learning, except in the technical subjects, there is no such excessive use of the technology observed.

The COVID-19 period was a dark period in the history of the University and Schools. Therefore, the management and conduction of classes on this period was really a challenging like in Nepalese context because of not having preparedness towards virtual mode of instruction. This study was focused on exploring the practices of mathematics instruction through online during pandemic. Hence, perceptions of students and mathematics teachers towards online classes were the main concern

of this research. More specifically, this study was related to ‘how classes in mathematics were conducted on this period?’ for this, it is necessary to know the perceptions of students and teachers towards online classes. Some of the pertinent questions may be: what are the perceptions of students and teachers towards online classes? How can it be improved? How can we handle the situation of pandemic in the future so that the teaching/learning process should not be interrupted? What kind of preparations may be there to tackle the similar situation in the days to come?

If the teachers be prepared for the situations like pandemic of COVID-19, it will be beneficial in the future in case of urgency. This is necessary for two different reasons. First is: this is the right time to introduce the technology in the usual classes of mathematics so that students can learn or take advantage of it in deepening their understandings. And the second is: it becomes a side-by-side preparation for the situation like COVID-19 pandemic in the future. It can be argued that the COVID-19 pandemic has made the teaching institutions aware about technical literacy. If we are well equipped, then we can handle this type of situation in an ease in the future. Similarly, the fear of technology can also be minimized among the teachers. Pandemic is the worst event among ourselves but the lesson it has given to us cannot be underestimated. We all do not want its repetition from the core of our heart but like an accident, this type of situation might occur again in the days to come. With the knowledge of this bitter truth, we need to prepare ourselves for fighting such moments. It is believed that this study will be helpful to overcome with such type of situations in the future.

Statement of the Problem

The worldwide attack of Novel Corona Virus rigorously affected the life of people all over the world. Almost all the sectors including schools and universities became dysfunctional for a long time. The authorities decided to seek alternative ways in order to make them revive. As a result, the discussion concluded to implement the alternative ways for operating those institutions. The situation of Nepal was not different than other countries. Tribhuvan University has decided to conduct online classes in order to open the stage of deadlock. For the purpose, the university has circulated guidelines for the conduction of such classes and managed virtual trainings for the same. Following the guidelines of the University, campus administrations take the responsibilities for the conduction of online classes. The online class was a new practice for the teachers and students. Teacher and their students have positive relationship in technology enabled classroom (Higgins & Bushell, 2018). Despite the trainings by university and campus, there were many obstacles among teachers for the successful implementation of the program. There might be arguments about ‘pros’ and ‘cons’ of online classes. For example, whether the online class is an alternative means of teaching and learning or it should go side by side so that both the teachers and students remain attached with the technology. The main principle of teaching is that it must be for the betterment of students’ learning. Therefore, student centered innovative teaching methods are preferred. During the period of COVID-19, there was no possibility of physical classes and teachers were not experienced in conducting online classes. In this regard, present study aims to analyze the perceptions of teachers and students involved in online teaching /learning in mathematics. This study will be useful to handle similar type of pandemic in the future.

Rationale of the study

Teaching/learning is considered as a continuous process for the fulfillment of grade wise and level wise objectives of education determined by the concerned authorities. This is required in order to achieve the national objectives of the education determined by the state. Sometimes it happens that the situation may not be favorable in the achievement of those objectives within the estimated time period. COVID-19 was one of the pandemic situations that have disturbed the whole education system. It has

troubled all the schedules of every level in the educational institutions all over the world. Nepali education system could not be exception of it. The schools from Nursery to Tertiary level got closed during lockdown period of COVID-19. As a result, the concerned authorities decided to conduct online classes in order to continue the teaching/learning process. This was a new practice in the institutions indeed. Therefore, it became a matter of investigation that ‘how was the teaching/learning process conducted during that period?’ For this, it was necessary to get the experiences of teachers and students involved in it. Present study was the consequence of the same. At the same time, it was intended through the study that ‘how can online teaching/learning be made productive?’ in the days to come. These concerns were responsible behind the conduction of this study. The study would be helpful in planning and be prepared for tackling the similar and more serious types of pandemics in the future.

Objectives of the Study

This study aims to fulfill the following objectives:

1. To explore the perception of students towards online teaching/learning in mathematics
2. To explore the perception of teachers towards online teaching/learning in mathematics

In order to fulfill above stated objectives, following research questions were prepared:

RQ1: How do students perceive the online teaching/learning mathematics during COVID-19?

RQ 2: How do teachers perceive the online teaching/learning mathematics during COVID-19?

Review of Related Literature

In order to get some ideas of the previous researches and making the problem of research truly a researchable one review of literature was carried out for this study.

Online Learning

In general, the worldwide practice of teaching /learning is related to the conduction of a class in the presence of teacher and students. Due to the spread of invader COVID-19, this system has been interrupted all over the world. As a result, after a long discussion, the classes were started with the use of internet. This was the demand of time and situation at that time in order to revive the learning process of children. Internet and other technical tools have been found to be supportive in order to extend students’ knowledge (Hancock, 2002). In the context of Nepal, the classes were conducted through virtual means such as ‘Zoom’, ‘Google meet’, and ‘Microsoft Teams’. For the purpose of this study, any class which has run through the use of digital means is counted as a part of online learning. It is the reality that online classes provide opportunities to students to learn in difficult times by joining in a group from a distance apart at once with the teacher together from all over the country. According to Raheim (2020), online class was the best substitute in order to carry on students learning during the hard times of COVID-19 pandemic. It seems that online education is not a novel idea because it was in practice in London in middle 1800s (Paul& Jefferson, 2019). But, in case of Tribhuvan University, in general programmes, like B. Ed. annual systems, this type of practice can be regarded as the new one. Therefore, it was usual that the teachers and students might face complexities and experience a difference in the pedagogical process. Some researchers advocate in the ‘for’ of traditional classes arguing that online learning is not free from feedbacks from the teachers and students both (Atchley et

al.,2013). On the contrary, others count it as a part of flexible learning so that students can take an advantage by means of re-visiting the class in their own convenience (Fauziana, 2020).

Scenario of Nepal

Most of the higher education institutions are using different kinds of technologies in their different program. For example, computers, internet, projector, smart board, etc. have been found to be commonly used. Digital technology was found to be incorporated with the curriculum in higher education (Joshi et al., 2022) but difficulty was found in the use of such tools in the classroom (Adhikari et al., 2022). Studies have shown that higher institutions were trying to motivate their teachers and students in the use of digital resources in their instructional activities (Khanal et al., 2022). Such attempts were found to be helpful in strengthening the digital knowledge of teachers (Khanal et al., 2022).

It is a well-known fact that learning is a continuous process. Learning takes place in the presence of learner and the teacher, in general. A worldwide convention of learning believes on the interaction between teacher and students in the class. Therefore, physical presence of teacher and students in the class is required in order to promote students' learning. But digitalized technology has replaced the above discussed mode of learning especially in the difficult times where there was less chance of students and teachers to be together physically due to the worst situation caused by COVID-19. Online class is the byproduct of the same in the Tribhuvan University Faculty of Education, annual program.

Roger's Diffusion of Innovation Theory

This theory was developed by E. M. Roger's in 1962. The main essence of the theory was 'how people adopt the new ideas in their workplaces'. Technology as a new idea can be taken as an innovation and adoption of it by the people (students) in their lives as an inseparable part of the life is the diffusion according to the theory. If people (students) become habituated to a new idea, it becomes a part of their daily life. As a result, the diffusion becomes possible.

After the review, I felt the necessity of conducting research regarding online classes of mathematics at higher level in the faculty of education. In my opinion, it can act as a small increment in the field faculty research. The conceptual framework of the study is presented as follows:

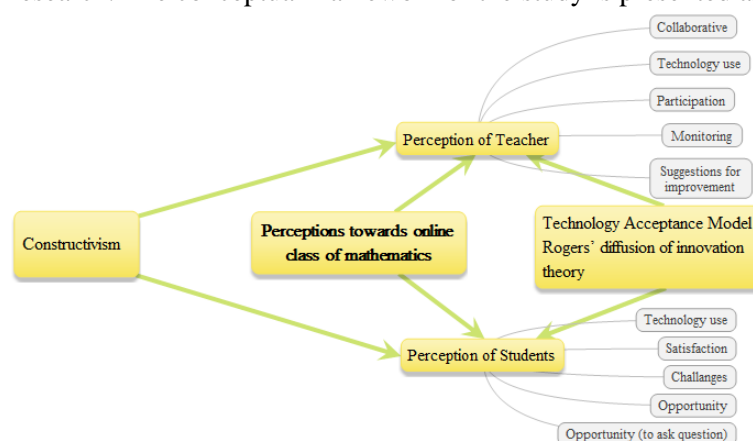


Figure 1 Conceptual Framework

Methodology

Research Method

This study was qualitative in nature. An in-depth interview was conducted to secure the information related to the objectives of the study. Likewise, the interview of two purposively selected teachers and four students was conducted based on the interview guideline. Purposeful sampling helped me to select those participants who can provide the richest information for the study (Best & Khan, 2018).

Research Design

This study was based on the descriptive case study design. The case study is a way of organizing social data for the purpose of viewing social reality. It examines a social unit as a whole. The unit may be a person, a family, a social group, a social institution, or a community (Best & Khan, 2018).

Development of research tool

An interview guideline was developed by the researcher for exploring the perceptions of students and teachers towards the online teaching/learning in mathematics. The aspects of online teaching/learning were taken into consideration while developing the interview guideline. For example, how it was planned, executed and to what extent it was helpful in addressing students' expectations. At the same time, the problems and ways to solve them during online instruction were also taken into consideration while preparing the interview guideline.

Selection of Participants

In my research, I followed the purposeful sampling technique for the selection of participants. In purposeful sampling, researchers purposely choose individuals and sites to learn or understand the essential phenomenon (Creswell, 2012). Four students studying mathematics at B. Ed. level and two teachers teaching at the same level and campus were the participants of this study. I selected the participants from a single campus because of my convenience. For the purpose of data collection, the in-depth interview based on interview guideline was utilized related to the topic of the study.

Findings and Discussion

Online class in the context of the general courses in Tribhuvan University as like annual B. Ed. program was a new approach for many teachers. It was a consequence of the pandemic created by COVID-19. Therefore, there was no much time for pre-preparations of such classes. University adopted some immediate measures in order to handle the situation of the pandemic so that the loss in students' learning can be minimized. It happened that the situation was not in the control of the teacher fully. For example, the connection and internet were not in the control of the teachers. Sometimes device may not support the teacher to continue his/her presentations. This study was designed to dig out the reality. For this, it was needed to analyze the perceptions of teachers and students involved in the online class. Participant interview was conducted in order to collect their views regarding the topic of the study. On the basis of the participant interview, following findings have been generated:

Less Interactive Class

Both of the participant teachers said that there was a big challenge of making the online mathematics class more interactive. It was so because there were difficulties in managing all students to participate equally in the discussion as like in the physical class.

All of the students told that the online class in mathematics was mostly teacher-centered. According to them, teacher has demonstrated his screen from his device and explained the content kept

there. This made an online class teacher centered and students were passive listeners. Researches on the effectiveness of online class have shown the similar result. Howland and Moore (2002) found that the interaction between students and teacher was a serious concern of online class. According to them, there was lacking among the students to be confident on what they have learnt in an online class.

Similar Type of Presentation

In case of mathematics class, the participant students argued that it was not effective and interesting as compared to the physical class. According to them, it was because there was no face-to-face communication and eye contact of the teacher to all students in an online class. Kemp and Grieve (2014) in a study concluded that there is a high chance of making a change in the teaching style for a teacher by simply looking the facial impression of the students in a face-to-face class. According to them, there is no such possibility in an online class to do so. As a result, it becomes less effective comparatively.

Familiarity of the Teacher with IT

According to participant students, the teachers of mathematics were not IT friendly to handle online classes. Therefore, there was disturbance and a type of the interruption in the class. As students, this has become an obstacle in running the class smoothly. A study conducted by Ifran and Iman (2020) on Malaysia concluded the same. According to them, one of the reasons behind the ineffectiveness of online class is the lack of ability of the teacher to handle the online class.

Isolated Feeling

Participant students told that they feel isolated in an online class. According to them, there was a group of students in the physical class but no such environment was there in the online class. Therefore, feeling of loneliness has made them isolated. Woods (2002) in a study found that students felt isolated in online class from their friends and the teacher.

Monotonous feeling

Participant students said that they felt monotonous in online class of mathematics due to the similar type of presentation daily. "One sided speech by the teacher daily has made the online class boring", one of the respondents said. Similarly, another student said "it is not possible to discuss with friends and the teacher in an online class, so, it has become unexciting".

Motivational Issue

Online class in mathematics was less motivational in comparison to the physical class according to the participant students. The one-sided presentations made the online class less motivated. Bodzin and Park (2000) had mentioned the issue of lack of motivation in an online class as the finding of their study. In a similar study, Samat et al. (2020) concluded that although the online learning was appropriate during COVID-19, but it could not motivate students to promote their learning satisfactorily.

Poor Connections

Participant students told that they could not attend the online class smoothly due to poor connections. They said, "Sometimes we missed the class in the beginning, sometimes in the middle and sometimes in such a crucial time where there was required clarity from the teacher. As a result, we got distracted at the moment". Therefore, they demand to have the strong source of internet in order to join the online class without interruptions. In a study on the effectiveness of online class during COVID-19, Muhammad and Kainat (2020) concluded that poor internet facility was one of the causes behind the ineffectiveness of online class.

Flexible Learning

Two of the participant students told that despite many shortcomings of online class, it promotes flexible learning. According to them, online class can be recorded in the device and repeatedly listened wherever they got confused. Therefore, it promotes flexible learning. Handiness and elasticity can be taken as two vital components of online education (Lee, Stringer & Du, 2017). In a similar study by Lundberg et al. (2008); it was found that online course was in the preference of students due to flexible study hours in their convenience.

Opportunity to Learn in Self Pacing

Online class provides the opportunity to the individual students to learn in his/her own pace. It becomes possible because of the materials provided by the teacher according to them. With the use of technology, there is the possibility of this kind of learning. Study of Haidah et al. (2020) also concluded the same fact of learning with the use of technological tools.

Need of Separate Training

According to the participant teachers, there has been the need of intensive separate trainings for operating different software related to mathematics teaching. For example, GeoGebra, MATLAB, FORTRAN, etc.

Challenge of Immediate Feedback

Participant teachers argued that there was the challenge in answering the questions asked by students in online teaching. According to them, it was because of the difficulties in typing mathematical symbols, equations etc. immediately while presenting through online.

Challenge of Monitoring Students' Activities

According to participant teachers, it was difficult to monitor student activities in an online class. "It was a big challenge for us to know whether all the students were listening attentively in the class or not", they said. They argued that teacher was not fully informative about individual students' activities as such. This was an issue in managing the online mathematics class with proper control.

Conclusion and Implications

The main objective of this study was to collect the in-depth understanding of students and teachers towards online classes of mathematics during COVID-19 pandemic. Depending on the purpose of the study, the qualitative research methods were found to be well suited in order to proceed in the study arena. Participant students and teachers experienced commonalities during the online class. They expressed that online class was teacher-centered and not effective as compared to face-to-face physical class.

As an experience of online class, participants pointed out some shortcomings of online class. According to them, teacher-centered class, less IT friendly teachers, isolated feeling, monotonous feeling, lack of motivation and poor connections were some issues raised by participants during interview.

Similarly, participants raised some challenges which they had faced during the class time. Challenge of immediate feedback by the teacher, challenge of making an interactive class and challenge of monitoring student activities were the main challenges expressed by the students and teachers during the online class. At the same time, participants have also expressed their views in favor of the online class. Flexible learning environment, opportunity to learn in one's own pace and opportunity to be familiar with IT tools were major aspects that were articulated by participants as the constructive aspects of the online class.

As learning from the experience of online class, it was concluded that teachers should be well equipped enough and skillful in using IT devices in the future if some similar type of pandemic recurs time and again. Similarly, teachers need to be trained with the use of different software related to mathematics teaching, for example, GeoGebra, MATLAB, FORTRAN, etc. so that mathematics class could be made more interesting and practicable with the use of IT tools.

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Appendix A

Interview Guideline for Students

- What devices of multimedia do you use in your personal life?
- What devices of multimedia does the teacher use in the class?
- Are you satisfied with the online class?
- Did you get opportunities to ask questions in an online class?
- What are the strong aspects of online class?
- What are the weak aspects of online class?

Appendix B

Interview Guideline for Teachers

- How long have you been in the teaching field?
- In which level are you teaching currently?
- What devices of multimedia do you use in your personal life?
- What devices of multimedia do you use in your classroom teaching?
- Do you find/realize any difficulties in using multimedia in your teaching?
- How do you monitor students' activities in an online class?
- What are the challenges you have faced in online class mathematics teaching?
- Is the online mathematics class interactive?
- What can we do in order to improve online teaching/learning of mathematics?