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Access, Efficiency, Inconvenience, and Scarcity as Issues of Online and Distance Learning in Higher Education

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Abstract: This study aimed to explore online and distance learning (ODL) issues related to higher education during the coronavirus disease (COVID-19) in Nepal. We applied an online survey design with a five-point Likert scale. We surveyed 71 (57 male and 14 female) postgraduate students in science education at a public higher education institution in Kathmandu, Nepal. A Principal Component Analysis identified four major constructs as the components of ODL issues. They are scarcity, efficiency, access, and inconvenience. The results of the Independent Samples Test (t-test and ANOVA) showed that participants' views about scarcity were significantly different across their gender (male and female) and device use (mobile, laptop, and desktop). They were not significantly different in their views about efficiency, access, and inconvenience across gender, device use, hometown, age group, ethnicity, and school type at .05 level of significance.

Keywords: *Distance learning, issues on online and distance education, student perception.*

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Introduction

The history of formal distance education in Nepal dates back to 1978, when a teacher training project began on the radio with the support of United States Agency for International Development (USAID), the British Council, and the United Nations International Children's Emergency Fund (UNICEF) (Holmes, 1990). The program aimed to train thousands of primary school teachers in Nepal. The mode of distance education has changed drastically due to the Internet and related technology. Nepal has achieved 63% Internet penetration by the year 2019 (Ministry of Communication and Information Technology [MoCIT], 2019). The Digital Nepal Framework 2019, National ICT Policy 2015, and National Broadband Policy 2015 show that the country is moving ahead in promoting ICT-based development and social transformation in Nepal. Some policies have been implemented to guide the development and use of digital technology in Nepal (MoCIT, 2015, 2019). A recent initiative with the Geo-Satellite Policy 2020 has added a new vision to utilize the space for communication, national security, and education, among other implications (MoCIT, 2020). The High-Level Education Commission Report of 2019 also advised the government to develop open and distance learning to provide better access to education (Ministry of Education, Science and Technology [MoEST], 2019).

Online and distance learning (ODL) are gaining popularity before and during the coronavirus disease (COVID-19) in many countries. Many higher education institutions could not conduct face-to-face teaching-learning due to the COVID-19 pandemic (Dubey & Pandey, 2020). The COVID-19 pandemic immensely impacted the education system in the world due to lockdowns and social distancing measures (Johnson et al., 2020). As a response to this effect, online and distance education have been a means of continuing teaching and learning at schools and in higher education (AlMahdawi et al., 2021; Omar et al., 2021). Although distance education has been offered by several universities through their courses, it has not been a mainstream education (Sadeghi, 2019).

In the 21st-century era, ICT has brought a revolution in the sector of education by using a virtual environment by extending education through ODL mode, lifelong, synchronous, asynchronous, flexible, and blended learning (Perveen, 2016), which is now a requirement for adults who wish to continue education despite their other obligations (Fojtik,

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2018). The distance learning has opened up new possibilities in higher education with new opportunities and challenges (Mahlangu, 2018). Open distance learning students expect stability and availability of learning resources, as a part of their career development (Allam et al., 2020). In this context, environmental variables of ODL should support an independent and self-directed learning with technological efficiency (Ajmal & Ahmad, 2019) and students' independence (Dean & Lima, 2017).

This study gives some insight into online and distance learning in higher education in the Nepalese context, especially, when the traditional classroom system is not feasible for many working and busy people. During the COVID-19 pandemic, it is an even more critical factor in keeping higher education functional. For many people, it is a waste of time traveling to reach the institutions, thus awaking the learners and teachers (Perveen, 2016). State of art ODL helps in communication between learners and teachers and provides them with a virtual means to familiarize and support each other without direct face-to-face contact, especially when it integrates multiple media in both synchronous and asynchronous techniques (Murphy et al., 2011). Adding YouTube videos to the learning system can promote the continuous learning and development of students despite the lack of a one-on-one feedback system (Insorio & Macandog, 2022). It expands educational opportunities and professional development for in-service and pre-service teachers and teacher educators (Ghos et al., 2012) despite the challenge of diverse learning styles and cultural differences (Islam et al., 2015), an unfavorable home learning environment, and conflict between family, work, and study schedules (Musingafi et al., 2015).

Previous studies generally covered areas such as e-learning challenges faced by academics (Islam et al., 2015) and understanding and reducing stress in collaborative e-learning (Lawless & Allan, 2004). Other critical issues include online education in a multicultural context (Markova et al., 2017) and e-learning's ability to accommodate the paradigm shift from teacher-centered to student-centered teaching and learning (Lee et al., 2010). Some scholars consider learner autonomy as an essential factor in e-learning (Firat, 2016), and online teaching skills and competencies of teachers (Albrahim, 2020). Some issues may arise from the faculties' perception of student performance in the online classroom (Amro et al., 2013) and others from the pedagogical aspect of online learning (Picciano, 2017). Some researchers are concerned with pedagogical and psychological challenges in online education (Musingafi et al., 2015) and the others consider advantages and disadvantages of distance learning (Sadeghi, 2019). Some studies focused on the "diffusion of innovation" through ODL in teachers' and university faculties' professional development (Al-Karaki et al., 2021; Richardson et al., 2020).

The National Curriculum Framework for School Education in Nepal 2007, the National Curriculum Framework for School Education in 2019, and the Open and Distance Education Policy 2007 have introduced some provisions for ODL education as an alternative/supplementary forms for deprived communities, women, working people, and housewives through distance mode (Ministry of Education and Sports, 2007a, 2007b; MoEST, 2019). Nowadays, some universities (Tribhuvan University, Nepal Open University, and Kathmandu University) offer ODL based education for Bachelor's degrees and Master's degrees (Shakya et al., 2017). Although the current teaching-learning approach has been changed with the development of new information and communication technologies, many higher education institutions are facing challenges in developing an ODL system due to a lack of human resources, a language barrier, a lack of ICT tools, cost, access to a computer, and online tools and learning management system (Shakya et al., 2017; Upadhayaya et al., 2021). The majority of the students who have admitted to the ODL have felt difficulties due to social, technological, political, and psychological issues (Upadhayaya et al., 2021). In this context, the objective of the study was to explore the issues of online and distance learning in higher education in Nepal's context. The research question was formulated as: How do graduate students perceive the access, efficiency, inconvenience, and scarcity related issues in online and distance learning in higher education in Nepal?

Literature Review

Review of Empirical Studies

Musingafi et al. (2015) investigated the challenges of open and distance learning (ODL) by students of Zimbabwe Open University. This mixed method study aimed to examine the challenges facing students of ODL at Zimbabwe Open University as a case study. The study results showed that 75% of students had a lack of sufficient time, 70% had difficulties accessing and using ICT, 40% had agreed to a lack of support from family, and 80% had geographical distance. The study concluded that lack of sufficient time, ineffective and delayed feedback, and lack of study materials were the major challenges for ODL students in Zimbabwe. Likewise, Tindowen et al. (2017) studied alternative skills required for the twenty-first-century learning system with the 4Cs (critical thinking, collaboration skills, communication skills, creativity, and innovation skills), global and local connections, and technology as a tool for learning. They concluded that sex, age, and employment status affected learners' acquisition of 21st-century skills.

Joubert and Snyman (2017) studied e-tutors' challenges experienced in an ODL institution by examining the challenges experienced by e-tutors in e-tutoring and identified a possible solution for ODL institutions. They found that 54.8% of participants had challenges with e-tutoring experiences. Similarly, 16.13% of them were not committed, and 9.7% of them preferred communicating with the lecturers directly, not the e-tutor. Next, Fransson et al. (2018) investigated the perspectives about using ICT in teaching as being good or less good by examining the use of ICT as more or less

supportive of learning in Swedish upper secondary students. They found that ICT competency and pedagogical skills are the foundations for effective applications of ICT tools in teaching. In another study, Zuhairi et al. (2019) concluded that open universities may have several commonalities and differences from each other. These universities can exchange their experiences of good practices together with the challenges they faced in order to enhance ODL practices.

Arulogun et al. (2020) reported that about 35.8% of the students agreed on the cost of Internet data, while 32.1% also strongly agreed that it is a challenge in adopting online facilitation. About 38.2% agreed that power availability was a major challenge in the use of alternative modes of learning, while 35.6% also strongly agreed. In a similar vein, Firat and Bozkurt (2020) found that ODL learners who spent more than three hours online learning demonstrated a higher average than those who spent less than two hours a day. The findings revealed that the Online Learning Readiness (OLR) scores for those employed increase in parallel with their age and become more distinct in the 36–56 age range. These findings confirm that confidence in using the ICT tool is a crucial factor in OLR.

The review of the above-mentioned literature helped us identify some challenges and issues related to skills, perceptions, and experiences of the ODL system. Based on these issues and challenges, we constructed a theoretical framework by including five major issues: administrative, technical, pedagogical, political, and psychological issues of ODL in the Nepalese context.

Theoretical Framework

We formulated a theoretical framework for the study by integrating five areas of major issues in Online and Distance Learning (ODL) (Figure 1).

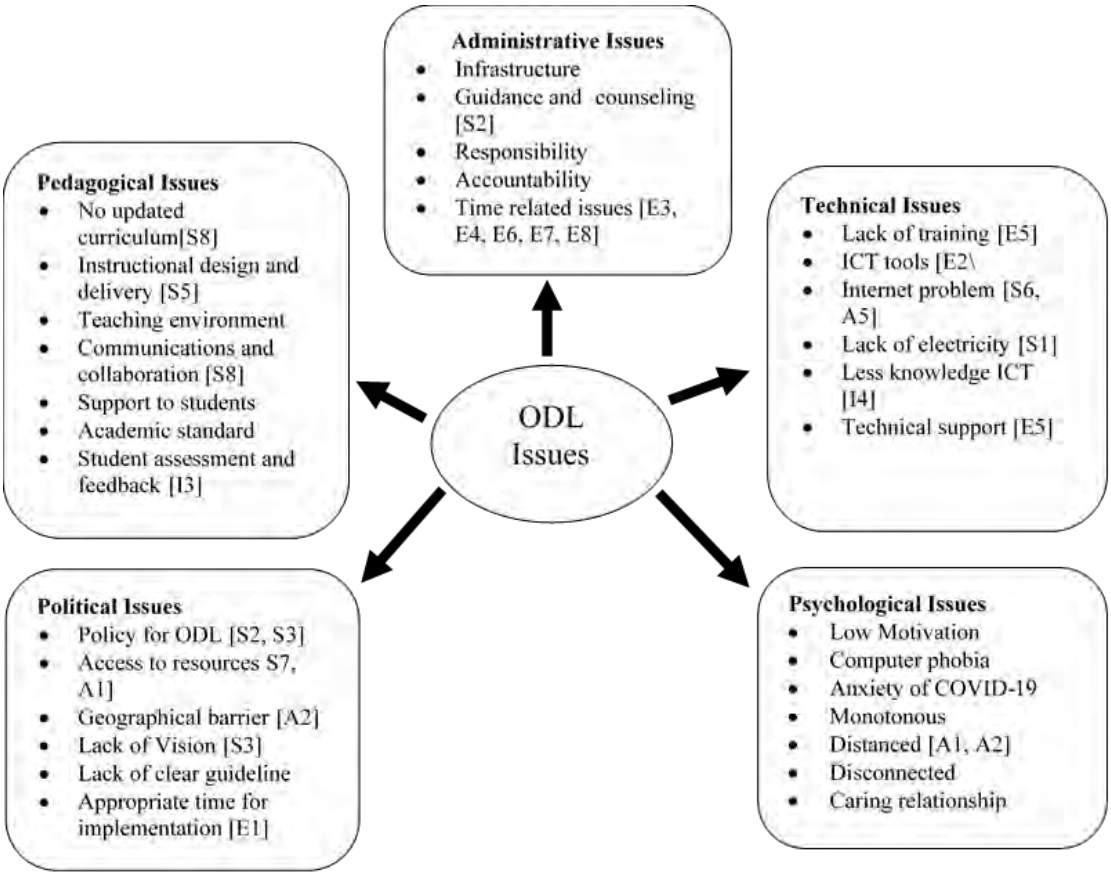

Figure 1. A Theoretical Framework for the Study of ODL Issues

These five domains of issues are pedagogical, administrative, technological, psychological, and political issues. These five domains cover the most pertinent issues, despite several other issues not listed in the framework in Figure 1.

The participants of ODL may feel anxiety due to various issues, boring courses, economic difficulties, lack of feedback or encouragement, isolation, lack of motivation, lack of communication with tutors, comprehension of assessments, and lack of interaction with fellow classmates (Ajmal & Ahmad, 2019). Most remote (rural) students may have additional responsibilities, such as family and children, as well as household chores (Ajmal & Ahmad, 2019). Similarly, ODL students may encounter difficulties due to a lack of a device and Internet access, a lack of knowledge to upload the assignment, and difficulties signing up for a new account in the courses (Allam et al., 2020). Most often, psychological

problems may occur in ODL, mainly, due to low perception and motivation, and the high pressure of educational activities, such as assignments (Akther, 2013).

Similarly, in some cases, teaching staff may lack training in adopting technology and pedagogical practices (Albrahim, 2020). Furthermore, Voloshinov et al. (2020) reported a lack of sufficient distance learning technologies, support systems, teaching methods, pedagogical approaches, remote laboratories, and virtual environments. Teaching is a profession with responsibility and accountability that needs preparation of lessons, delivery of subject matter, fair evaluation, providing immediate feedback, and establishing a pleasant classroom environment (Semradova & Hubackova, 2016). Poor infrastructure is one of the most reported issues in ODL (Tembo, 2019). In face-to-face learning, students are assimilated to each other, in contrast to online learning, but there are typical challenges that students feel disconnected from their group community in the ODL (Swan, 2017). These key points about the issues in ODL from the theoretical framework are helpful in designing the study and analyzing the data to understand the major issues in ODL in the Nepalese context.

Methodology

We applied a quantitative research design with an online survey questionnaire that we constructed, including five-point Likert-scale items. Survey research is used to collect data from a large number of samples in a certain period, which does not concern individuals' characteristics (Best & Khan, 2006; Cohen et al., 2010). An online survey has the advantage of quick distribution of questionnaires at a low cost (Andrews et al., 2003). The questionnaire can be implemented into an online platform like Microsoft Teams, Google Share, etc. to collect the data and save respondents' responses (Andrews et al., 2003).

Construction of the Tool

First, we developed a 28-item structured survey questionnaire. Four researchers discussed these questions in a webinar about the issues and problems of ODL and the nature of the items. After the extended discussion among the researchers, we finalized and shared the questionnaire with two senior experts at Tribhuvan University, who were involved in ODL for the validity purpose. We made minor corrections according to the experts' feedback and suggestions in the content of the items. These corrections were mainly about grammatical with double meaning with conjunctions. The item-wise agreement between the two research experts was more than 80% as only there were minor issues with 9 items that needed some corrections.

The survey questionnaire's reliability for the Likert-scale items was performed in the IBM SPSS 26 (Table 1). The reliability test results for the internal consistency of the Likert-scale items showed that the Cronbach's Alpha value was .824, and the Cronbach's Alpha based on the standardized items was .819 for the 28 items. The reliability coefficient, being greater than .60, was highly reliable for the statistical analysis (George & Mallery, 2003). Hotelling's T-squared test value was 1165.35 with $F(27, 44) = 27.13$ was significant ($p < .05$) (Table 1).

Table 1. Reliability Test of the Survey (Likert-Scale Items)

Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**			**N of Items**
.824	.819			28
Hotelling's T-Squared Test				
Hotelling's T-Squared	**F**	**df1**	**df2**	**Sig**
1165.349	27.130	27	44	.000

Principal Components

We performed a factor analysis of the extraction method with principal component analysis and rotation method of Varimax with Kaiser Normalization. We fixed the factor loading coefficient of items at 0.4, and the number of factors (principal components) to four based on their internal consistency (Cronbach's alpha > 0.6) and total variance being greater than 5% for each component. We applied the Kaiser-Meyer-Olkin (KMO) measure to test the sampling adequacy for the factor analysis. The KMO value was 0.628, and Bartlett's Test of Sphericity was significant ($p < 0.05$) with a Chi-square of 786.09, and a degree of freedom of 378 (Table 2).

Table 2. KMO and Bartlett's Test for Sample Adequacy of Principal Component Analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.628
Bartlett's Test of Sphericity	Approx. Chi-Square	786.09
	df	378
	Sig.	.000

We examined the internal reliability of each component with Cronbach's alpha. Among the twenty-eight items, eight were loaded into the first component named "perception of *scarcity*." The next eight items loaded into the second component, named "perception of *efficiency*." The third component, designated as perception of *access*, had six elements loaded into it. The fourth component had the last six items loaded. We named this component as "perception of *inconvenience*." We presented these four components, their associated items with factor loading, and reliability values (Cronbach's alphas) for each component in Table 3.

Table 3. Principal Component Analysis Results with Four Components, Items Loaded in Those Components, and Rotated Factor Loading for Each Item in the Respective Components

Components	**Items loaded**	**Rotated Factor Loading**
Scarcity	S-1. Unscheduled cutoff electricity is one of the main hindrances of ODL learning.	.700
(Cronbach's alpha = 0.75)	S-2. It is difficult to run the ODL program due to a lack of clear policy and guidance from the university and the government.	.684
	S-3. There is a lack of ODL educational policy to deal with the challenges of online and distance learning.	.599
	S-4. There is a lack of sufficient time for study and conflicts between family/work and study schedule.	.562
	S-5. Facilitator facilities in Nepali medium but ask us to write in English medium in the exam is the gap of learning.	.561
	S-6. The problem of low power/bandwidth of the Internet is the hindrance of the ODL classes.	.553
	S-7. I feel that there is a lack of security in my online content.	.502
	S-8. The course content is not adopted to the technology and even limited interaction between teachers and students.	.401
Efficiency	E-1. This is the right time for the implementation of this program.	.656
(Cronbach's alpha = 0.75)	E-2. Online content sharing and conference (Teams, Skype, Moodle, Google Classroom) tools are the best tools for the ODL.	.602
	E-3. There is an inappropriate timetable for online classes.	.594
	E-4. The ODL class schedule and time management of the class is very effective.	.560
	E-5. There was a lack of adequate technical support and ICT tools while training the initial phase at the campus.	.552
	E-6. There is a lack of time for practice at home.	.454
	E-7. The lack of time is the hindrance of your ODL mode class.	.446
	E-8. There is a lack of sufficient time to use ICT in the ODL classroom.	.411
Access (Cronbach's alpha = 0.70)	A-1. The ODL course is not accessible to me as I work in a remote area of the country.	.658
	A-2. The geographical barrier is the hindrance of your ODL mode class.	.625
	A-3. In the ODL program, I get support from IT persons during online learning difficulties.	.613
	A-4. ODL provides students a chance to be involved in decisions about digital services.	.592
	A-5. Because of the lack of internet access, I cannot take online classes outside the school premises.	.591
	A-6. Online courses are better solutions to Nepal's people who work in rural areas for upgrading their higher education.	.515
Inconvenience (Cronbach's alpha = 0.69)	I-1. It is a convenient approach for my study.	.659
	I-2. The ODL mode is more expensive for regular use at school and at home for joining the classes.	.620
	I-3. In the ODL, online assessments are delivered and managed well.	.586
	I-4. I feel difficulties in using an online platform for my study.	.580
	I-5. The ODL program provides appropriate guidance for learning difficulties.	.567
	I-6. Improvements in online technologies are the major challenges of ODL.	.505

Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization, Rotation converged in 8 iterations.

Test of Normality

With the 71-sample size, we first performed a normality test using the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests. However, after testing outliers, we removed three cases that were outliers. Then, the test of normality of the distribution of the four components with a sample size of 68 showed that perceptions of *scarcity* and *access* were normally distributed ($p > .05$) in both measures (K-S & S-W), whereas the perceptions of *efficiency* and *scarcity* were not normally distributed ($p < .05$ by the K-S test), but they were both normally distributed in the Shapiro-Wilk test (Table 4). We chose to follow the Shapiro-Wilk test and accepted that all four dependent variables had a normal distribution ($p > .05$). That means we could run parametric tests for *scarcity, efficiency, access,* and *convenience* to compare these constructs across subgroups of gender, hometown, age group, ethnicity, school type, and device use.

Table 4. K-S And S-W Test of Normality Distribution of the Four Components

	Kolmogorov-Smirnov			Shapiro-Wilk
Components	**Statistic**	**Df**	**Sig.**	**Sig.**
Scarcity	0.093	68	.200	.383
Efficiency	0.150	68	.001	.105
Access	0.076	68	.200	.320
Inconvenience	0.121	68	.015	.190

Administration of the Survey

A total of 92 students were enrolled in a postgraduate two-semester M.Ed. in Science Education at the ODL program under the Faculty of Education at Mahendra Ratna Campus (MRC) Tahachal, Kathmandu. At the same time, 78 students continued synchronous regular virtual classes, whereas, other 14 students participated in a mixed-mode (asynchronous and synchronous). These 14 students were not included in the survey. Among the 78 regular students, 64 (82.05%) were male, and 14 (17.95%) were female. Among them, 35 (44.9%) were from rural areas, and 43 (55.1%) were from urban areas of Nepal. As a teacher, counselor, and IT person, we were in regular contact with all students. We shared the survey link in an online virtual classroom through MS Teams on the same date and time in both groups. We informed all students about the purpose and use of the data. We asked them to submit the questionnaire in their free time. The students were requested to participate in the study voluntarily with autonomous self-determination. We confirmed their anonymity and confidentiality of all the submitted data (Fouka & Mantzorou, 2011). Finally, 71 (57 male and 14 female) students completed the online questionnaire within two weeks. After removing 3 participants' data as outliers, the final analysis was done with 68 sample size (54 male and 14 female graduate students) in an ODL program in a higher education institution in Kathmandu, Nepal.

Data Encoding

After retrieving the data from the Google Forms, we uploaded it into IBM SPSS 26. We coded the gender as male = 1, female = 0. We coded the hometown of the participants as rural = 0 and urban = 1. We coded the age groups as 21–25 = 1, 26–30 = 2, 31–35 = 3, 36–40 = 4 and > 40 = 5. We coded their ethnicity as Brahman = 1, Kshetree = 2, Baishya = 3, and Sudra = 4. Likewise, we coded the school types as public school = 1, institutional school = 2, community school = 3, and other school = 4. We coded the used devices as mobile & laptop = 1, laptop = 2 , mobile phone = 3 and desktop = 4. We coded the survey questionnaire responses for each item as strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5.

Analysis of Data

We administered a factor analysis of the data from the 28 Likert-scale items to find four critical dimensions of issues in ODL. We performed KMO and Bartlett's tests to examine the sample adequacy for the factor analysis with the extraction of the principal components and a scree plot with Varimax rotation method and Kaiser Normalization. We set the limit of factor loading coefficients at an absolute value of 0.4. Although there were eight factors loaded by the SPSS based on the eigenvalues greater than or equal to one, we chose to limit the number of factors to four to determine the most significant dimensions of the issues based on the items loaded with them. The four scale values for these four dimensions were calculated by the average of all items loaded with them. Then, we carried out a descriptive analysis for mean and standard deviation and a one-sample t-test for the items in each dimension together with effect size for statistically significant results by using Cohen's d. We performed a test of normality to decide whether parametric or non-parametric tests should apply. We conducted parametric independent sample tests (t-tests and one-way analysis of variance [ANOVA]) for group comparison in each dimension (dependent variable) with groups of independent variables. Likewise, we also conducted Levene's Test of Homogeneity to decide whether the distribution of dependent variables within the subcategories of gender, hometown, age group, ethnicity, school type, and device use had equal variance or not. The effect size was computed for the statistically significant results.

Results

We have discussed the results of the study in four sub-sections: descriptive (mean, mean difference from the population mean and standard deviation), one-sample t-test for significance of sample mean for each item in the principal components, and parametric tests for comparing means for each principal component (factor) with respect to several independent grouping variables, such as gender, hometown, ethnicity, age group, and device use.

Perception of Scarcity in Online Learning

Cronbach's alpha of .75 for Likert-scale items loaded with *scarcity* was reliable because it was higher than 0.6 and was acceptable (George & Mallery, 2003). The participant responses to the items related to the issue of ODL *scarcity showed* that they were almost neutral towards the overall problem of *scarcity*. Their opinions about the cut-off of electricity, guidance policies from the university, educational policies, security issues for online studies, sufficient time for their studies, and Internet facilities were significantly different from the neutral value of 3. They rated higher (above the neutral value of 3) in the items related to Internet power and bandwidth of the Internet and unscheduled cut-off of the electricity. However, they were rated low (below neutral) for the lack of security on the Internet and limited interaction between teachers and students of the ODL. The highest-rated value was 4.42 and the lowest rated value was 2.68, whose corresponding standard deviations were 0.730 and 0.968, respectively (Table 5, Figure 2). There was a highest effect size (Cohen's d = 1.95) for S-1 that states, "unscheduled cut-off electricity is one of the main hindrances of ODL." The item with the second highest effect size was S-6 (Cohen's d = 1.85) which states, "The problem of low power/bandwidth of the Internet is the hindrance of the ODL classes" (Table 5).

Table 5. Descriptive Statistics and One-Sample t-Test for the Issue of Scarcity of ODL

One-Sample Statistics (Test Value = 3)									
							Effect size (Cohen's d)	95% C. I. of the Difference	
Items	N	Mean	Std. Deviation	Mean Diff.	t	Sig. (two-tail)		Lower	Upper
S-1	68	4.42	0.730	1.423	16.415	.000	1.95	1.25	1.60
S-2	68	3.45	1.131	0.451	3.357	.001	0.39	0.18	0.72
S-3	68	3.27	1.055	0.268	2.137	.036	0.26	0.02	0.52
S-4	68	3.65	1.255	0.648	4.351	.000	0.52	0.35	0.94
S-5	68	3.18	1.268	0.183	1.216	.228	-	-0.12	0.48
S-6	68	4.37	0.741	1.366	15.527	.000	1.85	1.19	1.54
S-7	68	2.68	0.968	-0.324	-2.821	.006	-0.33	-0.55	-0.09
S-8	68	2.87	0.999	-0.127	-1.069	.289	-	-0.36	0.11

The items S-1 to S-8 for *Scarcity* can be referred to Table 3 for details.

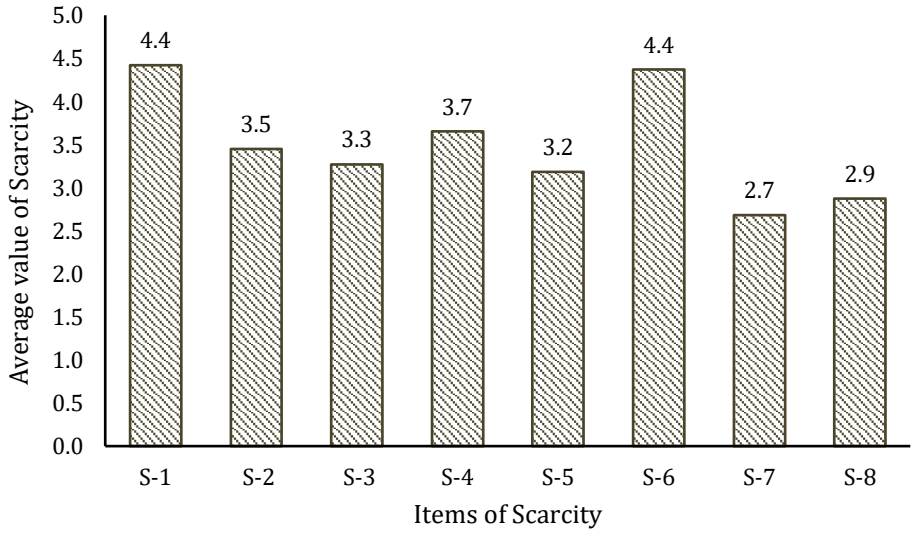

Figure 2. The Average Value for the Issue of Scarcity of ODL

Perception of Efficiency in Online Learning

The reliability coefficient for the component *efficiency* measured by Cronbach's alpha was .75, which was reliable because its value was greater than 0.6 (George & Mallery, 2003). The participants' responses to the items related to the

issues of *efficiency* related to ODL showed that they were almost neutral on the overall issues within this domain. The highest-rated value and lowest-rated values were 3.97 and 1.80, respectively. Their opinions about the right time for the implementation, a tool for the sharing in ODL, an inappropriate schedule for the classes, effective class schedule and time management, lack of time for practicing at home, and lack of time being hindrances for the study were statistically significantly different from the neutral value (mean = 3), but their opinions about the lack of time and adequate technical support and ICT tools in the training phase were not significantly different. The results in Table 6 showed that the participants rated (below neutral) for the right time for the implementation, the tool for the sharing in ODL, an inappropriate schedule for an online class, an effective class schedule, and time management. Likewise, they rated near to neutral (mean = 3) for lacking technical support and ICT tools, lack of time for practice at home, unavailability of time as a hindrance for the ODL, and insufficient time to use the ICT (Table 6, Figure 3). The two items "E-1: This is the right time for the implementation of this program" and "E-2: Online content sharing and conference (Teams, Skype, Moodle, Google Classroom) tools are the best tools for the ODL" have high effect sizes to the negative side indicating that the students' had a great degree of disagreement with these items and perceived as ongoing issues in ODL.

Table 6. Descriptive Statistics and One-Sample t-Test for the Issue on Efficiency of ODL

				One-Sample Statistics (Test Value = 3)					
						Sig. (Two-tail)	Effect size (Cohen's d)	95% C. I. of the Difference	
Items	**N**	**Mean**	**Std. Deviation**	**Mean Diff.**	**t**			**Lower**	**Upper**
E-1	68	1.90	1.097	-1.099	-8.435	.000	-1.00	-1.36	-0.84
E-2	68	1.80	0.689	-1.197	-14.639	.000	-1.74	-1.36	-1.03
E-3	68	2.63	1.301	-0.366	-2.372	.020	-0.28	-0.67	-0.06
E-4	68	2.32	1.053	-0.676	-5.412	.000	-0.65	-0.93	-0.43
E-5	68	3.11	1.271	0.113	0.747	.458	-	-0.19	0.41
E-6	68	3.97	1.028	0.972	7.967	.000	0.94	0.73	1.22
E-7	68	3.51	0.984	0.507	4.343	.000	0.52	0.27	0.74
E-8	68	3.11	1.128	0.113	0.842	.403	-	-0.15	0.38

The items E-1 to E-8 for Efficiency can be referred to Table 3 for details.

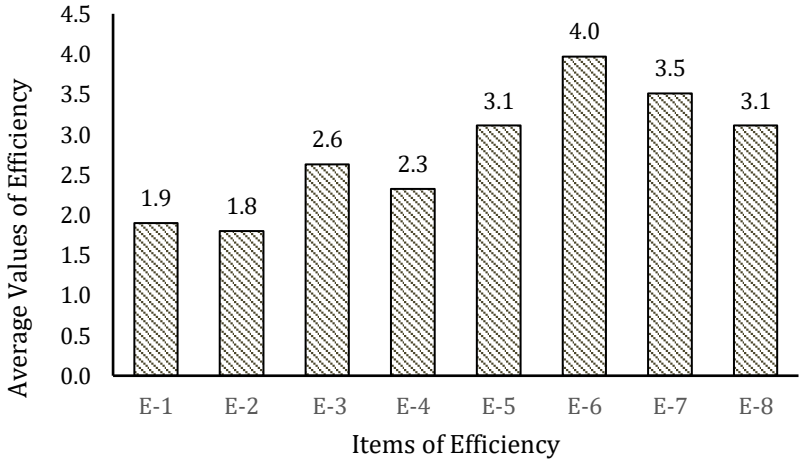

Figure 3. The Average Value for the Issue on Efficiency of ODL

Perception of Access in Online Learning

The reliability coefficient value (Cronbach's alpha) for the domain *access* was .70, which was significant because it was greater than .6 among the six items (George & Mallery, 2003). The highest-rated item had a mean of 4.01 and the lowest-rated item had a mean of 2.18, whose corresponding standard deviations were 0.765 and 1.211, respectively. The participants' responses to the items related to the issue of ODL access showed that except for the geographical barrier as the hindrance for ODL, remaining items (ODL course is not accessible due to remote area, support from IT person during the online class, students' involvement in digital service, unavailability of Internet access, and online course is the better solution for upgrading higher education for those who work in rural areas) had significant differences from the neutral population mean at the level of significance of 0.05 ($p < .05$). They rated only one item as near-neutral value (A-2), three items were rated below the neutral value, and two items were rated above the neutral value (Table 7, Figure 4). The item "A-4: ODL provides students a chance to be involved in decisions about digital services" has the highest effect size (Cohen's d = 1.32) among the six items in the issues related to access of ODL.

Table 7. Descriptive Statistics and One-Sample t-Test for the Issue on Access of ODL

One-Sample Statistics (Test Value = 3)									
							Effect size (Cohen's d)	95% Confidence Interval of the Difference	
Items	N	Mean	Std. Deviation	Mean Diff.	t	Sig.		Lower	Upper
A-1	68	2.44	1.192	-0.563	-3.982	.000	-0.47	-0.85	-0.28
A-2	68	3.27	1.133	0.268	1.990	.051	-	0.00	0.54
A-3	68	3.72	1.044	0.718	5.795	.000	0.69	0.47	0.97
A-4	68	4.01	0.765	1.014	11.167	.000	1.32	0.83	1.20
A-5	68	2.61	1.224	-0.394	-2.714	.008	-0.32	-0.68	-0.10
A-6	68	2.18	1.211	-0.817	-5.685	.000	-0.68	-1.10	-0.53

The items A-1 to A-6 for access be referred to Table 3 for details.

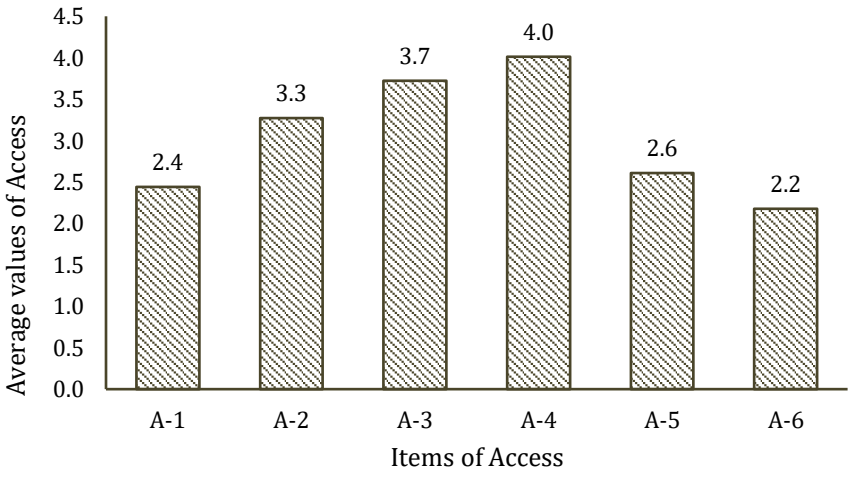

Figure 4. The Average Value for the Issue on Access of ODL

Perception of Inconvenience in Online Learning

The reliability coefficient for the scale *inconvenience* was .69, which was in the acceptable range (>.60) (George & Mallery, 2003). Table 8 showed that the improvements in online technologies were the significant challenges of ODL, indicating the highest mean score, which was 3.96, and a standard deviation of 0.885 for the item I-6 which stated 'improvements in online technologies are the major challenges of ODL.' That means the participants felt that there were several issues with online technologies that had caused the inconvenience in the ODL processes in Nepal. Similarly, the lowest mean score was 1.87 and its standard deviation was 0.861 for the statement 'it is a convenient approach for my study' (Table 8). That means the participants did not have a good experience of ODL classes in terms of convenience due to various reasons. They rated the average mean score is 2.84 (Table 9). However, these items related to the issues of *inconvenience* showed that they had difficulties in the online study because of not having appropriate guidance and counseling for learning difficulties and the way online assessments were delivered and well managed (Table 8, Figure 5). The highest effect size was for the item "I-1: It is a convenient approach for my study" (Cohen's d = -1.31) indicating a sharp disagreement of the students about the convenience of the ODL in Nepal.

Table 8. Descriptive Statistics and One Sample t-Test for the Issue on Inconvenience of ODL

One-Sample Statistics (Test Value = 3)									
							Effect size	95% C. I. of the Difference	
Items	N	Mean	Std. Deviation	Mean Diff.	t	Sig.	(Cohen's d)	Lower	Upper
I-1	68	1.87	.861	-1.127	-11.031	.000	-1.31	-1.33	-0.92
I-2	68	3.37	1.111	0.366	2.776	.007	0.33	0.10	0.63
I-3	68	2.96	1.139	-0.042	-0.312	.756	-	-0.31	0.23
I-4	68	2.61	1.259	-0.394	-2.639	.010	-0.31	-0.69	-0.10
I-5	68	2.27	0.999	-0.732	-6.175	.000	-0.73	-0.97	-0.50
I-6	68	3.96	0.885	0.958	9.115	.000	1.08	0.75	1.17

The items I-1 to I-6 for inconvenience be referred to Table 3 for details.

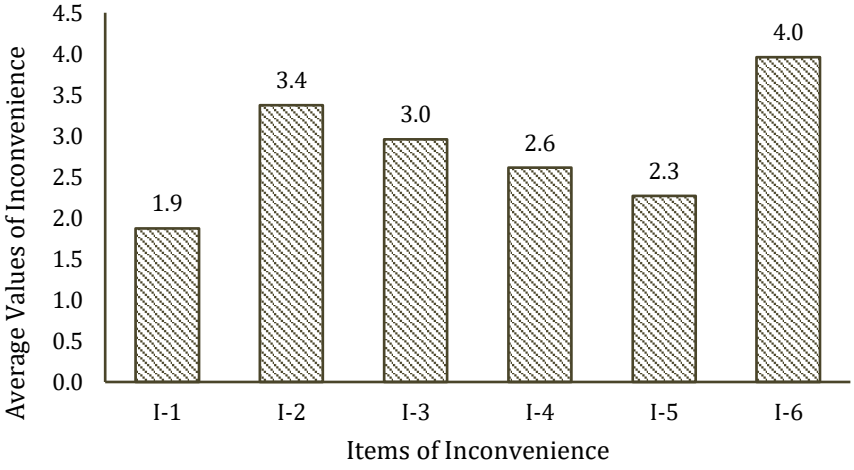

Figure 5. The Average Value for the Issue on Inconvenience of ODL

Overall Perception of Access, Convenience, Efficiency, and Scarcity in Online Learning

Descriptive statistics (mean and standard deviation) were calculated for each of the four components to compare them with the population mean (test value = 3) based on the Likert-scale item scoring. A one-sample t-test was performed to see if the differences in sample means and population means were significant at the .05 level of significance. The component "scarcity" had the highest mean score of 3.4859 with a standard deviation of 0.63. The difference between the sample mean and the population mean was significant ($p < 0.05$) in the domain of scarcity. The mean for efficiency was 2.7958 with a standard deviation of 0.65678. The difference between the sample mean and the population mean was -0.20423, which was statistically significant ($p < .05$). Likewise, the average component score for convenience was also lower than the population mean, and the difference was significant at the 0.05 level of significance. However, the component access was almost neutral because the difference between the sample mean and the population mean was not significant ($p > .05$) (Table 9). The effect size shows that scarcity was most dominant among the four issues of ODL as perceived by the sample graduate students in Nepal.

Table 9. Descriptive Statistics and One-Sample t-Test for Significance of Mean Differences

One-Sample Statistics (Test Value = 3)								
Components	**N**	**Mean**	**Std. Dev.**	**Std. Error Mean**	**Mean Diff.**	**t**	**Sig.**	**Effect Size (Cohen's d)**
Scarcity	68	3.4859	.62662	.07437	.48592	6.534	.000	0.78
Efficiency	68	2.7958	.65678	.07795	-.20423	-2.620	.011	-0.31
Access	68	3.0376	.70102	.08320	.03756	.451	.653	-
Convenience	68	2.8380	.66067	.07841	-.16197	-2.066	.043	-0.25

Perception of Access, Convenience, Efficiency, and Scarcity in Online Learning by Gender and Hometown

We performed parametric hypothesis tests to compare the groups for the four categorical dependent variables—*scarcity*, *efficiency*, *access*, and *inconvenience* because their distribution passed the normality test of Shapiro-Wilk ($p > 0.05$).

Table 10. Independent Samples t-Test for the Comparison of Mean by Gender

	Gender	**N**	**Mean**	**Std. Dev.**	**Std. Error Mean**	**Mean Diff.**	**Sig. (two-Tailed)**	**Effect Size (Cohen's d)**
Scarcity	Female	14	3.8036	0.49447	0.13215		.047	0.61
	Male	54	3.5000	0.50177	0.06828	0.30357		
Efficiency	Female	14	3.0625	0.58373	0.15601		.152	-
	Male	54	2.8032	0.59953	0.08159	0.25926		
Access	Female	14	3.1429	0.98895	0.26431		.603	-
	Male	54	3.0309	0.63036	0.08578	0.11199		
Inconvenience	Female	14	2.8571	0.49293	0.13174		.959	-
	Male	54	2.8673	0.68403	0.09309	-0.01014		

*Levene's test for equality of variance was not significant ($p>0.05$) for all categories. Hence, homogeneity was not violated.

The Independent-Samples Test for the distribution of participants' perceptions about the scarcity of resources for ODL experience was significantly different across genders (male and female) at the .05 level of significance. The perception of female students was higher compared to the male students on scarcity issues of ODL (with effect size of Cohen's d = 0.61). There was a significant difference in the opinions of male and female participants (Female Av. = 3.8, SD = 0.49, Male Av. = 3.5, SD = 0.50, and p < .05). Whereas, the perception of *efficiency, access,* and *inconvenience* was not significantly different by gender (Table 10). Similarly, there was no significant difference in the perception of the four categories by hometown (p > .05) (Table 11).

Table 11. Independent Samples t-Test for the Comparison of Mean by Hometown

	Gender	**N**	**Mean**	**Std. Dev.**	**Std. Error Mean**	**Mean Diff.**	**Sig. (two-Tailed)**
Scarcity	Rural	31	3.6774	0.50288	0.09032	0.21120	.090
	Urban	37	3.4662	0.50574	0.08314	0.21120	
Efficiency	Rural	31	2.8185	0.56073	0.10071	-0.06997	.636
	Urban	37	2.8885	0.63927	0.10510	-0.06997	
Access	Rural	31	3.1774	0.70440	0.12651	0.22697	.192
	Urban	37	2.9505	0.71023	0.11676	0.22697	
Inconvenience	Rural	31	2.9677	0.65038	0.11681	0.18846	.234
	Urban	37	2.7793	0.63835	0.10494	0.18846	

*Levene's test for equality of variance was not significant (p>0.05) for all categories. Hence, homogeneity was not violated.

Perception of Access, Convenience, Efficiency, and Scarcity in Online Learning by Age-Groups and Ethnicity

The one-way ANOVA test for the distribution of participants' perceptions about the issues of ODL experience was not statistically significantly different across the age groups (p > .05) (Table 12). Since none of the categories had a significant difference across the age groups, the post hoc test was not conducted.

Table 12. ANOVA Test Across Age-Group Regarding Perception of the Issues of ODL

Comp.		**Sum of Sq.**	**df**	**Mean Sq.**	**F**	**Sig.**
Scarcity	Between Groups	0.730	3	0.243	0.926	.433
	Within Groups	16.817	64	0.263		
	Total	17.547	67			
Efficiency	Between Groups	0.949	3	0.316	0.870	.461
	Within Groups	23.278	64	0.364		
	Total	24.227	67			
Access	Between Groups	0.843	3	0.281	0.544	.654
	Within Groups	33.071	64	0.517		
	Total	33.913	67			
Inconvenience	Between Groups	0.531	3	0.177	0.413	.744
	Within Groups	27.428	64	0.429		
	Total	27.959	67			

The one-way ANOVA test for the distribution of participants' perception about the four issues of ODL experience was not statistically significantly different across the ethnicity (p>0.05) (Table 13). Since none of the categories had a significant difference across the ethnicity, the post hoc test was not conducted.

Table 13. ANOVA Test across Ethnicity Regarding Perception of the Issues of ODL

Comp.		Sum of Sq.	df	Mean Sq.	F	Sig.
Scarcity	Between Groups	1.072	2	0.536	2.115	.129
	Within Groups	16.475	65	0.253		
	Total	17.547	67			
Efficiency	Between Groups	1.033	2	0.517	1.448	.243
	Within Groups	23.194	65	0.357		
	Total	24.227	67			
Access	Between Groups	0.473	2	0.237	0.460	.633
	Within Groups	33.440	65	0.514		
	Total	33.913	67			
Inconvenience	Between Groups	0.711	2	0.355	0.848	.433
	Within Groups	27.248	65	0.419		
	Total	27.959	67			

Perception of Access, Convenience, Efficiency, and Scarcity in Online Learning by School Types and Use of Devices

The one-way ANOVA test for the distribution of participants' perceptions about the three issues of ODL experience, such as *scarcity*, *access,* and *inconvenience, was* not significantly different across the school types ($p > .05$) (Table 14). However, the perception of *efficiency* was statistically significantly different within the sub-categories of school types ($F_{3, 64} = 3.518$, $p < .05$). Hence, the post hoc test was conducted to determine the pairs of school types that differed significantly. The results of the Post Hoc Tukey Test showed that the pair of community and institutional schools had significant differences in their perception of *efficiency* issues with the ODL in Nepal ($p < .05$). The effect size of perception of issues regarding efficiency of ODL was near medium with Cohen's d value of 0.41 (Table 14).

Table 14. ANOVA Test across School Type Regarding Perception of the Issues of ODL

Comp.		Sum of Sq.	df	Mean Sq.	F	Sig.	Effect Size (Cohen's d)
Scarcity	Between Groups	0.921	3	0.307	1.181	.324	-
	Within Groups	16.626	64	0.260			
	Total	17.547	67				
Efficiency	Between Groups	3.429	3	1.143	3.518	.020	0.41
	Within Groups	20.798	64	0.325			
	Total	24.227	67				
Access	Between Groups	0.332	3	0.111	0.211	.888	-
	Within Groups	33.581	64	0.525			
	Total	33.913	67				
Inconvenience	Between Groups	0.337	3	0.112	0.261	.854	-
	Within Groups	27.621	64	0.432			
	Total	27.959	67				

The one-way ANOVA test for the distribution of participants' perceptions about the three issues of ODL experience, such as efficiency, access, and inconvenience, was not statistically significantly different across the devices used ($p > .05$) (Table 15). However, the perception of *scarcity* was significantly different within the sub-categories of device use ($F_{3,64} = 6.399$, $p < .05$). The effect size of perception of scarcity in ODL was medium (Cohen's d = 0.55). Hence, the Post Hoc Test was conducted to determine the pairs of devices use that had a significant difference. The results of Post Hoc Tukey Test showed that the pair of laptops only and desktop, and laptop-and-mobile and desktop had a significant difference about the participants' perception of *scarcity* issues with the ODL in Nepal ($p < .05$).

Table 15. ANOVA Test Across Device Use Regarding Perception of the Issues of ODL

Comp.		Sum of Sq.	df	Mean Sq.	F	Sig.	Effect Size (Cohen's d)
Scarcity	Between Groups	4.049	3	1.350	6.399	.001	0.55
	Within Groups	13.498	64	0.211			
	Total	17.547	67				
Efficiency	Between Groups	0.934	3	0.311	0.856	.469	-
	Within Groups	23.293	64	0.364			
	Total	24.227	67				
Access	Between Groups	0.086	3	0.029	0.054	.983	-
	Within Groups	33.827	64	0.529			
	Total	33.913	67				
Inconvenience	Between Groups	1.466	3	0.489	1.180	.324	-
	Within Groups	26.493	64	0.414			
	Total	27.959	67				

Discussion

The first component, scarcity, had eight items indicating the limitations with respect to electricity, policy and guidance, time conflict, instructional language, Internet capacity, online security, and adoption of technology. The results showed that there was a scarcity of electricity, a lack of enough bandwidth on the Internet, and a lack of clear policy and guidelines. The participants revealed that they were not having any issues with the online security of ODL content. The perception of scarcity of resources in the ODL was significant by gender and type of device use, but not significant by hometown, age group, ethnicity, or school type. The perception of scarcity could be predicted by independent variables – ethnicity (Kshetree), device use (Desktop), school type (other school), and perception of efficiency. The lack of clear rubrics and guidelines has been a hindrance to the development and operations of ODL in Nepal and elsewhere as well (Kasani et al., 2020). Among the four issues, scarcity has been perceived as the most serious issue with ODL, having the highest effect size.

The second component, efficiency, had eight items related to the right time for implementation of ODL, content sharing and conference tools, class schedule, technical support and training, practice at home, and the use of ICT. The results indicated that the participants disagreed about the right time for the implementation of the ODL program, the appropriateness of the content sharing tools, and the effectiveness of the ODL class schedule and its time management. They seemed to agree that there was a lack of time for practice at home, and this could be a major hindrance in the ODL classes, although the timetable was appropriate for the classes. The perception of efficiency in ODL was not significant by gender, hometown, age group, and ethnicity. The perception of efficiency can be predicted by independent variables: age group (> 41 years), device use (desktop), ethnicity (Kshetree), and perception of scarcity. There are still ongoing challenges with ODL in Nepal in terms of smart course design and faculty development. This view is consistent with (Santelli et al., 2020).

The third component, access, contained six items signifying that an ODL course is not accessible, has geographical barrier, lack of adequate support from IT people, chance to be involved in digital services, lack of internet access, and that online courses were better for upgrading their higher education. The results indicated that they were able to attend the ODL courses that were accessible to them even outside the school premises. They seemed neutral with the issue that the ODL courses were accessible in a remote area (geographical barrier) where they were working as teachers. However, the online courses in higher education may not be a better solution for all the students who work in rural areas because there is no well-developed infrastructure for the Internet and other resources required for ODL. They agreed that the geographical barrier is a hindrance in ODL mode classes. The other issues were difficulties in obtaining IT support during online classes, and that the ODL program gives students the opportunity to participate in digital services. The perception of access in ODL was not significant by gender, hometown, age group, and ethnicity. Access has been a critical factor in the effectiveness of online and distance education in Nepal and elsewhere (Andoh et al., 2020).

The fourth component, inconvenience, included six items related to the convenient approach in ODL, being more expensive than face-to-face classes, whether the assessment system is well managed, difficulties in using online platforms, appropriate guidance for learning, and challenges in improving online technologies. The participants did not have difficulties using online platforms, such as Teams and LMS (Moodle). However, they reported that the online program was not a convenient approach for their study. They also reported that appropriate guidance was not

provided for their learning. Furthermore, they agreed that the ODL mode of learning was more expensive and that improvements in online technologies were the major challenges of ODL. The results indicated that none of the independent variables were significant predictors of participants' views on the issue of inconvenience. Inconvenience and inefficiency have been a challenge to implementing ODL in the least developed countries, like Nepal and elsewhere (Kayaduman & Demirel, 2019).

Although higher educational institutions have focused on this new trend of ODL, it is clear that many educators, teachers, and students have faced specific barriers and encountered issues that may hinder the overall quality of ODL (Markova et al., 2017). Some of these issues are related to the lack of a clear pedagogical, quality, and governance model (Mahlangu, 2018). Mahlangu (2018) has discussed a variety of other types of infrastructure, resources, training, and personal motivational issues in distance education in higher education. Estelami (2016) raised efficiency concerns in online courses from the perspective of students. However, in the present study, we discussed the efficiency in terms of classes, interactions, and feedback on time as perceived by the research participants. Access issues are related to physical and technological aspects. Most of these issues are related to place (geography), planning (development of infrastructure), and technology (computers and the Internet) (Mahlangu, 2018). Croft et al. (2010) discussed some of the benefits of distance learning, and one of them is convenience. Convenience, in a general sense, can be understood as the ease of access to ODL. However, as an issue, it sheds light on the lack of student-teacher direct contact, alienation, and anxiety at the personal level due to a lack of immediate feedback, causing an inconvenience in students' learning and development (Pozdnyakova & Pozdnyakov, 2017).

Currently, higher education institutions in Nepal have moved rapidly to ODL as an alternative to face-to-face education during the COVID-19 pandemic. There was a different view before COVID-19, but COVID-19 changed it. Rasid and Rasid (2012) reported that student quality in ODL is affected by several factors like academic standards, financial problems, social impracticability, unequal products, partiality in the job market, communication problems, and misuse of technology. Similarly, Markova et al. (2017) indicated quality issues that had affected ODL. In this regard, Vasilevska et al. (2017) expressed that a lack of stable internet connection might create a problem in ODL. These issues discussed above can also be interpreted in relation to digital transformation and transitional modes from face-to-face to online and distance mode during the COVID-19 pandemic (Al-Karaki et al., 2021). In this context, pre-recorded learning materials, such as YouTube videos, can help students access the learning materials, although they may lose the opportunity to interact with other students and the instructor (Insorio & Macandog, 2022).

Conclusion

The present study examined issues in online and distance learning in higher education in the context of COVID-19 in Nepal. The findings revealed several issues faced by ODL students. These issues include *scarcity, efficiency, access,* and *inconvenience*. The experience of ODL was new for the students and teachers. Therefore, there were issues related to the lack of resources and tools. There were issues related to the class schedules and providing immediate feedback to the students. Other issues were the costly program and poor Internet connectivity to access the virtual classes. Despite some limitations, there are many positive aspects in ODL that help working teachers and professionals to continue higher education and professional development. The four broad categories of issues in ODL at higher education in Nepal were a lack of electricity and internet access, inefficiency in sharing tools and technical support, access issues to digital services and location, and inconvenience due to cost and a lack of learning support. This study revealed that technology usage in ODL provided educational opportunities to the students. New practical and effective teaching approaches are required to fit into the context of ODL.

Recommendation

The policy implications of this study can be related to *scarcity, efficiency, access*, and *inconvenience.* According to the results of this study, it was found that many students and teachers were not able to take their regular online mode classes because of uncertain electricity cut-offs, low Internet bandwidth, and a lack of clear policy about ODL programs and infrastructure development in the country. Therefore, the government of Nepal should focus on expanding all the possibilities for continuous supply of electricity and Internet bandwidth for reliable access to distance education. Likewise, the ODL policy should be updated with all the possible opportunities for the students' and teachers' diverse needs for access to education in both synchronous and asynchronous modes. Higher education institutions in Nepal should reform the curriculum as per the needs of the time and also focus on pedagogical training for faculty members to prepare them for 21st century teaching-learning to reduce scarcity, enhance efficiency, extend access, and address their problems related to convenience.

We recommend research-based strategic plans, policies, and actions for ODL. We suggest further studies in the areas of ODL in general and teachers' and students' perceptions and practices of ODL in particular. We suggest the research questions for future study on ODL be as follows: How does ODL improve overall education with respect to quality, access, opportunity, equity, and lifelong learning in Nepal? In what way can 21st century higher education benefit from modern technology for ODL in Nepal? How does ODL support continuing education during a national and global crisis, such as the COVID-19 pandemic?

Limitations

There were several limitations while conducting this study. One of the most critical limitations was the sample size. In this study, 92 distance education students from the Master of Science Education program were the potential participants. We implemented the questionnaire with 78 students. Only 71 students completed the online questionnaire in the Google Form, which we distributed through MS Teams. Therefore, the findings from the study have a limited scope of generalizability to other institutions and samples.

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Authors Contribution Statement

All authors collaborated on this study's concept, design and final approval. Gnawali and Upadhayaya: Data acquisition Belbase: Data analysis / interpretation, Sharma, Gnawali and Upadhayaya: Drafting manuscript. Sharma: Critical revision of manuscript. Belbase: Statistical analysis, Gnawali: Admin. Upadhayaya: Technical or material support. Belbase: Supervision.

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