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Using ICT Facilities by Science Teachers during COVID-19 Pandemic in Higher Education

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Abstract

Several adverse educational impacts are observed due to COVID-19 pandemic in academic sessions in the Nepalese higher education system. The aim of the study was to describe the exiting situation of using of ICT tools for online teaching by science education teachers at higher level both in constituent and affiliated campuses in Madhesh Province, Nepal. The study followed descriptive research design with in quantitative framework. The population of the study were science teachers from both the constituent and affiliated campuses and by applying census sampling all 103 teachers were selected for the study. The data were collected through survey questionnaires. I analyzed data by applying Statistical Package for Social Science (SPSS) Version 20. The result shows that constitute campuses had better ICT facilities than affiliated campuses but the practice was adverse. Less than one-third teachers had better practice of ICT tools for online teaching and learning. It was also found that MS-Teams and Zoom were two widely used learning platforms but Zoom was more popular. Most of the science teachers had limited knowledge of ICT with poor ICT friendly culture. However, teachers' ICT competencies significantly support for the paradigm shift towards online science teaching in Madhesh Province.

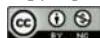
Keywords: Learning platform, online teaching, pedagogical impacts, teachers' competencies, ICT facilities

Introduction

Nepal is highly diverse with vast geographical diversity. It has multi-diversity in geographical, social, cultural, and educational practices in teaching science. Education systems all across the world was impacted by the coronavirus (COVID) epidemic. To check COVID-19 epidemics, the majority of countries temporarily closed their educational institutions. Over 60% of the world's students are impacted by this widespread lockdown. Millions of additional students are affected by localized lockdowns that have been enacted in several other nations (United Nations Educational, Scientific, and Cultural Organization [UNESCO], 2020).

ICT is currently significantly assisting the globalization process. With the employment of superior ICT facilities in the present day, science and technology are increasing education in both schools and universities. The epidemic had an equally devastating effect on higher

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education. In-person instruction was displaced by remote activities in 91% of higher education institutions worldwide (Marinoni, Land, & Jensen, 2020). The advancement of information and communication technology (ICT) enabled higher education institutions to switch from in-person instruction to online instruction, preventing a more significant interruption of the educational process during the epidemic. Students of rural areas families are unable to fund the fees of their children attending school or campus that forced children to work for financial support. Things are expected to get rougher in rural areas for a variety of reasons, the most obvious of which is economic. Tiruneh (2020) states unequivocally, "Parents from agrarian areas may be hesitant to send their children to school because they want them to help with agriculture and animal rearing." This situation may cause in discontinuous in attending classes and ultimately creates a number of drop out cases. This has a long bad impact in the lives of people. One of them is a large proportion of Nepal's labor has to work abroad with a low wage.

Many teachers believed that the methods they employed in their traditional classrooms did not apply to the online setting (Kennedy & Archambault, 2012). Teachers must therefore alter their pedagogical strategies and perspectives on instruction and learning. It required a shift from imparting knowledge to directing knowledge, which could give students the information they needed. This method gave professors the freedom to present the material in a variety of ways utilizing text and multimedia, and it gave students lots of opportunities to engage with the course material (DiPietro, 2010).

Although some higher education institutions used online learning (OL), for others (eg. campuses in the Madhesh regions), this adoption was a complete novel that came with numerous difficulties. The distinctive features of OL during the pandemic were related to what Watermeyer, Crick, Knight & Goodall (2021) refer to as 'afflictions' resulting from the quick and complete switch to online delivery and early 'entry-level' use of digital pedagogies. ICT has changed the process of education by bringing elements of community to environment of learning, even virtual ones. As a powerful and persuasive tool ICT is providing educational opportunities, thus learning in upcoming days without ICT will be hard. ICT developed and changed so quickly in the last decade that developing countries were left behind as a result, which caused them to fall behind in their correspondence.

Ali, Haolader and Muhammad (2013) mentioned that the use of ICT has become essential for practice teaching in classroom as it supports both teachers and students to work. Besides it, for conversing, controlling and recovering information other than advancing self-directed and dynamic education ICT is useful. When institutions were shut down and the direct method of teaching-learning was discontinued there, the students were absent. Moreover, during that time many former committees dissolved up. Mahboob (2020) mentioned that at the houses and residences of students, impact of the campus shutting situation was felt at that time. Society offered an alternative method of teaching-learning, but the main priority was maintaining human life. The main areas of concern regarding teachers' use of ICT facilities in higher education were the teaching-learning and evaluation system, and the high drop-out rate, poor ICT infrastructures, slow internet access, inadequate ICT friendly environments, inadequate teachers' ICT knowledge and practices etc.

The state has not provided any technical help or teacher training in ICT except from the admin Microsoft team training T.U. 2020; instead, it has let NGOs to do so (Rana &

Rana, 2018a). Improvements in learning methods are occurring as a result of the introduction of technology. Because of the rural Nepali setting, this study does not attempt to compare the use of techniques or the affordability of resources to any outside norms; rather, it aims to present a description of the event that is taking place in the specific region. However, Tribhuvan University enhanced its online educational resources (Moodle, LMS, cloud systems, etc.) to provide standard online education at campus center websites and give a chance to use e-mail and repositories through handheld and desktop platforms. All parties including institutions as well as their teachers, and students, have collaborated to create online content (books and educational materials) that can be provided via online classes using Zoom and Microsoft Team, but they have not yet noticed a difference (Azzi-Huck & Shmis, 2020).

Studies related to education system of Nepal shows use of digital learning practices has increased opportunities for students in higher education to study abroad; however, difficulties using these practices effectively are caused by limited access to digital learning resources and a lack of handling skills. Dawadi, Giri and Simkhada (2020a) research report also highlighted the opportunities and challenges of using digital learning practices. Similar to this, a study conducted in Nepal on internet-based higher education during COVID -19 found that even though internet facility was available to nearly three-fourths of the participants, more than one-third of them did not continue taking online courses because of weak internet connections and power supply issues. It further revealed that online class was not felt comfortable by two-thirds of students. According to the study's findings; institutional policy, internet connectivity, and poverty all have a substantial impact on the use of digital learning in Nepal's higher education systems (Acharya, Budhathoki, Bjonness & Devkota, 2020).

The current situation demonstrates how the COVID -19 affects Nepali students in a variety of ways. Several schools in metropolitan have begun to provide online courses to reduce the impact on learning, but this was not practical in rural places, notably in Terai. Internet access is available to more than half people (56%) of Nepal. Despite the fact that 35% of educational institutions have web connectivity, just 13% of them may be able to give virtual lessons (Pandit, 2020). To put it another way, the current ICT facilities and their expansion in urban and rural areas resulted in two major types of inequalities within the country, namely, between urban and rural students and between wealthy and poor. Therefore, Nepal's Human Rights Commission has advised Ministry of Education Nepal and institutional schools to desist from putting students under stress through virtual schooling (Sherpa, Baraily & Basnet, 2020).

In this setting, the Nepalese government chose to implement a computerized learning system to supplement classroom teaching-learning at the time of COVID -19 pandemic. Alternative Learning in Higher Education Facilitation Framework-2077 was approved by Ministry of Education, Science, and Technology that includes teaching-learning, research, examination, and evaluation for campuses and it was implemented by University Grants Commission (UGC, 2020). This framework has advocated for the management of e-learning tools and the application of e-learning strategies in higher education. Despite several challenges, during COVID -19, Nepalese universities began implementing digital learning classes using digital learning resources such as Moodle, MOOCs, Zoom, Google Meet, and Microsoft Teams (Gyawali, 2020). Similarly, during the pandemic, TU produced an Online Teaching Guideline Framework-2077 to deploy an online teaching system, and afterwards, when the

pandemic became less offensive, the university adopted a blended style of learning in its constituents and associated campuses. As a result, during the pandemic time, the Faculty of Education (FoE) also embraced an online form of teaching-learning which FoE has been experimenting with online and distance learning (ODL) as an alternative mode of teaching-learning in teacher education programs since 2015, in conjunction with the Finnish government's YAMK and HAMK universities (Yadav, 2020). The FoE also strives to foster innovative educational practice in semester wise program of the Master Degree in Education (M.Ed.). The FoE now offers teacher education programs in both online and face-to-face formats.

Tribhuvan University developed an Online Teaching Guideline Framework-2077 specially to provide and enhance university teachers and students; its online educational resources by Microsoft Team, Moodle, LMS, and cloud systems through individual email ID. TU admin provided Microsoft Team short term ICT training to conduct online classes to all selected teachers in both constitute and affiliated campuses but they did not find their impacts in study areas (Yadav, 2022a). The similar report of education under lockdown estimated that nearly three-fourth (72%) of people has internet access and most of them belong to urban-centric areas (Sharma,2018). There is also limited study exploring about access and practice of digital learning resources in online mode of classes in pandemic. Regarding it, this study attempted to find out the online teaching learning practice among higher education teachers, especially the use of ICT facilities by Madhesh Province science teachers during COVID pandemic. In this context, this study aims to explore the practice of higher-level Science education teachers' existing use of ICT facilities in online teaching during COVID-19 period particularly in Madhesh Province.

Methods and Procedures

Quantitative survey was the design of this research that was conducted in March-April 2022. Semi-structure questionnaire and closed observation through check-list sheet were used as research tools. These research questions were pre-tested and checking of reliability of questionnaire the delimitations of unnecessary information were checked. In this study, the authentic permissions of related persons and institutes were taken before collecting the relevance data. The collected data was analyzed using statistical tools and descriptive methods to reach the conclusion. The information was gathered from science teachers who taught online classes, lab instructors, and all other teachers that were involved in science education. Entire Madhesh province was selected as research site purposively. All seven science education stream campuses (FoE, TU, 2079), 103 teachers who teach in Science Education program in Madhesh Province were selected as a census sample. Distribution of teacher is presented in Table 1.

Table 1. *List of Selected Sample*

| S.N. | Name of Selected Campus | Categories of Campus | No. of Male Teachers | No. of Female Teachers | Total Teachers |
|-------|-------------------------|----------------------|----------------------|------------------------|----------------|
| 1. | SSMY Campus | Constitute | 22 | 0 | 22 |
| 2. | Thakuram Campus | Constitute | 16 | 3 | 19 |
| 3. | J.S Murarka Campus | Affiliated | 12 | 3 | 15 |
| 4. | Tapsi Baba Campus | Affiliated | 10 | 1 | 11 |
| 5. | Salhesh Campus | Affiliated | 9 | 2 | 11 |
| 6. | Model Campus | Affiliated | 8 | 2 | 10 |
| 7. | RajarshiJanak Campus | Affiliated | 13 | 2 | 15 |
| Total | | | 90 | 13 | 103 |

Among selected campuses, all 41 teachers from constitute and 62 teachers from affiliated campuses who taught Physics, Chemistry, Botany, Zoology and other (Math) along with a lab total 103 teachers were participants of the study. The data was collected from teachers by using questionnaire, checklist sheets and ICT tools were verified from head of the Institutions. The ranking level of teachers' use of ICT facilities assessed by measuring three-point Likerts' scale ranging from 'Never' (0), 'Seldom' (1) and 'Always' (2). Data was entered in Statistical Package for Social Science (SPSS) (Mujis, 2014) Version 20. Checking and editing of data was performed before analyzing it by applying statistical tools such as percentage, frequency and average. Analyzed data was presented in tables and figures.

Results

In this section, data constitute to availability of ICT facilities and relationship of use these facilities in online teaching during COVID -19 pandemic periods.

Availability ICT Tools were comparative to both Constitute and Affiliated Campus Teachers

Table 2 shows that both constitute, and affiliated campuses had ICT related tools and facilities. The data also shows that all science teachers had common tools access in the institutes like mobiles, computers/laptops, and internet/Wi-Fi but only below two-thirds of teachers had these facilities at home. Due to a lack of ICT infrastructure and competency, only 53.4% of teachers had access to projector facilities on campus. However, only a small percentage of campuses (only 7.8%) had multimedia equipment available.

Table 2. Comparative Studies of Existing ICT Tools in Constitute and Affiliated Campus⁷

| Descriptions of ICT Tools | Availability of ICT Tools | | | | | | | | | | | |
|---------------------------|---------------------------|-------|------------|-------|-------|-------|------------|-------|------------|-------|-------|------|
| | At Campus | | | | | | At Home | | | | | |
| | Constitute | | Affiliated | | Total | | Constitute | | Affiliated | | Total | |
| f (n) | P (%) | f (n) | P (%) | f (n) | P (%) | f (n) | P (%) | f (n) | P (%) | f (n) | P (%) | |
| Desktop/Laptop | 33 | 80.4 | 58 | 93.5 | 91 | 88.3 | 35 | 85.3 | 59 | 95.1 | 66 | 64.1 |
| Smart Phone | 41 | 100 | 53 | 85.4 | 94 | 91.3 | 41 | 100 | 61 | 98.4 | 102 | 99.0 |
| Internet | 41 | 100 | 61 | 98.4 | 94 | 91.3 | 35 | 85.3 | 59 | 95.1 | 66 | 64.1 |
| Printer | 20 | 48.8 | 46 | 56.4 | 66 | 64.1 | 7 | 17.0 | 6 | 9.6 | 13 | 12.6 |
| Projector | 20 | 48.8 | 35 | 56.4 | 55 | 53.4 | 1 | 2.6 | 0 | 0 | 1 | 1.0 |
| Multimedia | 3 | 7.3 | 8.0 | 8 | 7.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| Virtual Lab | 0 | 0 | 1 | 1.6 | 1 | 1.0 | 0 | 0 | 0 | 0 | 0 | 0.0 |

The data also shows that information technology resources were easier to find on constituent campuses but were used at a lower rate on affiliated campuses. According to respondents' results, most young educators, females, and ICT proficient science instructors were spread out on affiliated campuses compared to constituent campuses, however older professors showed up on constituent campuses with insufficient ICT access. In addition, they attempted to make ICT accessible. The entire result also showed that facilities of ICT are more in constitute campus than affiliated campus but comparable use of ICT in science teachers is higher in affiliated campus than constitution campus.

Use of ICT Tools during Online Teaching Learning

Today, use of mobile, laptop and desktops have risen significantly. It is commonly used for communications, information collections and different purposes all over the world. Smart phones have a lot of advantages and increase work efficiency as well. It helps in sharing information such as text, audio, and video and helps in getting the latest information through social media and open sources also.

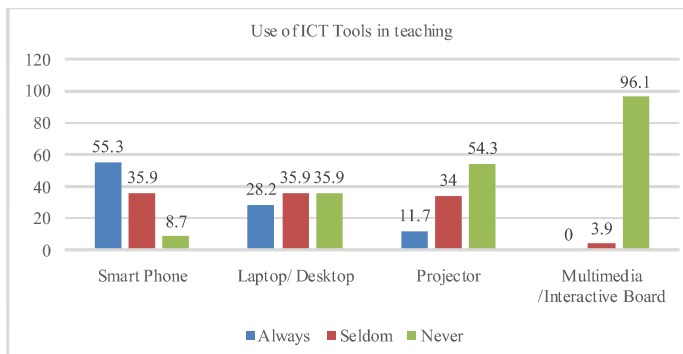


Figure 1. Use of ICT tools as Teaching Learning

Figure 1 shows that all teachers had been using android mobiles, except 8.7% of science teachers. However, more than one third (35.9%) of teachers never used desktops or laptops in schools or home also. Similarly, only 11.7% of teachers were familiar with the use of projectors which says that utilization rate of interactive board/multimedia is very negligible. 96.1% of teachers were completely out of reach from interactive board/ multimedia. The data interpreted that smart phone and laptop were popular ICT tools which were used in online teaching during COVID periods. It was also found that there was not any practice about the use of multimedia/ interactive board in the study areas of the Madhesh providence's campuses.

Teachers Use of ICT Apps During Online teaching

Application of ICT aids in advancing the incorporation of ICT in academia. Today's fast-changing world is dominated by ICTs and the usage of ICT apps. In this study evaluated those digital devices such as PCs, web pages, cell phones and apps, You Tube, and Zoom. It was found that ICT applications and resources are often utilized for educational purposes during the COVID-19 pandemic and these technologies support educational systems, teachers, and students in their efforts to teach and learn. Moodle is prominent among lecturers because of its pedagogical base and applicability to the educational environment. Traditional schooling can be modified or enhanced by e-learning in the pandemic.

Figure 2 indicated that more than 60% of teachers used Zoom app regularly and 33% of teachers used it sometimes in online class. However, 7.8% teachers never used this app. Similarly, 17.1% regular and 41.5% constituents' campus teachers seldom used Microsoft teams since T.U. central administrators enforced use of MS-team. The results also highlighted that 79% of affiliated campus teachers never used MS-team. Other apps like Google meet, Google classroom etc. were used by only 19.4% of teachers of affiliated campus. The result also found that all ICT friendly teachers used You Tube for individual purposes but only 15.5% teachers used You Tube for learning. Also, it was found that both constitute, and affiliated campus used Moodle as learning platforms.

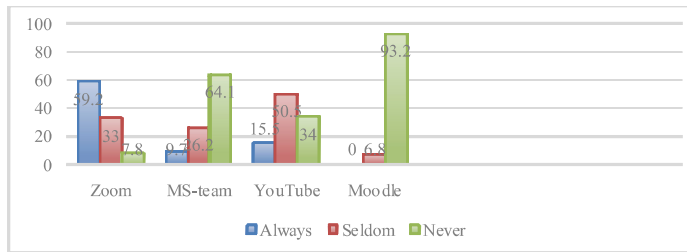


Figure 2. Use of ICT apps During Online Teaching

*Note: f = frequency, % = percentage

The case study conducted by Rana and Rana (2018b) revealed that prior to COVID-19, the use of digital learning resources among higher education teachers and students, particularly in government-funded higher education institutions in Nepal, was very low. Despite the fact that TU began remote access online learning via open and distance learning (ODL) mode for teacher education programs in 2015, technology-enhanced classroom teaching and learning was still uncommon among higher education students and educators (Carm, Johannesen & Ogrim, 2020).

E-resources and their Use in Online Teaching

Online resources help with different learning styles with specific activities of teaching. It also helps with self-improvement. Strengthening students and instructors' access to online learning equipment and technology is essential to effectively utilize the learning platform.

Table 3. E-resources and their Use in Online Teaching

| Descriptions | Indicators | Constitute Campus | | A ffiliated Campus | | Total | |
|---|------------|-------------------|------|--------------------|------|-------|------|
| | | F | % | F | % | f | % |
| Use of E-resources for teaching learning Contents | | | | | | | |
| World wide web(www) | Always | 13 | 31.7 | 27 | 43.5 | 40 | 38.8 |
| | Seldom | 18 | 43.9 | 29 | 46.8 | 47 | 45.6 |
| | Never | 10 | 24.4 | 6 | 9.7 | 16 | 15.5 |
| Use of E-Textbook | Always | 7 | 17.1 | 8 | 12.9 | 15 | 14.6 |
| | Seldom | 13 | 31.7 | 21 | 33.9 | 34 | 33.0 |
| | Never | 21 | 51.2 | 33 | 53.2 | 54 | 52.4 |
| Use of E-References | Always | 7 | 17.1 | 6 | 9.7 | 13 | 12.6 |
| | Seldom | 14 | 34.1 | 27 | 43.5 | 41 | 39.8 |
| | Never | 20 | 48.8 | 29 | 46.8 | 49 | 47.6 |
| Use of E-Internet Sources | Always | 23 | 56.1 | 21 | 33.9 | 44 | 42.7 |
| | Seldom | 14 | 34.1 | 36 | 58.1 | 50 | 48.5 |
| | Never | 4 | 9.8 | 5 | 8.1 | 9 | 8.7 |

Table 3 reveals that 38.8% of the teachers always wanted to access www e-resources whereas 45.6% teachers seldom used it. About 15.5% never used these resources in teaching learning during pandemic. As to the frequency of using e-resources, like e-text books, e-reference books, and internet sources, it was used only about 14.6%, 12.6% and 42.7% respectively. But the data also indicated that more than one-third of teachers seldom used the above resources. Half of all respondents never accessed these materials, and 8.7% of teachers were unable to use online resources for a variety of reasons.

According to the results above, 15% of instructors never used any of the e-resources due to lack of ICT training, familiar only with the traditional techniques, and lack of ICT-friendly environment. The above result interprets the rate of searching and utilization of e-resources are higher in constitute campus science teachers than affiliated campus. It means experience and subject specialized teachers could be more involved in other research or searching activities than new teachers. Therefore, in this case, results of maximum indicators are higher among constitute science teachers than affiliated campus teachers.

Teaching Activities Uses during Online Teaching

Even professional educators often struggle to overcome the challenges of taking classes online. In the study, only delivery of contents, way of interaction with students, types of teachings, classroom evaluation system and use of virtual science lab etc. are focused here.

Figure3 shows 7 indicators mentioned about using online science classroom activities during COVID time. Data reported that only contents delivery in class, use of interaction activities with students, only verbal mode of teaching, use of learning conference, virtual science lab works, and the online assignments or exam were measured in three Likert scales. The result expressed that 35.9% and 20.4% science teachers always used only contents delivery and verbal mode of teaching respectively. However, around 50% of the total teachers seldom used it and 13.6% to 20.4% never used the above teaching activities.

Similarly, only 8.7% teachers always used interaction activities with students, but 54.4% teachers never used it during teaching. The results also indicated that no science teachers used video conference frequently, virtual lab practical and conducted online assignment/ exam during online teaching periods.

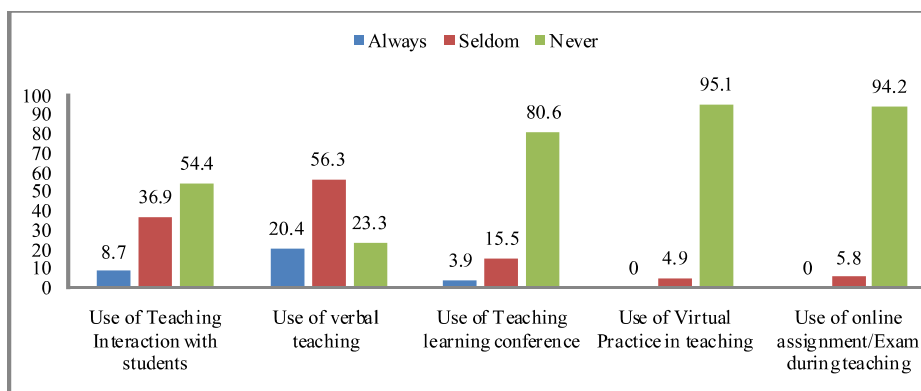


Figure 3. Use of Teaching Activities during Online Teaching

The results interpreted that only one third of the total science teachers always got involved in delivering only contents and verbal mode of teaching whereas never conduct virtual science labs, video learning conference and online assignments/ exam practice regularity as there is a shortage of competencies, sufficient information, and friendly environments etc.

Discussion

In the current context of Nepalese education system, it is necessary to integrate ICT in school as a discipline and as a teaching tool. The study of impacts of COVID -19 on the education sector in Nepal, it explores the use of internet facility has reached 35% of schools and only 13 % of school should prepared to provide virtual courses (Dawadi, Giri & Simkhada (2020b). Another study conducted in Nepal during the COVID -19 pandemic found that university teachers and students, particularly in urban areas, struggled to manage their online classes due to limited ICT infrastructure, weak administrative support, a lack of related training, and poor internet connectivity (Baral & Rana, 2022). An empirical study conducted among higher education students in Vietnam during the COVID -19 outbreaks found that a lack of stable and fast internet access is one of the main impediments to online experiences (Maheshwari, 2021). In relation with the shifting the paradigm in higher education (Khanal & Carm, 2021) also expressed the use of digital tools and internet resources become effective learning at all levels. Although problems lie with teachers regarding the use of ICT in teaching close up / no gap learning as a majority of teachers are still use traditional lecture pedagogy and many of them are reluctant to learn technology and integrate into their teaching learning activities.

In the context of study areas, most of the higher education science teachers had smart phones and laptops/ desktops which are common digital devices. But they were not utilized in proper way during teaching and learning. Projectors are not used commonly in regular classrooms and nobody used virtual science labs in COVID -19 pandemic. There were majority of institutions had insufficient number of projectors and lack the proper management of science virtual labs, (survey observation sheet, 2022). Learning is influenced by the ICT resources available to teachers. This is supported by study done by Obielodan, Omojola, KazeemTijaniand Samuel (2020) who stated that it is critical to integrate ICT into pedagogy in order to improve learning. Additionally, Llerena-Izquierdo and Ayala-Carabajo's(2021) found that instructors need to have multidisciplinary, pedagogical, and technological skills. Regarding the adoption of ICT tools for educational purposes, Casillas Martine, Cabezas Gonzalez & Garcia Penalvo (2020) researched that teacher's lack of appropriate knowledge and skills of ICT, which negatively impacts on learning. In the same way, Alkaromah, Fauziati and Asib (2020) said that the use of mobile applications leads to only a little change and improvement in learning. Furthermore, Amhag, Hellström and Stigmar (2019) researched that use of ICT seems to play an insignificant role in students learning.

A similar study carried out by Yadav (2022b) supported that both constitute, and community campus teachers preferred Zoom learning apps but only constitute campus used MS-Teams for online teaching. Arguing this finding, Nadezhda's report(2020) also supported that Zoom is an efficient method for imparting knowledge during COVID-19 pandemic.

Most of the science teachers were knowledgeable and common skilled on using of social media, they were used internet, website, e- references and e- text books as teaching learning purpose. Likewise, they were used learning sources as e-sources but only below one-third of the science teacher regularly utilized references and e- text books. Similarly, majority of science teachers used of internet and website but used as personal and entertainments purposes. The result concluded that common e-source facilities are available in the institutions as well as personnel but utilization of these e-resources should be needed to increase for better and effective online teaching learning. The findings are supported from report on transition to online higher education during COVID -19 pandemic (Gautam & Gautam, 2021), indicates that the online learning out of Kathmandu is less effective in comparison to Kathmandu.

As stated in the Swami Shraddhan College study research report, Sharma (2018), about 60 students and teaching staff chose to utilize the internet (Google) as a digital resource, while 24 respondents (13.34%) prefer e-books, 9 respondents (5%) prefer e-databases, and 8 respondents (4.44%) use other sources. However, online indexing and abstracting services are not frequently used sources. Bhat and Ganaie (2016) stated in their study that ‘the I&A databases and e-journals emerge as the most widely used e-resources, whereas the e-books and e-thesis are not yet used to a desirable magnitude.

The competency of ICT of science teachers strongly associated with online supportive learner activities like teachers’ interaction activities with students, conduct online learning conferences, conduct online assignments/ examination, virtual science lab etc. These online supportive activities have done vital role in improvement of modern need of existing online pattern of teaching. Even though result of study was not found positive due to only one-third science teachers were practiced interaction with students during online teaching. Nobody could be conducted online conference, online assignments or internal examinations and virtual science lab activities. Majority of science teacher teach virtually only for delivery of contents or displayed of leaning note or slides. This situation is also agreed study of Post COVID -19 Digital Learning Practice in Master’s Level Students of Faculty of Education, Upreti (2023) stated as relationships of digital facilities and digital learning practices were not statistically significant. Results of the study affiliated campus have slightly better results than constitute campus about use of online learning activities. The supported study of Bangladesh (Miah, Singh, & Rahman, 2023) shows that private campus students have better online platform and their learning activities compared to public ones. ICT has been highlighted in the School Sector Development Plan (SSDP, 2017) to enhance how lessons are delivered in the classroom, expand student access to learning resources, and enhance the efficacy and productivity of school administration and management by creating an ICT-enabled learning environment. Arguing this finding, Bhattarai and Maharjan (2020) reported that the digital learning system is changing the traditional practice of learning with technology and innovation. In the same line, Liu et al. (2022) viewed that online teaching and learning needs the use of digital tools.

Conclusion

The research report has provided an existing situational pedagogical analysis of both constitutional and affiliated campuses of Madhesh province and their status of ICT facilities for virtual science classes during COVID -19 pandemic. It has focused on the

adoption of digital resources in science education and points out some impacts arising from the online teaching which are responses for the management of the situations.

The study explores the adoption of ICT in schooling, scientific instructors' perceptions of ICT infrastructure, facilities, and applications, and the role of ICT in improving the competence of teachers. ICT helps to achieve the aim of teaching and learning. As a result, it is said that conventional teaching styles are less prevalent among modern scientific teachers. ICT-integrated teaching and learning models are more suited to the educational trends of the twenty-first century. Though the COVID-19 pandemic situation has forced higher education teachers and students to acquire digital learning skills as an alternative way of 21st century classroom teaching and learning and/or self-learning strategy, most of the higher education students are yet to adopt digital learning practices at campus and home due to lack of both internet facilities with bandwidth and skill-oriented training and workshop time to time.

It is concluded that the COVID-19 pandemic has led to some form of online learning techniques since Tribhuvan University fails to maintain strong control over the system of education. In this situation, if the appropriate steps are not taken promptly, the entire higher education system will be adversely affected from the effects of COVID-19 pandemic. Therefore, a task group on higher education in the province of Madhesh must be established under the direction of the TU to investigate potential solutions, ideas, and emergency measures for scientific profession to control learning loss.

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