Can Google Classroom be Used as an Alternative for Classroom Teaching?

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Abstract
This study explored if Google Classroom (GC) can be used as an alternative for classroom teaching. 316 students (M:120 & F:196), classes ranging from nine to twelve from Phuentsholing HSS in Bhutan responded to the survey. The survey contained quantitative part with close ended questions with the Likert scale and the qualitative questions which was open ended questions. The descriptive analysis was done for quantitative response and simple thematic analysis was done for the qualitative data. The findings indicated that the students had problem with access to Internet and affordability in terms of purchasing the gadgets and paying for the Internet bills. The students were found to be adaptive to this new tool with exploration as they kept using it. Moreover, students agreed that the GC was very much applicable for online teaching and learning as it enabled the continuation of education even when the school remained closed. The study showed that teachers were using different styles to engage the students online for meaningful learning. Some challenges were identified such as high cost of Internet, poor network, students not focusing on their learning, students simply copying assignments without learning anything, time management, teachers simply sending the videos and materials without clear explanation, and no face-to-face interaction for discussion.

Keywords: Google Classroom, Technology, Self-Learning

Introduction

The concept of education has shifted from teacher centric to learner centric at present. The emphasis on integrating technology in the classroom is increasing because use of technology can drive innovation in teaching strategies and pedagogies that will enable the students to achieve the learning objectives as desired (Hwang, Lai, & Wang, 2015). In the 21st century, traditional classroom teaching has been already replaced by modern technologies in developed countries like United States of America, South Korea, Singapore, Finland, China and many more. Moreover, online teaching and learning has been implemented long time ago in most of the countries. Educational technologies are integrated in a classroom setting to make the learning independent and personalized for the students (Graham, 2006).

Technology in education has been a boon for many countries who were able to harness the potential of digital platforms particularly for teaching and learning. With the use of technology in education, access to education has been greater. Technology has also overcome the difficulties of teaching and learning in remote places by providing distance education through various online platforms. At the same time, teaching and learning has been made easier. It can be done from any places at any time. Besides, there are lots of software and apps that has been developed to help in teaching and learning. This has enabled the teachers to transform the teaching pedagogies and also to incorporate different teaching styles to cater to different learners in the classroom. Use of technology has helped to develop 21st century skills such as creativity, innovation, analytical, reasoning and the skills to do things at faster pace. The difference in quality of education in developed and developing countries could be attributed to use of technology in education. This has created greater inequality in education for the developed and developing countries.

Bhutan is no exception. The very idea of use of technology is new to the Bhutanese society and the users. The Qingdao Declaration on ICT in education in 2015, under 'Quality Learning' recognizes the ability to leverage ICT for learning as a foundation to success than merely specialized skills in today's society (Ministry of Education, 2019). It is also the vision and aspiration of His Majesty the fifth king to leverage the use of ICT in all spheres of life. His Majesty's emphasis is on creating digital economy, cashless transactions, e-commerce, e-banking, artificial intelligence, robotics, block chain and more. Therefore, the Royal Government of Bhutan (RGoB) appreciated the enormous potential of ICT to breakthrough multiple challenges in ensuring developments and transformations, gearing towards the accomplishment of Gross National Happiness. Besides, RGoB aspired to achieve use of ICT for good governance, Bhutanese information society, and ICT as key enabler for socio-economic development (Department of Information Technology and Telecom, 2014). Ministry of Education started to implement ICT master plan in education in 2014 and the second ICT master plan was launched in 2019, gearing towards integration of ICT in education.

The government offices, schools and institutions have started to use technology in delivering services for various purpose. The government has also started a flagship program to implement ICT in education for all class levels. Hence, the government has started to train ICT teachers on block chain and python which is to be taught to the students. These gives the hope to all the future leaders to transform the system and the economy. Recently, the schools across the country has started to use GC since the schools were closed down due to COVID-19 pandemics. This was implemented immediately due to emergency but then there was no training or orientation given to the teachers and students. Therefore, it is not known how this GC is serving the purpose. There is no clear information on the end users' side. It is imperative to know the details about the end users for an effective implementation and engagement of students through online teaching.

Significance of the Study

This research explored the use of E-Learning through GC. The research focused on Access, Affordability, Adaptability and Challenges. This study was to help the individual teachers, principals, Educationist and the Ministry of Education to have better understanding about the use of GC, implementation, possible outcome and challenges. The findings are expected to help to plan and make guidelines for effective implementation of GC. The study tried to explore the use of GC and it did not look at other aspects that may be important to understand about GC. The sample was chosen randomly, for the convenience of the participants and the researcher; it may not be the true representation of the entire population. The findings from the research is only limited to particular section of the population chosen.

Limitations of the Study

There was no earlier research being done on similar topic in Bhutan. This limited the researcher to the use of literature from other countries in which the context and the educational setting may be different than Bhutan. Due to lack of such literature, there is no comparison of findings from other countries and Bhutan. The findings from this study is not the representative of whole country; it represents only one school being selected along with the students from class nine to twelve. So, all the findings and recommendations are based on the school and students represented. The findings may not truly represent all the school and students of Bhutan.

Literature Review

According to Azhar and Iqbal (2018), GC was launched in 2014. There is not much of studies done related to the use and effectiveness of GC in education. Phan (2015) mentioned GC as a program that enables teachers to create a digital classroom for students to communicate with their teachers and peers. This free application integrates e-mails and documents to save into storages. It is easy for the teachers to review and share the files, videos, links, make announcements and assign the task for students. The documents can be shared and edited in the class. This can help in collaborative learning. The students can submit an assignment through the GC after work is done. Any device such as smart phones, computer or desktop can be used at any place with internet connection. This is convenient

for both the teachers and students. GC has another platform where the students and teachers can discuss online through a chat. Moreover, Google meet can be done if there is any need for face to face interactions. Different assignments can be posted such as video segments, PowerPoint presentations, documents and webquests.

According to Beal (2017), a tool which facilitates students and teacher collaboration, and enables teachers to create and distribute assignments to students in an online classroom for free is called GC.GC is a free Internet-based learning application or tool that can be collaboratively used by the teachers and learners. The instructors can create classes, invite learners to the class and start exchanging of course content materials. Hence, it is also a learning management system (Mafa, 2018). Nagele (2017) said that teachers can create active lessons which are student centered, collaborative, and life-long learning through GC. This can be used for all types of learners with customized teaching learning activities.

How has the use of technology changed our lives or is it going to change our life? With the availability of technology and resources in the schools, more schools are trying to integrate technology into their curriculum and daily teaching learning process. It is learnt that technology-based instruction provides an opportunity for students to learn and practice in a visual and virtual environment (Bonk, 2009; Davidson & Goldberg, 2009).

GC is expected to be effective for both teachers and learners due to its varied features available. It is useful in facilitating in teaching and learning process. It is said to enhance the students self-directed learning (SDL) cognitive skills (Maroof & Emran, 2018). Online learning can help students especially when they have social anxiety; student can freely interact with the teacher to ask questions and clarify doubts without notice of their classmates. Through the GC, students take an active role and teacher becomes a facilitator. This is important because students become independent, responsible for self-learning and develop analytical skills. They also become accountable for their own learning. Bebell and Kay (2010) considers GC as the best instrument to enhance teaching and learning because as it gives a room of pivotal features that makes GC perfect tool to use for online teaching and learning.

Muslimah (2018) posits that GC has copious facilities which are beneficial for its users. Some of these facilities are said to be user friendly, cost free, cell phone friendly, and time saving. GC is also known to be a good platform for students and teachers because it is easy to use, efficient, effective, better for the environment, and enables collaboration between teacher and student. Muslimah (2018) mentioned that integrating technology or ICT can control students learning and keep the students engaged. While many people believed that ICT make learning process more fun and interesting, learning activities with technology pose new challenges in higher education as the teachers struggle to integrate ICT into teaching learning. Mafa and Govender (2017) stated that learners can learn at their own pace without pressure from the teacher and friends. The utilization of technology innovations have been thought to be powerful in disseminating instructions. Mafa (2018) identified GC as a powerful tool in higher education especially for giving instruction and learning. Mareco (2015) stated teachers are not satisfied with the effectiveness of digital tools and face challenges to implement it. However, Cox (2019) said that implementing classroom technology in the school is needed in order to help students to prepare for the future which is a digital era.

In a comparative performance of GC for 100 students by Shaharanee, Jamil and Rodzi (2016) revealed that GC was better for communication, interaction, perceived usefulness, ease of use, and overall students' satisfaction. An action research was done in Taiwan using GC with the integration of peer tutor mechanism for 6th grade students. It was observed that the learning objective was achieved and students developed positive perception regarding the use of GC (Liu & Chuang (2016). Heggart and Yoo (2018) posits that the use of GC and other Google features was received well by the students. Google forms were used to create surveys and questionnaires, google slides to share materials and enable students to contribute to the teaching and learning resources, Google drawing tools were used to create mind maps with students and to help them to engage in critical thinking and broader perspectives. Besides, Heggart and Yoo (2018) stated that

> GC increased pace of content delivery and improved accessibility for all students in the class.

The use of the learning platform was generally perceived to be a positive experience, although some students did identify some concerns regarding the rapid delivery of the content, and the danger of overwhelming students through pace needs to be carefully managed.

Although GC is found to be interactive tool which allowed integration of Google sheet, Forms, Docs, Slides, you tube, Google drive, Google Meet and apps that can be used as extension, there could be challenges and problems that limits the full use of GC. These challenges and problems must be understood and tackled with proper solution in order to harness the full potential of this interactive classroom that will substitute the traditional classroom during the times of emergencies or for the blended learning.

Methodology

For this study, mix method was used to do the research for this topic. The quantitative part looked at the closed questions dealing with numbers and figures and qualitative part looked at the open-ended questions. A survey questionnaire was developed using Google form to enable online collection of data. The questionnaire contained two parts: first part contained item questions using Likert scale and second part contained open ended questions for the respondents to share their views, opinions, feelings, suggestions, and many more. The random sampling was used for the collection of data. All the students above class 7 was given an opportunity to participate for the same. However, the participation was based on their willingness.

Data Analysis

Quantitative

The quantitative data analysis was done through excel. Descriptive analysis such as percent, graphs, charts, mean, Skewness and figures were used for this study. For the qualitative part, response from open-ended questions was analyzed using thematic analysis. The findings were derived based on the analysis from quantitative and qualitative analysis, and cohesive conclusion was drawn.

Table 1: Mean for Accessibility

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Mean	42.60	63.40	24.60	54.20	131.20
Standard Error	25.82	23.38	7.30	18.27	35.31
Standard Deviation	57.73	52.28	16.33	40.85	78.95
Kurtosis	3.86	-0.54	-2.99	-2.71	-0.78
Skewness	1.96	0.80	0.19	-0.06	-0.99
Confidence Level (95.0%)	71.68	64.92	20.28	50.72	98.03

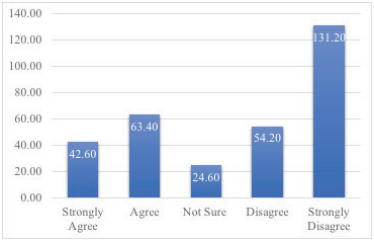

Figure 1: Mean for Accessibility

For accessibility, five close ended items were used and gathered response from the participants (see annexure 1). When the response was analyzed using the mean marks for the five items, the maximum mean was 131.20 against 'Strongly disagree' and the minimum mean was 24.60 against 'Not sure'. Likewise, for the 'Strongly disagree' response, it is negatively skewed at -0.99 and for the 'Strongly agree' response, it is positively skewed at +1.96. For agree, not sure and disagree, the Skewness is 0.80, 0.19 and -0.06 respectively.

Table 2: Mean for Affordability

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Mean	26.00	86.75	93.00	66.50	43.75
Standard Error	5.49	22.94	5.31	18.09	13.21
Standard Deviation	10.98	45.88	10.61	36.19	26.42
Kurtosis	-1.04	-1.81	-0.47	-1.70	1.73
Skewness	0.62	0.07	-0.24	-0.13	0.72
Confidence Level (95.0%)	17.48	73.00	16.89	57.59	42.05

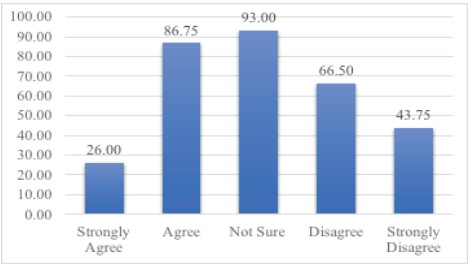

Figure 2: Mean for Affordability

For affordability, four close ended items were used and gathered the response from the participants (see annexure 2). The response was analyzed using the mean score for the four items, the maximum mean was 93.00 against 'Not sure' followed by 86.75 against 'Agree'. The minimum mean was 26.00 against 'Strongly agree'. The skewness for 'Not sure' was -0.24 and the skewness for 'Agree' was 0.07. For 'Strongly agree' the skewness was 0.62, f-0.13 for 'Disagree' and 0.72 for 'Strongly disagree'.

Table 3: Mean for Adaptability

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Mean	46.43	129.29	94.86	26.86	18.57
Standard Error	5.89	9.63	11.57	4.74	4.29
Standard Deviation	15.59	25.47	30.62	12.55	11.36
Kurtosis	0.10	-0.48	1.82	-2.53	-0.91
Skewness	0.03	-0.49	1.40	0.29	1.13
Confidence Level (95.0%)	14.42	23.55	28.32	11.61	10.50

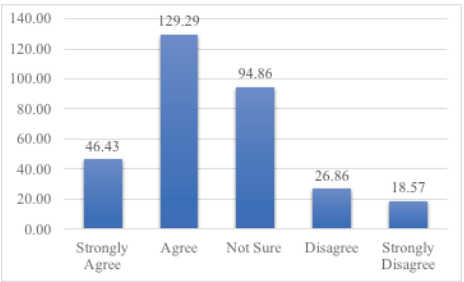

Figure 3: Mean for Adaptability

For adaptability, seven close ended items were used to gather the response from the participants (see annexure 3). When the mean score of the respondents were analyzed, the maximum mean score was 129.29 against 'Agree' followed by 94.86 against 'Not sure'. The minimum mean score was 18.57 against 'Strongly disagree'. The skewness was -0.49 for agree and 1.40 for 'Not sure'. For the 'Strongly disagree', the skewness was 1.13.

Table 4: Mean for Applicability

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Mean	30.85	97.38	89.77	59.00	39.00
Standard Error	2.97	9.34	3.82	4.78	6.12
Standard Deviation	10.71	33.67	13.78	17.24	22.06
Kurtosis	3.13	1.22	1.39	0.28	6.91
Skewness	1.68	-0.03	-1.15	-0.21	2.26
Confidence Level(95.0%)	6.47	20.35	8.33	10.42	13.33

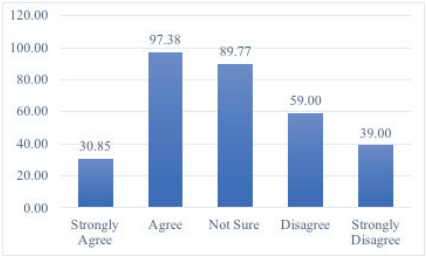

Figure 4: Mean for Applicability

For the applicability, thirteen close ended items were used to gather response from the participants (see annexure 4). The mean score of the responses were analyzed. The maximum mean score was 97.38 against 'Agree' followed by 89.77 against 'Not sure'. The minimum mean score was 30.85 against 'Strongly agree'. The skewness for 'Agree' was -0.03 and -1.15 for 'Not sure'. Similarly, the skewness for 'Strongly agree' was 1.68.

Table 5: Mean for Pedagogy

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Mean	34.29	136.57	73.57	44.86	26.71
Standard Error	4.98	16.08	5.83	11.39	8.87
Standard Deviation	13.19	42.54	15.44	30.14	23.46
Kurtosis	0.36	-0.08	1.88	-0.19	3.45
Skewness	0.26	-0.48	-0.54	0.74	1.74
Confidence Level (95.0%)	12.20	39.35	14.28	27.87	21.70

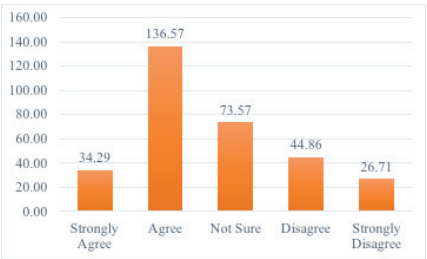

Figure 5: Mean for Pedagogy

For the pedagogy, seven close ended items were used to gather response from the participants (see annexure 5). The mean score for the response was analyzed for all the items. The maximum mean score was 136.57 against 'Agree' followed by 73.57 against 'Not sure'. The minimum mean score was 26.71 against 'Strongly disagree'. The skewness for 'Agree' was -0.48 and the skewness for 'Not sure' was -0.54. The skewness for 'Strongly disagree' was 1.74.

Table 6: Comparison of Mean

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Accessibility	42.60	63.40	24.60	54.20	131.20
Affordability	26.00	86.75	93.00	66.50	43.75
Adaptability	46.43	129.29	94.86	26.86	18.57
Applicability	30.85	97.38	89.77	59.00	39.00
Pedagogy	34.29	136.57	73.57	44.86	26.71

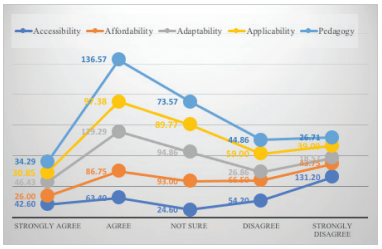

Figure 6: Comparison of Mean

The Mean score for all the five aspects, accessibility, affordability, adaptability, applicability and pedagogy was also compared (see Figure 6). In all the aspects, the mean score for 'Agree' was greater except for accessibility. For accessibility, the mean score for 'Strongly disagree' was greater.

Qualitative

Was GC Useful or Not? Support with Reasons

59.38% (57 out of 96) mentioned that GC was useful to them. The reasons mentioned were as follows:

- Students got links, videos and notes that are relevant to their studies.
- It helped them to improve their studies as they got enough time to study.
- The learning was interesting.
- During pandemic, they were taught through GC though the school remained closed.
- It saved time, helped students to interact with everyone.
- Students could share their doubt and solve with friends and teachers.
- Students developed confidence to ask questions to their teachers and self-learning was encouraged.
- It was easy way for the students to send assignments.
- It encouraged independent learning.
- It engaged students to learn in even during the time of closure of the school.
- It gave access to gather information needed for the lesson as shared by their teachers.

38.5% (37 out of 96) said that GC was not useful for them. The reasons stated are

- Some of the students didn't understand what was taught in GC.
- It consumed time and made learning boring.
- It made things complicated and boring since there was no physical contact with the teachers.
- Quality during the video calling was not good.
- Some students could copy and send the answer without learning anything.
- Students didn't do the assignments on time and some students didn't even do any assignments.
- Slow learners were not able to catch up with rest of the friends.
- There was not much explanation for lesson that they couldn't understand.
- Teachers were just sending the notes and questions rather than explaining it.
- All the students were not involved or they were not actively participating.

0.2% (2 out of 96) of them were neutral. They shared both good and bad part of using GC in teaching and learning.

Mention Anything that You Liked the Most About GC

There were so many things that the students liked about GC. Some of them are as mentioned below.

- It was easy to submit their work through GC.
- Students had the opportunity to share their doubts without any problem.

- They were graded immediately and feedback was given on time.
- It was convenient to type the answers than to write in the notebook.
- It was quick.
- They could submit their work on time.
- They liked the systematic homework assigned.
- Students found it interesting.
- Students were able to learn and explore by themselves.
- It has a personal chat column where they can chat with the teachers.
- Students found that it wasconvenient and easy to use.
- It was comfortable to do assignment and send on due date.

Mention Anything that You did Not Like About the GC

Students not only liked GC but there were also some of the things that they did not like which was all related to GC. They are as mentioned below.

- It consumed huge data.
- It doesn't facilitate video chatting due to poor network connectivity.
- Sometimes it was difficult to understand and hard to connect with teachers.
- It took lot of time to upload the homework.
- Their names were reflected automatically when they didn't submit their work.
- They could not send all the assignments at one time. They had to send one by one, which they felt was quite tedious.
- They had to download the video or watch the video which consumed lot of data.
- When the net was slow, they face difficulty to submit the assignment.
- The interaction was less unlike the usual interaction on the classroom.

What are Some of the Challenges that You Face When you use GC?

The students have mentioned all the pertinent challenges that they have come across while learning through GC.

- Network problem.
- Some of them didn't know how to use properly.
- Sending homework and assignments were difficult at times.
- Sometimes they were not aware that their teachers gave them assignments.
- Some of them didn't understand anything what teacher taught.
- It was difficult to cope up with time and manage it accordingly.
- Some could not use all the features easily. Sometimes the file doesn't get attach and creates lots of problem. It gets stuck in the important time.
- Some of them did not have smartphones or data packages.
- At times, the assignment and task assigned confused them.
- Some of the students didn't know all the features, so it was troublesome.

Do You Suggest for the Schools to Continue using GC Even after Reopening of the School?

44.89% (44 out of 98) do not suggest for the schools to continue with the GC while the school is open. The reasons are stated as

- Students found it tough to learn online
- Some students felt it is waste of time since many focused-on phone games rather on learning.
- Not many students were serious in their studies when they have phones.
- learning online was hectic to them.
- Students felt that learning in school was far better than online learning.
- Not all students and parents can afford to recharge internet package at all times.
- Students are doubtful if GC can be effective.

On the positive end, there are 42.85% (42 out of 98) who agreed and suggested that the school to continue with the GC even after opening of the school.

- They suggested to use GC even after the reopening of school if it were used every day.
- GC can be continued as the teachers can send notes and other materials.
- It can be used as supplementary to classroom teaching. It will help to get additional knowledge.
- It helps in doing assignment.
- It is useful for the students who are introvert to ask question in the classroom.

- They can get used to using technology
- some felt that receiving notes, questions and submitting their assignments was easy.
- It would save time and give more time for discussion in the classroom.
- It's a good way to learn from home without interaction of humans.

Few of them, 4.08% (4 out of 98) mentioned that the school can use the GC sometimes as and when necessary. It is also suggested to use to follow up with the lessons not finished in the class.

There are also around 8.16% (8 out 98) responded that they were not sure if the schools can continue to use GC even after the reopening of the school. This could be probably because some students may not have really understood the pros and cons of using GC for teaching and learning. Moreover, it might be because they were not able to decide which one to choose.

How is GC Different from Normal Classroom Teaching-Learning?

The students also mentioned some significant difference between the GC and normal classroom. They said,

- in the normal class, they cannot ask their doubts but in GC they can askdoubts without any hesitation.
- through GC, they have to do more of self-learning.
- there is no or very limited face to face learning.
- using GC, they can stay at home and learn. They can explore any doubts from the internet and teachers too can help them online.
- GC is best because they can research from the internet while doing assignment.
- through GC they can explore more than the textbooks.
- teaching learning is not that effective in GC.
- notes are sent fast for easy reference.
- it is interesting and they can study at their own pace and time.
- through GC, they can get more information and understand better.

Conclusion

Accessibility

The mean score for the five items against the 'Strongly disagree' response is highest with 131.2 with skewness of -0.99 and the mean score for the response 'Disagree' is 54.2 with skewness of -0.06. This indicates that there are a greater number of respondents who strongly disagreed and disagreed with respect to the items pertaining to accessibility. This means the participants do not have proper access to Internet for online teaching and learning. However, looking at the positive skewness of the response 'Strongly agree' with 1.96 and 'Agree' with 0.80 gives an indication that there are some participants who have the access to Internet. But this would be of concerned as there are greater number of participants who do not have access.

Affordability

The mean score for the four items against 'Not sure' is the highest with 93.0 with skewness of -0.24. This indicates that a greater number of students are not in a position to tell if they or their parents can afford to buy gadgets and also pay the bills for Internet charges. This is followed by mean score of 86.75 against the response 'Agree' with the skewness of 0.07. The lowest mean score was 26.0 against the response 'Strongly agree' and with the skewness of 0.62. Considering this mean score and the positive skewness, it shows that there some participants who can afford to buy gadgets and pay bills for Internet charges. The mean score for the response 'Disagree' was 66.5 with skewness of -1.70. This supports the above-mentioned facts that there are lesser number of participants who can afford to buy gadgets and pay bills for the Internet as shown by higher mean score and negative skewness against the response 'Disagree'.

Adaptability

The maximum mean scores for the seven items that tried to check the adaptability of the participants against 'Agree' was 129.29with the skewness of -0.49 followed by mean score of 94.86 against 'Not sure' with the skewness of 1.4. The lowest mean score was 18.57 against 'Strongly disagree' with the skewness of 1.13. Although the means scores

and skewness indicate that there are greater number of students who agree that they are able to adapt to teaching and learning through GC, there are also some participants who are not adapted to online teaching and learning as indicated by the lowest mean score and the skewness of 1.13.

Applicability

The mean score of thirteen items against the response 'Agree' was 97.38 with the skewness of -0.03. The means score for the response 'Strongly agree' was 30.85 with the skewness of 1.68 and the mean score for 'Strongly disagree' was 39.0 with the skewness of 2.26. The mean score for the response 'Not sure' was 89.77 with the skewness of -1.15. This figure indicated mixed findings: there are some participants who mentioned that GC was applicable as online teaching and learning platform but then there are also some who mentioned that they either disagreed or strongly disagreed that GC was appliable and useful platform for them. More interestingly, there are group of participants who also mentioned that they are really not sure of its applicability in teaching and learning online.

Pedagogy

The mean score of the seven items against the response 'Agree' was the maximum at 136.57 with the skewness of -0.48 and the mean score of 'Strongly agree' was 34.29 with the skewness of 0.26. The mean score of the response against 'Not sure' was 73.57 with the skewness of -0.54. The minimum mean score was 26.71 against the response 'Strongly disagree' with the skewness of 1.74 and the mean score against 'Disagree' was 44.86 with the skewness of 0.74. Through this, the participants have indicated that teachers were applying different pedagogy such as use of recorded video lesson, sharing of useful video links, use of ppt, asking challenging and high order thinking questions, engagement of students in google conversation and doing live session via Google Meet. However, there are some students who disagreed and strongly disagreed that teachers applied varieties of pedagogy to make the teaching and learning interactive. Moreover, there are participants who are also not sure if teachers used different pedagogy to teaching online.

Comparison of Mean Score for Five Aspects (Accessibility, Affordability, Adaptability, Applicability and Pedagogy)

From the comparison of mean marks for the five aspects: accessibility, affordability, adaptability, applicability and pedagogy, the participants agreed that teaching and learning online through GC was applicable, adaptable and use of various teaching pedagogy was also done by the teachers. This was indicated by higher mean score against the response agree with respect to other response such as strongly agree, not sure, disagree and strongly disagree. On the other hand, the mean score for accessibility and affordability against the strongly disagree was higher than other responses. This indicates that the participants do not have access to Internet and it is not affordable as well. But this applies only to certain group of participants.

From the quantitative analysis, the student's response clearly indicated that most of them have problems with accessibility and they do not have proper access to Internet. The affordability was another issue with the students; although they had their own smartphones but almost all of the students did not have their own laptop, tab, iPad, and many were struggling to pay Internet bills. Without the proper access to internet and if the students do not own the gadgets, teaching and learning through GC can be challenging. It will affect the quality of teaching and learning.

It was learned that the students were able to adapt to online teaching and learning. Although it was new medium for them, they slowly began to explore and learn the features of GC as they deal with it every day. The students were also ready and willing to learn new things that would help them to learn better online.

The students agreed that GC was the right tool for online teaching and learning given its user friendliness and wide range of features that enabled them to do different things.

The qualitative analysis showed that students found the GC useful for them as it helped them to do self-learning, saved their time, it was easy to send assignments, ask doubts and questions at any time, and video links and learning materials were shared by the teachers which gave them additional information.

The students mentioned that the teachers applied different pedagogy such as use of recorded video lesson, sharing of useful video links, use of ppt, asking challenging and high order thinking questions, engaging students in Google conversation, doing live session via Google Meet and conducting test through quiz using Google form. This helped in making the teaching and learning interesting and interactive; it also engaged the students in meaningful learning.

44.89% of the students did not suggest for the schools to continue GC after the school reopens for the normal classroom teaching. They feel it is the waste of time as the students do not focus on learning. Students felt that it would be costly for many of them and parents as online teaching and learning consumes lot of data charges. The students are also of the opinion that it was hectic for them and there was minimum learning.

On the contrary, 42.85%suggested that the school should continue with the GC even after opening of the school. They feel that GC can be used to send notes and additional learning materials besides the classroom teaching. It can help in doing the assignment. It helps the introvert students to interact virtually and ask question. Besides, students can keep in touch with the technology as they explore new things.

Some challenges were highlighted as network problem, some students did not know how to use GC properly, sending homework and assignments were difficult especially when the network was slow, students did not understand what was taught, managing time was difficult, there were many features new to the students, some students did not have their own smartphones, some teachers simply sent the video links and notes without explaining the concept, and many found it costly as the use of GC required Internet connection.

Recommendations

In order to make the use of GC effective and enhance online teaching and learning, the following recommendations are made for the schools, leaders, policy makers and the relevant stakeholders.

- Provide gadgets and free Internet connections to the students to improve the accessibility and affordability.
- Conduct frequent training to provide necessary skills and knowledge for the use of GC and its features. This is required for both the teachers and students.
- Teachers have to use different technique to make the online learning interesting and enriching for the students.
- Teachers need to allocate a particular day or time to have online question and answer session for clarification and interaction with all the students. This would encourage student's participation.
- Teachers to design enriching lesson, use short videos, assign the task at certain intervals, share only relevant and useful links and materials, and create interesting and challenging quiz questions.
- Teachers should provide constructive feedback and information on time. Teacher should also make themselves available online when students have doubts or clarification.
- The modality of assessment should be clearly explained to students. This will encourage students for active participation and meaningful learning.
- The assessment and grading should be done fairly and transparently. Students will be motivated to try their best despite multiple challenges.
- The school and the leaders should support both the teachers and students to make the online teaching and learning effective. This will motivate them to work harder and achieve the goals.

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