



## Relevancy of Online Classes in Mathematics Education

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Received: April 4, 2023

Revised: April 12, 2023

Accepted: June 28, 2023

### Abstract

*This research study entitled Relevancy of Online Classes in Mathematics Education was carried out to identify the views of students on relevance of online classes in mathematics education. The main objective of this study was to analyze student's barriers to online learning in mathematics education in the context of Nepal and to analyze the opportunities that students entertain while taking online class in mathematics education. The sample was 100 Students for questionnaire and 10 students for interview they were studying at first and fourth semesters of master degree in mathematics education during academic year 2077 at Tribhuvan University.*

*The questionnaires and interview were used for the collection of data containing close-ended and open ended questions. The Campus and the students were selected by using probability proportional sampling procedure. The collected data were analyzed by descriptively and statistically. 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.*

### Introduction:

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 [1, 2, 3, 4]. 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 [5, 6, 7].

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 [8]. 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 [9, 10, 11].

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 [12,13].

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 [14,15,16,17].

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 [18, 19, 20]. 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. 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? So, many researchers have concluded that mathematics online classes are more complex rather than other subject [21,22,23,24]. Therefore, these profiles mentioned above help to measure the Relevancy of Online Classes in Mathematics Education.

### **Objectives of the Study**

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

### **Method and Materials:**

**Design of the Study:** The research which we 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. It is 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 [19,20]. Findings are generalizable in this research.

Survey research design directly addresses the present 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 this 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's degree in mathematics education during academic year 2077. The researcher made the list of Master level Campus of Tribhuvan University. From the list there are 4 Master level campus selected by the method of random sampling

**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, we had selected the master level (mathematics education) students studying at first and fourth semester during academic year 2077 by using probability proportional sampling (PPS) procedure.

The questionnaires and interview were used for the collection of data containing close-ended and open ended questions. The Campus and the students were selected by using probability proportional sampling procedure. The collected data were analyzed by descriptively and statistically. Statistical tools such as measures of frequency and percentile, mean, standard deviation, chi-square test, t-test and chart bar graph were used to analyze and interpret data. When collecting the responses from interview was 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.

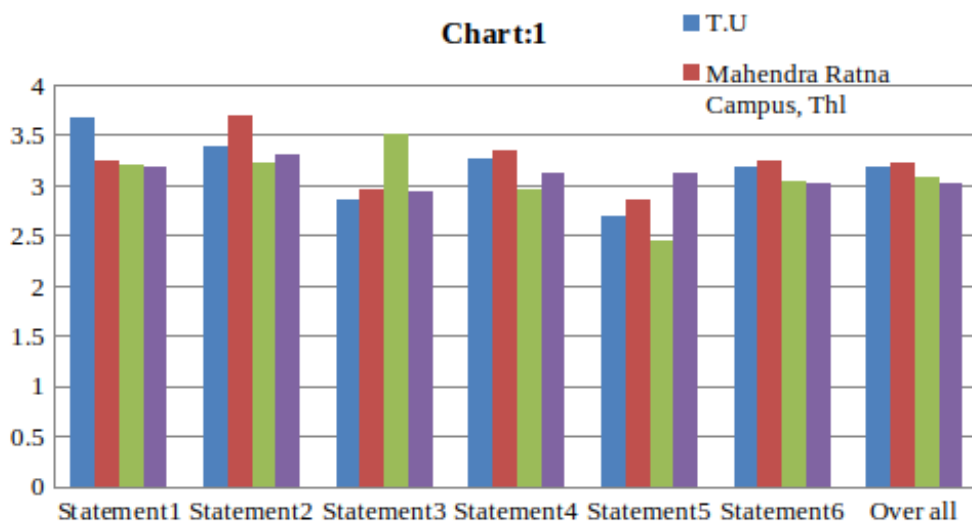
**Results.**

**Barriers of online classes in mathematics education:**

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 %	Mea n	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			



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

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 on campus. Based on of

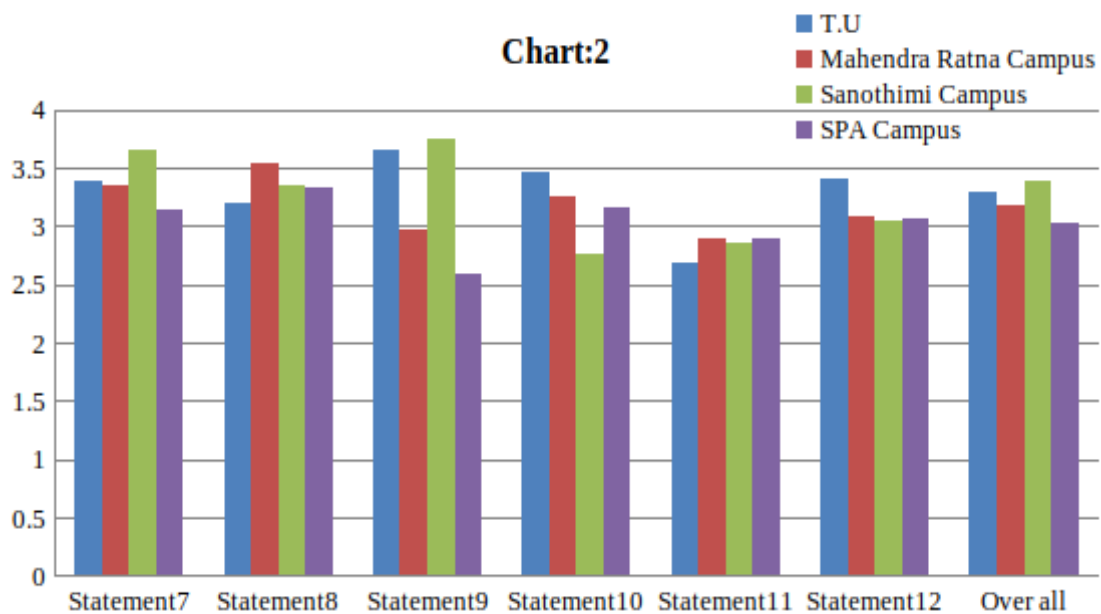
the overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

**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 2:** 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			



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

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 a greater 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

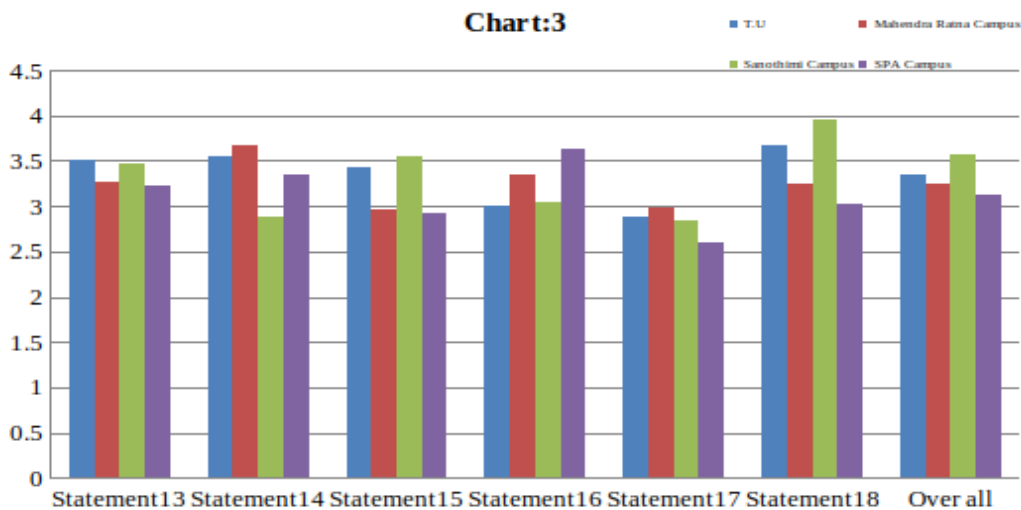
is no significant difference on students' attitude toward the statements on the basis of campus. Based on of the overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

**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 3:** 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			



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

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

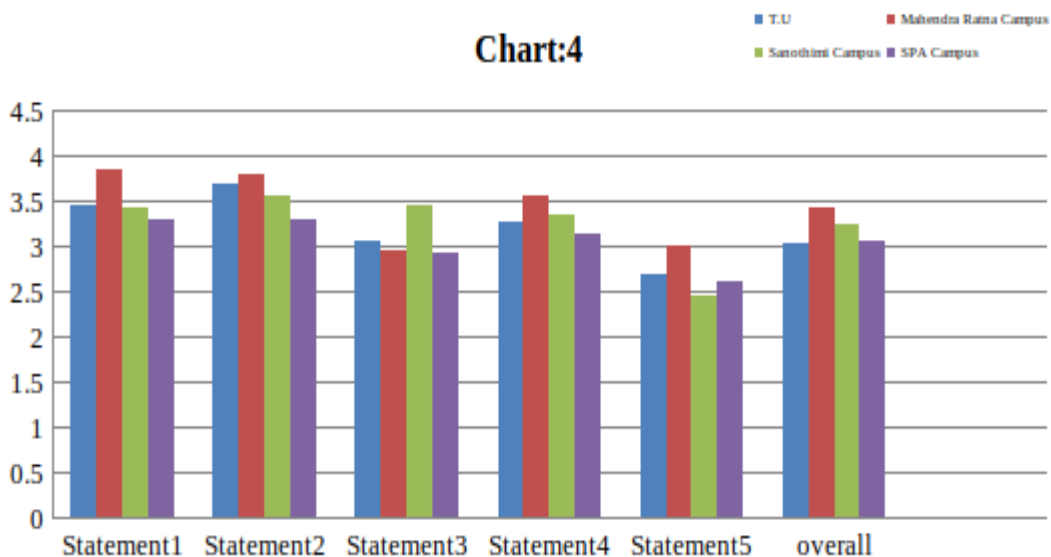
is no significant difference on students' attitude toward the statements based on campus. So, based on the overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

**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 5:** 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			



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

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

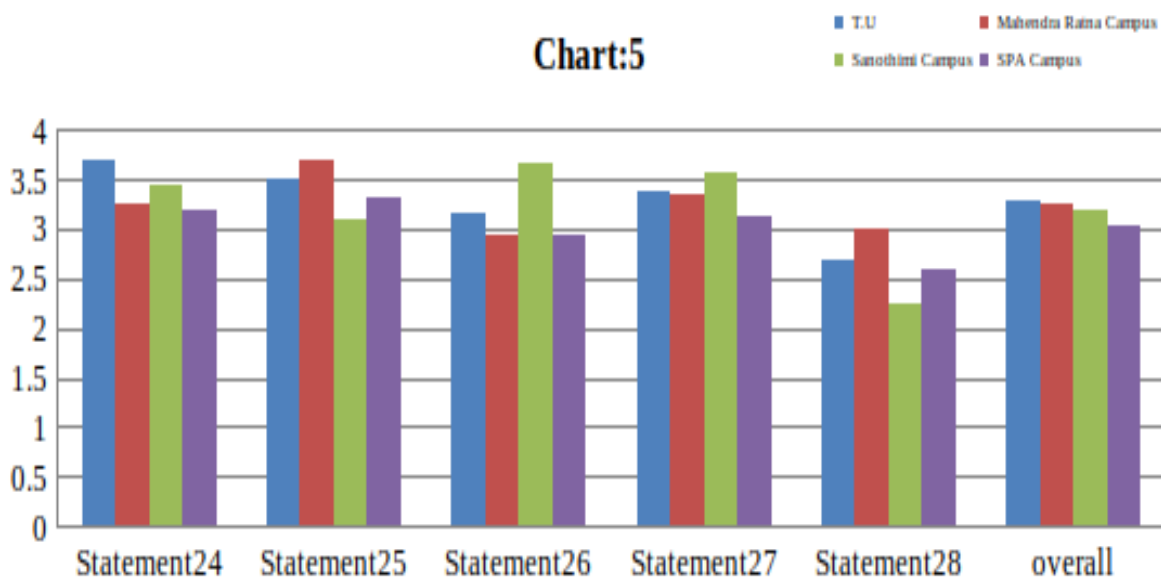
significance level is 0.05. So we can conclude, there is no significant difference on students' attitude toward the statements based on campus. Based on the overall percentage, the agreed percentage is higher in the related statement, so the attitudes of the students can be said to be positive.

**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 6:** Percentage and chi-square values

S.N	Statements	SA %	A %	N %	D %	SD %	Mea n	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			



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

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

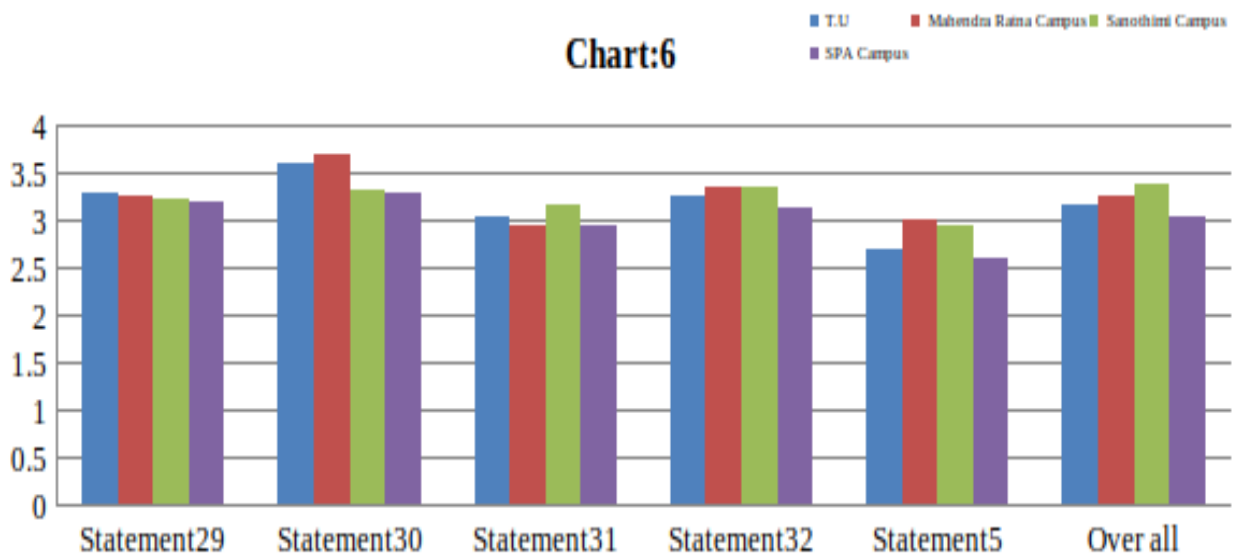
significance level is 0.05. So, we can conclude, there is no significant difference on students' attitude toward the statements based on campus. Based on the overall percentage, the agreed percentage is higher in the related statement. So the attitudes of the students can be said to be positive.

**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 7:** 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			



**Figure 6:** Mean result of opportunities of online classes in mathematics education



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 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.

### **Discussions**

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 we asked many questions according to interview guideline related to the barrier of online class in mathematics education. 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: 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 is Time flexibility, Location flexibility, Scope for Innovation & digital development, wide availability of courses & content, immediate feedback, with no boundaries and self-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.

### **Conclusion**

Overall, the research indicates the opportunities of online class outweigh the barriers that students face. Student respondents to this survey had a uniquely different experience than their counterparts taking online class elsewhere. 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.

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