Students' Perspectives on Learning Science Education Amidst Covid-19

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Abstract

One of the diseases caused by a Corona virus shook the whole world. This situation challenged the education system across the world and compelled educators to shift to an online mode of teaching. Many academic institutions that were persistent to keep their traditional pedagogical approach were also forced to change their teaching methods. This study aims to assess science education students' experiences and perceptions on this global issue especially on science teaching and learning process. The studies are based on qualitative research and through in-depth interviews with respondents and data are analyzed. The online distance teaching and learning process tries to address to some extent the needs of students who cannot or do not want to participate in traditional classroom settings. But there are some challenges for the students and teachers for the science teaching learning process. This study focuses on learning difficulties during pandemics and gives insightful feedback to planners and policy makers.

Keywords: corona virus, electronic devices, internet connectivity, online and distance learning, science learning, national policy

Background

The COVID-19 pandemic has had a massive impact on the teaching and learning process, with significant changes in teaching methods for students at all levels. Irawan & Hidayat, 2021 opine that learning continuity at the height of the pandemic depends not only on the availability of online communication technologies and resources, but also on students' ability to learn independently. The outbreak of the corona virus (COVID-19), Most of the countries have replaced traditional close-in education with distance education. Although many countries have faced

significant crises before, online learning has never been used as an alternative to physical education (Lily et al, 2020). Higher education institutions worldwide faced an urgent need to provide diverse learning opportunities for students to learn. This is necessary due to the emergence of the Covid-19 pandemic in the latter part of 2019 (Aboagye et al., 2020).

Online learning is a type of learning where learning takes place through the electronic medium. It can be defined as the creation of synchronous or asynchronous environments using different resources such as mobile phones and laptops with internet availability (Dwidienawati, 2021). When it comes to learning science, there are several methods to teach science but the two notable methods are : the traditional teaching method based on the transmissive mode through-which knowledge is passively transmitted from teachers to students, and the experimental method through-which students get the opportunity to pose a problem, formulate hypotheses and perform an experiment in order to validate them (Nahas et al., 2021). Online learning is a viable alternative to creating physical learning. Online classes include all educational situations where communication tools and information technology are applied significantly. Online learning poses a great challenge in education in this modern era as a result of the rapid changes in information technology.

Science learning involves students by giving them probability to check their own ideas and assembling their own understanding. So, it is necessary for a teacher to be able to make authentic experience activities, to educate and to facilitate students' learning, and also to support students to do hands-on / minds-on learning in order to help them make their own understanding (Ates et al., 2011). Hands-on experience or practical work is one of the situational factors that is often considered as an awakening point for interest and motivation of students to learn science (Bergin, 1999), and it can develop students' scientific knowledge and knowledge of science (Miller, 2004). Some courses like physics, chemistry, and biology, require physical presence of the learners due to practical done in the lab, there may have been differences between study disciplines within a university on adapting to the COVID-19 pandemic. An interesting aspect here is that while the technology existed to support fully online teaching, it may have been more difficult from an organizational perspective.

The plans of many schools to successfully conduct classes in Science education during the pandemic were affected by the spread of COVID-19. Most of the science teachers had included science in their school development the past years. However, COVID-19 disrupted and had a negative impact on their ability to implement changes to improve science as detailed in the plans (De Coito et al, 2022).

In addition to the challenges with remote learning, a study found that adapting pedagogy specifically for science is difficult. An important element of science is practical learning and field visit is to conduct the research and remote teaching learning activities provide teachers with limited opportunities to carry out those aforementioned activities in real life. Teachers find it difficult to take practical and research activities and have to avoid just 'talking at' children and giving them information, rather than encouraging inquiry through interactive teaching. According to Barrot et al (2021), a few teachers found differentiation harder in science because of a lack of response from some children, and described difficulties in identifying, remotely, when pupils pick up misconceptions or struggle to understand topics. The discussion and enquiry part of lessons is more difficult to replicate online.

Within this situation, the current study was undertaken to examine students' perception towards learning science learning and effect on this learning during the COVID-19 pandemic.

Significance of the study

There are different types of natural disasters or man-centered threats in the world. We have studied tsunamis, landslides, earthquakes and diseases like Ebola, influenza, Zika virus, etc. The economical and educational sectors have been disrupted. The epidemic of covid-19 has brought a crisis to the world by shutting down country after country. Similarly, Nepal has also gone through the same problem. Educational institutions such as schools and colleges came to closure. The assessment system was halted or postponed. The academic session was disrupted (Elena et al 2021). This study will be significant:

- To educate and validate how to prepare and manage school classrooms before and during emergencies.

- To help students and teachers to cope with classes in case of school closure.
- To provide awareness to train the school family (ie, staff, teachers, students) to work in virtual mode.

Research objectives

The objectives of this study are:

- To explore the students' challenges in studying science during the COVID-19 pandemic
- To identify the mitigating measures of those challenges while teaching science in emergencies

Literature Review

The Government of Nepal imposed a complete lockdown in the country on March 24, 2020 shutting down businesses, educational institutions, offices and a restriction on movement within the country and flight access in and out of the country (United Nations Nepal, April 2020). Many educational institutions like campuses, schools were used for establishing isolation and quarantine centers. Thus, these emergencies have badly affected education in the world and in Nepal as well.

Educational units are under pressure to find options to deal with this challenging condition. These conditions made us realize that scenario planning for educational institutions is at an urgent stage (Rieley, 2020). Moreover, there is a condition that weighs humanity and unity. There is a critical need to defend and save our students including faculty, academic staff, communities, societies, and the nation as a whole. The alternative way of running the education sector during such conditions is through an online and distance education system.

Different studies have found and examined serious issues affecting excellence of online education. These issues as a whole round up to communication, technology, time management, pedagogy and assessment (Bassoppo , 2006). Similarly, according to Cosmas (2009), the few privileged available require updating their knowledge and skills due to the rapid change of technology. The findings point out that except for the

challenges faced by Open Distance Learning (ODL) mode of delivery to higher education, it has a high contribution toward the condition of opportunities for professional development.

Although online education has long remained a key component of the education system in developed countries such as the United States, the United Kingdom, and Australia, it is relatively a novel concept for developing countries like Nepal where teachers and students are struggling with unreliable ICT infrastructures, lack of technological skills and motivation (Ghimire et al., 2022).

Research Design

This research topic adopted a qualitative method so the paradigm for the research refers to interpretivism. Qualitative research is a type of research that explores and provides deeper insights into real-world problems (Hammarberg et al, 2016). Qualitative research helps to generate hypotheses as well as further investigate and understand quantitative data. Qualitative research gathers participants' experiences, perceptions, and behavior.

The study site was selected as one of the community campuses (Aadikavi Bhanubhakta campus, Tanahun) and a constituent campus of TU (Sanothimi campus, Bhaktapur). Likewise, the informants were selected purposely three from the community campus and three from the constituent campus of TU.

Now to analyze the data through in-depth interview and focus group discussion tools were analyzed through initial coding, selective and focused coding and finally analyzing through qualitative data analysis.

Results and findings

The major instrument used to take data for the study was the interview. An interview is a two-person conversation initiated by the interviewer for the specific purpose of obtaining research relevant information (Kvale and Brinkmann, 2009). Interviews are viewed as one of the main data collection tools in qualitative research and are a very good way of assessing people's daily experiences and their inner perceptions,

attitudes, and feelings of reality.

Findings from the study, the perception made on students due to difficulty in COVID-19 periods are organized into following five themes. Which are;

1. Effect of lockdown
2. Unavailability of internet connectivity and electricity
3. Mental effect and household problem
4. Learning difficulty
5. Policy level requirements from national, local and campus level.

Effect of lockdown

Most of the students expressed that when COVID-19 pandemic occurred accidently, their online classes were unable to run frequently. Then, the government ordered a lockdown. They all rarely moved out of their rooms. They were scared of corona virus thinking that it would be transferred from the people in the Kathmandu valley. The travel expenses were very expensive and crowded. One of the students said, "It was very dangerous for infection and I lived in quarantine at home for 21 days. After 3 months, the campus informed us to join an online class".

According to Smith (2020), An important side-effect of the corona virus impact is the exposure of the digital divide. Social mobility and class differences mean that some of the poorest and most disadvantaged children are likely to be affected by a lack of access to remote learning because of technological issues.

Unavailability of internet Connection and electricity

The summary form of students' perception towards online class stated that because of the poor connection of, it was very difficult to take science class. The internet would connect perpetually and the teacher's voice would break time again.

Online classes from rural villages were very difficult, and the students' experience was very ambivalent. Due to the lack of electricity and inaccessible internet connectivity in the village, it was very difficult to

take the classes. Although their parents were tenacious to better facilitate the internet and electricity it was quite difficult.

Hazwani et al. (2020) found that internet connection was the most significant factor to influence the effectiveness of e-learning. Hazwani et al. (2020) contend that management personnel need to improve dormitory areas to provide all students with access to the internet. Internet connection must be moderate or good in order to suffice.

Mental effect and household problem

It was a very fearful time of virus transformation to each other. Radio and other mass media were used to broadcast fearful events of infected people's death in the hospitals which had a very high rate of mortality. The female students had more challenges than boy students because they had to take care of their babies and other senior members in the family and prepare food. Those additional responsibilities made it difficult to study through online class though our campus call to join virtual mode of class.

Hazwani et al. (2020) similarly found that students' motivation during online learning was low as this learning required students to be self motivated and independent in their learning. In Samat (2020) study, they found that intrinsic motivation is a predictor of a student's intention to use online learning. Therefore, teachers should play an important role in designing learning that is engaging and interesting for students.

Learning difficulty

Theoretical classes were running despite facing various problems of connectivity. Theory portion of the science subject was conducted anyway but the numerical portion as well as equations of chemistry was very complicated to learn. Teachers used to share photo sharing of written pages but students could not understand the learning materials.

Experimental classes which had to be done in the lab were not possible. Although the teachers used to present some practical presentations virtually, it was not. The experimental classes were less effective than the theoretical classes though the college provided the classes during the difficult time virtually. The classes were conducted but it was not like

the physical presence and various technical reasons including the lack of internet facility made it very difficult for us. Online teaching was not as easy as it seemed, because there were some common physical problems, such as eye pain and back pain while being sedentary.

An exam was held but when a student tried to take the exam by opening the camera in a systematic manner, he could not give the response of the teachers at the right time due to the lack of electricity supply and internet. So there was some cheating from us. Therefore, the exam in the online class did not seem so effective to him. Similarly he found science to be more effective because there were enough teaching materials available on the Internet and it was not difficult to read with the help of teachers and to search on the Internet myself. This may be due to the fact that the campus has given priority to science and students are interested in reading more. The campus has given more priority to science subjects than other theoretical subjects and the science professors have also taught hard. There was a bit of a problem in understanding the derivations of physics.

There is a lot of difference between science subjects and other subjects because things that are not understood theoretically in science subjects can be understood from the experimental class but during the online study experimental classes were not conducted.

Policy level requirements from national, local and campus level

Again, in the case of such a future situation like the COVID-19, the government should provide mobile data at a special minimum fee. Similarly, power supply should be provided everywhere. Teacher-student interaction and communication is required.The academic environment should be made comfortable. Teachers should also prepare a little more and display the material to be shared with the students.

One student said," I consider the efforts of the campus at that time to be positive because the campus had done the work of urging and orienting our parents that even in this period, even if it is an online class, it should be done. Even though we are science students, we were happy that the campus had made it easy for us to carry out our reading activities in a smooth manner. Except for the general financial support from the family,

there was not much support from any other place. Since he rented a room outside, everything needed for that was available from the family",

So this study found that sciences can be more effective because there were enough teaching materials available on the internet and it was not difficult to read with the help of teachers and to search on the internet. This may be due to the fact that the campus had given priority to science and students were interested in reading more. The campus has given more priority to science subjects than other theoretical subjects and the science professors have also taught hard. There was a bit of a problem in understanding the derivations of physics. There was a lot of difference between science subjects and other subjects because things that are not understood theoretically in science subjects can be understood from the experimental class but during the online study experimental classes were not conducted.

Discussion and Conclusion

The COVID-19 school and university closures have a negative impact on students' knowledge and skills development in Nepal. As Burgess and Sievertsen (2020) argue, going to school is the best public policy tool available to raise skills. While school time can be fun and can raise social skills and social awareness, from an economic point of view the primary point of being in school is that it increases a child's ability. Even a relatively short time in school does this; and even a relatively short period of missed school will have consequences for skill growth.

The online class was much more difficult than the contact mode class. The contact mode class can visit the colloquies and teachers then possible to share their own problems. But in the online class all students have to stay at home and slow net connection for a longer time and get let to join in the next period.

The current global pandemic inevitably has consequences for mental health, as shown through previous health crises. For instance, the SARS (Severe Acute Respiratory Syndrome) outbreak in Hong Kong in 2003 has been described as a "mental health catastrophe"(Maketal, 2009), with long-term psychiatric morbidities such as PTSD (Post-Traumatic Stress Disorder) and Depression(Mak et al 2007) The development

of psychiatric morbidity was mediated by factors such as social support and disease-related worry (Bonanno et al 2008).

According to this research, due to COVID-19, the students of Science education were not able to attend class directly. The campus therefore conducted online classes but faced a lot of problems as some friends were away from the internet access, some of the students lacked proper technological devices whereas others faced a financial crisis due to everything being shut down. During the online classes, it was difficult to conduct practical classes which resulted in lack of practice and delay in smooth operation. Therefore, it was difficult to relate practical and theoretical knowledge in a simple way.

Online classes are actually less effective for students living in rural areas. Due to the rainy season, power supply and internet access have also been reduced. Learning became less effective when there was less interaction for non-speaking students as there were no such situations in the online classroom where questions could be asked by pointing out each student in the live classroom. In particular, the financial situation is of great importance in online education. For such economically weaker students, the campus should provide special packages and some discounts in the field of annual fees as well as organize a good orientation program for the students. According to Rahiem (2020), students' learning was affected by limited internet access because of poor infrastructure and the high costs of internet packages. Most respondents noted that they did not have stable internet access and were unable to participate in class without disruptions. We believe that respondents' place of residence (urban vs. rural) may explain some of these issues, as almost 40% of respondents live in rural areas. Facilitating conditions are undoubtedly pivotal to students' learning motivation. With such challenges faced by these students, it was not surprising that their learning motivation was found to be 'low'. Provincial and local governments are a critical part of the corona virus response as they play important roles in four areas:

- Increasing the level of local public health service delivery
- Preventing transmission and epidemiological investigations and tracking:

- Mitigating the impact of the pandemic on other local public services:
- Supporting social and economic relief activities:

To have an effective and strong response mechanism, countries need to have appropriate legal instruments (plans, policies, acts, and guidelines), clarity on roles and responsibilities among government agencies and an effective coordination and collaboration mechanism. In Nepali context after the promulgation of the constitution of Nepal and the Local Government Act 2017 Federal, Provincial and Local level States have ceased to exist. With federal structure in place, it was up to the three-tiers to perform their roles and responsibilities to respond to the COVID-19 crisis appropriately and effectively. After transitioning to federal structure, it was expected to decentralize the power at province and local level. COVID-19 exposed the power of provincial and local governments, which are still more or less relying on the federal government to make decisions and launch their own initiatives (Shrestha et al.2020).

With the widespread availability of mobile phones, computers, laptops, tablets, and other devices, and their increasingly accessible and user-friendly interface displays, more students and parents should be able to access the internet in their local area. Government bodies and telecom companies must also take the lead to ensure internet access across the country, and thereby provide high-quality learning experiences for every student (Basar et al.2021).

To this end, the remote teaching learning approach includes online courses, live streaming, virtual teaching, and simulated labs serve as an excellent alternative means of learning science education remotely. The efforts of science teachers to manage online learning have not optimized students' varied learning experiences because learning science just by reading and discussion only, is less effective. The practical activities besides the theoretical aspects are the core part of the learning. To sum up, the pedagogical considerations in designing and implementing online courses need to be considered seriously to minimize problems that participants might encounter.

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