

Factors Affecting the Online Learning Outcomes of Higher Educational Institutions in Nepal

Bal Ram Duwal, PhD¹

¹Faculty of Management-Tribhuvan University
balramduwal@gmail.com

Received on : September 11, 2023

Revised on : October 20, November 25, 2023

Accepted on: December 7, 2023

Published on : December 17, 2023

Cite this paper

Duwal, B.R. (2023). Factors Affecting the Online Learning Outcomes of Higher Institutions in Nepal. The International Research Journal of Management Science, 8(1), 57-70.

Copyright©Author

Abstract

Purpose: This study primarily aims to examine and evaluate the factors affecting the outcomes of online classes during the COVID-19 pandemic period among university students in Nepal. Similarly, this study investigated management students' perception of online management courses and explored the presence of factors that help to generate online learning outcomes in management courses and devise an online learning outcomes model.

Methodology: Using a survey research design, the study applied a cross-sectional study in three out of eight universities that taught management courses. A purposive sampling method was applied to select the respondent students. Exploratory factor analysis was conducted to establish internal consistency and evidence of validity. To assess the responses to online classes, a multivariate linear regression analysis was used.

Findings: Digital pedagogy, learning environment, ICT knowledge, COVID-19 context, ICT-friendly University and curriculum, and outcomes were identified as the factors from exploratory factor analysis. The overall students' perceptions of the online management course had high reliability with Cronbach's alpha of 0.941. However, only three factors; digital pedagogy, learning environment, and ICT friendliness of university and curriculum were found to be significant as per the regression analysis.

Originality/value: This study contributes to the management of higher educational institutions and the model can be used in future research. The findings will support on quality improvement of the online teaching mode.

Implications: Nepalese universities have to work on the development of ICT infrastructure and courses should be redesigned with ICT features in mind for effective online learning. Furthermore, Nepalese higher educational institutions should step forward for institutional transformation, especially by following an ICT-friendly curriculum and structure with a gradual introduction of digital pedagogy in its regular courses.

Keywords: Online Management Classes, Outcomes of Online Classes, Higher education, Digital Pedagogy, Learning Environment, ICT

Introduction

The entire world unexpectedly encountered with Coronavirus disease 2019 (COVID-19) in late 2019. Within a very short time, a localized outbreak of COVID-19 quickly turned into a global pandemic with socio-economic disruption. The high-level COVID-19 prevention and control committee of the government of Nepal recommended that the on-class teaching-learning process of Nepal be suspended as of March 23, 2020 (Gautam & Gautam, 2021). As a consequence of the lockdown imposed by the government, examinations of universities, higher schools and school level were postponed for an unknown period. All educational institutions are temporarily suspended from March 24, 2020. According to UNESCO (2020), around nine million (8,796,624) students in Nepal are impacted by school and university closures in response to the pandemic. 404,718 of them are college-level students. The depth and direction of the effect of COVID-19 on the education sector of Nepal remain the area for investigation.

The COVID-19 pandemic has presented the higher education community with several issues. A significant issue has been the sudden and urgent demand for previously face-to-face university courses to be delivered online as stated by Rapanta et. al. (2020). It became impossible to conduct physical classes in universities during the lockdown period. As an alternative to physical classes, universities have urged students to take online classes via video conferencing platforms. Almost all universities in Nepal (excluding Nepal Open University and the Open and Distance Education Center of Tribhuvan University) have no experience in conducting online courses. According to Gautam and Gautam (2020), "These universities have no infrastructure and preparedness for online classes. Faculties and students were not mentally and technically prepared for online mode". As stated by Dawadi et al., (2020) the majority of school teachers don't seem to have the necessary skills to teach online courses since they haven't received the necessary training or experience. This issue is more prevalent in the area of higher education as well.

Online education denotes that students/learner and teachers/instructors are physically distant from each other and need a delivery method (Wang et al., 2013 and Wilde & Hsu, 2019). Online education is also known as "remote learning," "computer-assisted learning," "tele-learning," "virtual learning," "e-learning," and "Internet learning" (Anderson, 2008). This paper uses the term "online learning" throughout. One of the major infrastructures for online classes is the Internet facility. Almost 22.87 million individuals in Nepal, or 76.58 per cent of the population, have access to the internet as of today, and of those, 56% use mobile data (Nepal Telecommunications Authority, 2020). For many parents and students, access to the Internet or other forms of technology is exceedingly expensive. In many places in Nepal, internet facilities are barely reliable.

Despite this scenario, universities have shifted from traditional classrooms to an online environment to fill the void created by the lockdown in the country, although it is a very challenging and unfamiliar job for faculties, instructors and universities. For around 7 months from June 2020 to December 2020, universities have run the classes online. Faculties' skills and knowledge of Information communication technology (ICT) are enhanced and students get opportunities to take online classes which are not designed on online pedagogy. It is necessary to evaluate the outcome of online classes and analyze the students' perceptions regarding their classes.

The current study primarily aims to examine and evaluate the factors affecting the outcomes of online classes during the COVID-19 pandemic period among university students in Nepal. This study investigates management students' perception of online management courses and explores the presence

of factors that help to generate online learning outcomes in management courses and devise an online learning outcomes model.

Literature Review

COVID-19 pandemic brought many challenges and opportunities in the education sector, which are very new experiences for students, instructors and educational institutions. Due to the lockdown and work-from-home order of the government and university authorities, instructors and students remain at home. This situation brought a new way of teaching via ICT and distance education began in a new form. The COVID-19 pandemic has created a transformation in learning pedagogy and outcomes, thus many scholars namely Sthapit and Shrestha (2021), Gautam and Gautam (2021), Acharya et.al., (2020), Dawadi, Simkhada and Giri (2020) have researched the effect caused by COVID 19 on the education sector of Nepal. Many more researchers explored the effect of online learning in the COVID-19 context in different countries (Bui et.al., 2020; Gonzalez et.al., 2020; Alqahtani & Rajkhan, 2020; Chenet.al., 2020; Vermaet.al., 2020; Zhanget.al., 2020; Crawford et.al., 2020; Dhawan, 2020; Ionescu et.al., 2020; Patricia a Guilera-Hermida, 2020; Geogrouliaset.al., 2020; Blizaket.al., (2020); Mishra et.al., 2020; Baczeket.al.,(2021). and so on. Thus, it made sense to investigate how the COVID-19 context affected Nepalese management students' online learning.

The integrated multimodal model for Online Education developed by Picciano (2021) includes learning theories such as behaviorism, cognitivism, social constructivism and connectivism. The key to this model was the assumption that online education has evolved as a subset of learning in general rather than a subset of distance learning and blended learning evolves throughout all levels of education.

As a crisis management tactic, the sole option for physical classrooms is to convert face-to-face instruction into online instruction. Technologies serve as a conduit for educational activities in distance learning. Learning outcomes depend on pedagogy followed by courses. Researchers viz. Arbaugh et.al., (2009), Patrick and Powell (2009), Dani, Sinhai and Hyde (2018), Hodges et. al., (2020), Patricia (2020), Gonzalez et.al., (2020) and Rapanta et.al.,(2020) explored its relation with learning outcome from pedagogical aspects. The effectiveness of digital pedagogy is largely influenced by the ICT access and availability for both students and instructors. Such ICT includes; digital devices, teaching learning platforms and internet connectivity are essential for online classes. Suryasa et.al. (2020) postulated that mobile devices and ICT became tools for students to improve research and access information. Infrastructure-specific factors have been identified by Gautam and Gautam (2021) as more responsible factors for online learning along with teacher-specific and student-specific factors. According to Bczek et al. (2021), integrating online learning successfully into the curriculum demands a well-thought-out plan and a more active approach. Hence, technology and pedagogical aspects need to be explored to make online classes effective and it means learning outcomes need to be evaluated.

Globally, it is witnessed that the learning environment of students has changed significantly due to the pandemic. Online learning has demanded accessibility to the internet, a reliable device, technical support, a comfortable learning space at home and a supportive home environment. Brown (2010) found that building multicultural learning communities and maintaining a pleasant learning environment make the online learning experience more appealing for online learners. Further, it is argued that learning results can be significantly influenced by the design of space (Bower, 2019; Gonzalez et al., 2020; Wang et al., 2013). According to McFarlane (2019), access to a reliable and quick internet connection is a major obstacle to the efficient use of instructional technology in classrooms.

In the same way, Acharya et.al., (2020) also argued that infrastructural reformation is fundamentally required to conduct online classes effectively to ensure quality education in Nepal. Similarly, Gautam and Gautam (2021) claimed that the efficacy of online learning during COVID-19 was correlated with the characteristics of internet connectivity. Outhwaite (2020) found that families from low-income backgrounds are more likely to encounter obstacles of limited access to technological devices, lower likelihood of having a reliable and fast internet connection and reduced access to physical space. Yet, few researchers have found the role of accessibility to ICT and the home environment of students in their learning environment. This is why the current study aims to evaluate how the learning environment affects learning outcomes.

A successful online learning experience is strongly influenced by self-efficacy (Albelbisi Yusop, 2019) and ICT skills (Mac Callum & Jeffrey, 2013). Bui et.al., (2020) reported that ICT self-efficacy and computer playfulness have indirect effects on behavioural intention to use ICT. Similarly, Patricia (2020) argued that students who used technology before online learning because of COVID-19 had a greater sense of their ability to succeed academically. During the COVID-19 pandemic period, all universities are forcefully transforming their classes into online mode from physical mode. Thus, it became worthy to test whether ICT knowledge within students affects their online learning.

There is debate on the effectiveness of online classes over face-to-face classes. Many empirical studies by Bui et.al., (2020); Gonzalez et.al.,(2020); and Suryasa et.al., (2020) discovered that online learning has a significant influence on learning outcomes. Similarly, online courses are found to be more successful than their typical face-to-face course (Arbaugh et al., 2009; Patrick & Powell, 2009; Neuhauser, 2010; and Zhang, 2010). However, few studies revealed that online learning was similar to students' experience with the face-to-face method (Horspool, & Yang, 2010; Ionescu et.al., 2020; Sthapit & Shrestha, 2021; Gautam & Gautam, 2021). In some studies it was found to have a different effect on different subjects for example online courses are more successful than traditional in-person courses (Arbaugh et al., 2009; Patrick & Powell, 2009; Neuhauser, 2010; Zhang, 2010; Allen and Seaman, 2010). However, some research revealed that online learning was deemed to be similar to students' experience with the face-to-face method (Horspool, & Yang, 2010; et.al., 2020; Sthapit & Shrestha, 2021; Gautam & Gautam, 2021). The transfer of face-to-face learning into online learning during the COVID-19 pandemic era has shown a research void, as there has been no prior research directly addressing the major elements impacting the outcomes of online learning.

Study Framework

Based on the literature review conducted in the previous section, thematic analysis of Lai and Bower (2019) and the COVID-19 context empirical finding of Alqahatnai and Rajkhan (2020), learning outcomes are taken as a dependent variable and digital pedagogy, learning environment, ICT knowledge, ICT-friendly university and curriculum and COVID-19 context are taken as independent variables in this study.

Research Methodology

Using a survey research design, the study applied the cross-sectional study in three universities of Nepal among eight universities which taught management courses. The total number of universities in Nepal is 11 among them 8 universities have management courses. Total number of students in management courses were 227,283 across 8 universities in Nepal (MOF, 2020). Participants were semester students in Bachelor and Master level during the 2019-2020 academic year. All management students studying in semester courses in different universities of Nepal except Open University have been identified as the

population for this study. A purposive sampling method was applied to select the respondent student. The study used a self-administered, anonymous, online questionnaire with a single response limit for each participant to avoid duplicate data. The questionnaire was delivered in three ways to maximize the questionnaire's reach; initially, the questionnaire was distributed to instructors and administration of different colleges to share it with their semester students. The second way was sharing the questionnaire within the Facebook group of the targeted batches of students with the help of their batchmates, instructors and administration staff. A third way was to share the questionnaire directly in the students' email id. To build a snowball sample, participants were requested to distribute the questionnaire among their friends and colleagues.

The data collection instrument was created using a thorough examination of the literature and authors' agreement on the instrument's domain objectives. The questionnaire consists of five distinct domains, including digital pedagogy, learning environment and support, ICT knowledge and COVID-19 context and outcomes. A 5-point Likert scale with options ranging from "strongly disagree to strongly agree" is used in these domains. A quantitative research approach is followed and the perception of students is measured through a 5-point Likert scale, where 5= strongly agree, 4= agree, 3= neutral, 2= disagree, and 1= strongly disagree. It also includes cross-sectional studies, to sort out the existence of causal effects of independent variables upon a dependent variable outcome.

Reliability Analysis

A Cronbach's alpha of over 0.7 is considered sufficient to assess the internal consistency reliability of the questionnaire (Schofield et al., 2012). Here, Cronbach's Alpha of overall 32 items is 0.941 which shows the excellent strength of association between items.

Table 1
Reliability Statistics

Domain	No. of Items	Cronbach's Alpha
Digital Pedagogy (DP)	10	0.910
Learning Environment (LES)	8	0.876
ICT Knowledge (IK)	4	0.899
COVID-19 Context (CC)	5	0.792
Learning Outcomes (OUT)	12	0.901
Overall	39	0.954

Data Analysis Tools

Descriptive statistics is employed to examine the current status and practices of online classes at Nepalese universities and the perception of students was analyzed using a t-test. To determine the relationship between the dependent variable and independent variables, a correlation analysis was performed. Multiple regression analysis was used to assess the outcomes of the online management course.

Exploratory Factor Analysis

Exploratory factor analysis (EFA), was used to determine the constructs of common variance among a set of variables. Initially, the factorability of the 39 items was analyzed via a correlation analysis technique. Secondly, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity to determine the adequacy of the data set for using the EFA were assessed (Chung & Chen, 2020). EFA,

using the principal component extraction method with Varimax rotation, was conducted to identify the factor structure. Factors with an eigenvalue of >1.0 were reserved as common factors (Chung & Chen, 2020).

Model Specification

The following regression model was proposed by the study objective to examine factors affecting the outcomes of online learning during the COVID-19 pandemic period:

Outcomes of Online Learning = $f(\text{Affecting factors of learning})$

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \dots + \varepsilon$$

Where,

Y = Outcomes of Online Learning

X_1 = Digital Pedagogy,

X_2 = Learning environment,

X_3 = ICT Knowledge,

X_4 = COVID 19 context

X_5 = ICT-friendly university and curriculum

ε = Error terms

Results

Participant's Demographics

Overall 59.4% (n=211) female and 40.6% (n=144) male students participated in the survey. A majority of the participants were between the 21-25 age group (73.2%, n=260). In total, 46.8% (n=166) of the participants were from Bagmati province, 14.4% (n=51) were from Sudur-Paschim province, participants from Koshi and Lumbini province were 11.5% (n=41) and 11.3% (n=40) respectively. Participants from Gandaki province were 9.3% (n=33), while participants from province 2 and Karnali province were lowest which is 3.7% (n=13) and 3.1% (n=11) respectively. A large number of the participants (83.7%, n=297) were studying at Tribhuvan University, 8.5% (n=30) were studying at Pokhara University and 5.1% (n=18) were from Kathmandu University and the rest 2.9% (n=10) participants were from other universities of Nepal.

Construct Validity

The 39 items' construct validity was assessed using exploratory factor analysis. The factor loading must be at least 0.30, but it must be 0.60 or higher for a variable to represent a factor and moderate for any loading between 0.4 and 0.6 (Burns & Burns, 2008). At first, there was a minimum correlation of 0.3 between each of the 39 items.

Table 2 displays the findings of a reliability test conducted before the data were subjected to a factor analysis. The results are Kaiser-Meyer-Olkin (KMO) test statistics with a significant p-value.

Table 2

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.929
Bartlett's Test of Sphericity	Approx. Chi-Square	8413.156*
	df	741
	Sig.	0.000
Significant at 1 per cent level		

KMO measure of sample adequacy was 0.929, above the generally advised value of 0.6 and Bartlett's test of sphericity was significant (Chi-square = 8413.156, df =741, $p < 0.001$). Thus, all 39 items were used in the EFA. According to the KMO value, the correlation matrix is suitable for principal component analysis.

The Annex I shows the factor loading 0.5 coefficients. No item was found with cross-loadings. However, 7 items such as; b1, b2, b3, e2, e4, e6 and e7 could not load and these items are excluded for further study. Six factors were determined to be significant using the Kaiser's rule and the scree test. Following rotation, factor 1 loaded on 10 items accounted for 17.24%, which was labelled Digital Pedagogy. Factor 2 was loaded in 7 items accounted for 12.37% of the variance and was labelled as Learning Outcomes. Likewise, factor 3 loaded on 5 items and labelled as a Learning Environment. Factor 4 loaded on 4 items accounted for 9.12 % of the variance and was named as ICT Knowledge. Similarly, factor 5 loaded on 3 items accounted for 7.065% of the variance and was labelled as COVID-19 Context and final factor 6 which was a new component loaded on 2 items accounted for 6.605% variance and was termed as ICT Friendly.

Perception of students on online class

Digital Pedagogy (DP)

Altogether ten statements are listed under the digital pedagogy category. The mean of the digital pedagogy domain is 3.22 with a 0.77 standard deviation. Under this category, the mean value of nine out of ten items is greater than 3, which showed perceived improvement in digital pedagogy. However one item, "Your instructors solve ICT-related problems on their own" reported less than 3, which indicates that instructors are unable to solve ICT-related problems by themselves.

Table 3

Descriptive Statistics of variables (n=355)

	DP	LES	IK	CC	IF	OUT
Mean	3.2276	3.2276	3.1944	3.4244	2.9859	2.8989
Std. Deviation	.77246	.96634	.89484	.87450	.93870	.79953
Minimum	1.00	1.00	1.00	1.00	1.00	1.00
Maximum	5.00	5.00	5.00	5.00	5.00	5.00

The result revealed that students have perceived positive changes in improvement of course knowledge, creativity and time management skills. However, they are not satisfied with the current teaching methodology of the online courses which is consistent with the findings of Acharya et.al., (2020).

Learning Environment

The overall mean value of the learning environment is found 3.22 with a 0.966 standard deviation. However, students reported that they do not have reliable fast internet connectivity. Reliable fast internet connectivity is also a fundamental requirement for online classes. A lack of reliable fast internet connectivity is observed in the study as stated by Acharya et al. (2020). The item 'supportive family member for online class' has a 3.73 mean value, which expresses that students agree with this statement. The remaining 3 items indicated that students neither agreed nor disagreed.

ICT Knowledge

Students who have ICT knowledge are more benefited from the online class. It enhances the student's self-efficacy and confidence. ICT knowledge of students is analyzed from 4 items consisting of knowledge of MS Office, confidence in the utilization of ICT, sufficient skill to use ICT and confidence in using ICT. The overall mean value is 3.1944 and the standard deviation is 0.894 which means all the items' mean value is greater than 3, which depicts that students perceived they are indifferent to these items. Nepalese management students' level of ICT knowledge (mean=3.1944) is slightly lower than that of female students in Vietnam i.e. mean = 3.536 (Bui et al., 2020). Similarly, Nepalese management students perceived ICT as a solution during the COVID-19 context, such a result is consistent with the result of Bui et al., (2020).

COVID 19 context

In online classes, ICT tools and mechanisms arise as the best alternative to those classes. The aggregate mean value of this domain is 3.4244 and the standard deviation is 0.874. The student shows that ICT was a temporary solution during the COVID-19 pandemic with a mean value of 3.5. Similarly, they had expressed that during the pandemic situation, ICT was a requirement for students to continue the learning process which was supported by the mean value of 3.38. Furthermore, students expressed that ICT-friendly courses should be made mandatory during and after the COVID-19 pandemic.

ICT-friendly university and curriculum

ICT-friendly universities and colleges can transform physical classes into virtual classes within a short time of preparation during the pandemic. The aggregate mean of this domain is below 3 i.e. 2.9859 with 0.9387 standard deviation. ICT-friendly courses and curricula are more fitted for online education. In the study, it is found that the students hardly found their colleges and universities are ICT-friendly (mean=3.09). They opined that their courses and curriculum are not ICT-friendly and have less than 3 mean values. It is essential to design the courses and curriculum in an ICT-friendly nature for effective online teaching and learning.

Outcomes of online learning

The outcomes domain measures the changes brought due to online teaching practices during the pandemic period. The aggregate mean value of this domain is also less than 3 i.e. 2.8989 with a standard deviation of 0.7995. Three items out of eight items have a mean value greater than 3. It indicates that students have perceived positive changes in improvement of course knowledge, creativity and time management skills. However, five items have a mean score of less than 3. Students thought that the current teaching way of the course online is failing to satisfy them (mean=2.77). They are not convinced by the items, 'Learning via online classes is superior to the face-to-face classroom.' (mean=2.27). From the students' learning perspective, they felt face-to-face learning was superior to online classes. Participants realize that class attendance has decreased in online classes. Similarly, they perceive that learning through ICT does not increase their effectiveness on academic performance and they are not assured that online class learning will improve their final board exam score/grade.

Relationship between independent and dependent variables

The outcome of correlation analysis demonstrates that the dependent variable i.e. the outcome of online classes and all independent variables have a moderately positive relationship which is significant at the 0.01 level.

Table 4
Correlation Matrix between dependent and independent variables

		OUT	DP	LES	IK	CC	IF
OUT	Pearson Correlation	1					
	Sig. (2-tailed)						
DP	Pearson Correlation	.554**	1				
	Sig. (2-tailed)	0.000					
LES	Pearson Correlation	.582**	.512**	1			
	Sig. (2-tailed)	0.000	0.000				
IK	Pearson Correlation	.400**	.356**	.481**	1		
	Sig. (2-tailed)	0.000	0.000	0.000			
CC	Pearson Correlation	.440**	.453**	.448**	.462**	1	
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		
IF	Pearson Correlation	.515**	.522**	.413**	.372**	.527**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	

** . Correlation is significant at the 0.01 level (2-tailed).

The Model

In this section, simple linear regression analysis is conducted to analyze the impact of independent variables on dependent variables i.e. outcomes of online classes.

Results of Regression Analysis

Table 5
Summary output of regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	0.388	0.158		2.450	0.015		
DP	0.243	0.052	0.235	4.710	0.000	0.607	1.647
LES	0.268	0.041	0.324	6.539	0.000	0.614	1.629
IK	0.053	0.042	0.059	1.266	0.206	0.685	1.459
CC	0.045	0.046	0.050	0.995	0.320	0.605	1.654
IF	0.179	0.042	0.210	4.226	0.000	0.610	1.640

Adjusted R²=0.466 F-Statistics =62.671 (p=0.000)

- a. Dependent Variable: OUT
- b. Predictors: (Constant), IF, IK, LES, DP, CC

The result shows that the adjusted R square is 0.466, which means 46.6% of the variance in outcomes of online classes is explained by independent variables. The regression equation is greatly significant with a $F=62.671$, $p<0.01$. Thus, a regression model is excellent in terms of variance explained and significance. It is found that when the t-test results for the significance of the regression coefficients are reviewed, only digital pedagogy ($t=4.71$, $p=0.000$), learning environment ($t=6.539$, $p=0.000$) and ICT-friendly ($t=4.226$, $p=0.000$) are a significant predictor of outcomes of online classes. The effect of ICT knowledge ($t=1.266$, $p=0.206$) and COVID-19 context ($t=0.995$, $p=0.32$) are not significant. The coefficients of outcomes of online classes show that a unit increase in outcomes of online classes results in increases in digital pedagogy by 0.243, learning environment by 0.268 and ICT-friendly by 0.179. This coefficient is significant at a 1% level of significance. This shows the findings of the study are in line with Clark (1983), Bonk and Reydons (1997), Schramm (1977), Rovai (2002) and Gautam and Gautam (2021).

The Variance Inflation Factor (VIF) data indicates that collinearity is not a concern because each variable's values are far below 10.0.

Thus, the final model became:

Outcomes of online learning = 0.388+ 0.243 (Digital Pedagogy) + 0.268 (Learning Environment) + 0.179 (ICT Friendly)

Conclusion

Online teaching-learning activities are typically a new experience for many Nepalese universities except a distance mode university in Nepal. The COVID-19 pandemic period became the transitional phase for the adoption of online teaching-learning mode for most of the universities in Nepal. Thus, the design, implementation and evaluation of digital pedagogy is yet to be explored.

Six factors namely; Digital Pedagogy, Learning Environment, ICT Knowledge, COVID-19 Context, ICT-friendly University and Curriculum, and Learning Outcomes were verified from exploratory factor analysis. However, only three factors viz. Digital Pedagogy, Learning Environment and ICT-friendly University and Curriculum are significant in regression analysis. Thus, it can be claimed that ICT knowledge within students and the contextual factor COVID-19 pandemic do not influence student learning but learning is rather influenced more by the Digital Pedagogy (content, instructional strategy), Learning Environment and ICT-friendly University and Curriculum. Hence, universities have to work on the development of ICT infrastructure and courses should be redesigned with ICT features in mind for effective online learning. Nepalese management students thought that ICT-friendly courses should be made mandatory during and after the COVID-19 pandemic. They perceived that Nepalese universities are hardly ICT-friendly and they did not find university courses and curriculum ICT-friendly administrative and academic systems. As suggested in Integrated Multimodal Model for Online Education, all courses and programs will have some online learning components. Thus, grabbing the opportunity created by COVID-19, Nepalese higher educational institutions should step forward for institutional transformation, especially by following an ICT-friendly curriculum and structure with a gradual introduction of digital pedagogy in its courses. Online teaching mode is considerably different from face-to-face teaching mode because of the use of a diverse learning environment. Hence, to enhance the outcomes of online learning, the government of Nepal should give priority to balanced ICT infrastructure development to provide reliable internet connectivity and regular electricity supply in the country.

Way forward

Outcomes of online learning also can be visualized from instructors and institutional perspectives which could not be addressed in this paper. Similarly, it is influenced by many factors, so plenty of research areas are still open to examine the learning from behaviorist, cognitive and constructivist schools of thought. A similar study can be conducted longitudinally to extract further benefits of online learning during a pandemic period in different faculty and different universities. Furthermore, comparative benefits of online learning may be analyzed across the following areas; gender, study level, university and accessibility of technology.

References

- Acharya, A., Poudyal, N., Lamichhane, G., Aryal, B., Bhattarai, B. R., Adhikari, B., Bhatta, M., Gyawalli, N., & Parajuli, N. (2020). *Internet-based online higher education in Nepal amidst COVID-19*. <https://doi.org/10.35542/osf.io/r85bc>
- Albelbisi, N. A., & Yusop, F. D. (2019). Factors Affecting Learners' Self-Regulated Learning Skills in a Massive Open Online Course (MOOC) Environment. *Turkish Online Journal of Distance Education, July*, 1–16. <https://doi.org/10.17718/tojde.598191>
- Alqahtani, A. Y., & Rajkhan, A. A. (2020). E-learning critical success factors during the covid-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. *Education Sciences, 10*(9), 1–16. <https://doi.org/10.3390/educsci10090216>
- Anderson, T. (Ed.). (2008). *The theory and practice of online learning*. Athabasca University Press.
- Baczek, M., Zaganczyk-Baczek, M., Szpringer, M., Jaroszynski, A., & Wozakowska-Kaplon, B. (2021). Students' perception of online learning during the COVID-19 pandemic: a survey study of Polish medical students. *Medicine, 100*(7), e24821.
- Brown, W. J. (2010). Student multicultural awareness in online community college classes. *Multicultural Education and Technology Journal, 4*(2), 99–112. <https://doi.org/10.1108/17504971011052313>
- Bui, T. H., Luong, D. H., Nguyen, X. A., Nguyen, H. L., & Ngo, T. T. (2020). Impact of female students' perceptions on behavioral intention to use video conferencing tools in COVID-19: Data of Vietnam. *Data in Brief, 32*. <https://doi.org/10.1016/j.dib.2020.106142>
- Burns, R. B., & Burns, R. A. (2008). *Business research methods and statistics using SPSS*. In *Anthropology News* (First). Sage Publication Ltd.
- Chung, J., & Chen, H. C. (2020). Development and psychometric properties of student perceptions of an online course (SPOC) in an RN-to-BSN program. *Nurse Education Today, 85*. <https://doi.org/10.1016/j.nedt.2019.104303>
- Crawford, J., Henderson, K. B., Rudolph, J., Malkawi, B., Glowatz, M., Burton, R., Magni, P. A., & Lam, S. (2020). COVID-19: 20 countries' higher education intra-period digital pedagogy responses. *Journal of Applied Learning & Teaching, 3*(1), 1–20. <https://doi.org/10.37074/jalt.2020.3.1.7>
- Dawadi, S., Simkhada, P., & Giri, R. (2020). Impact of COVID-19 on the Education sector in Nepal- Challenges and coping strategies. *Sage Submissions. Preprint*. <https://doi.org/10.31124/advance.12344336.v1>
- Gautam, D. K., & Gautam, P. K. (2021). Transition to online higher education during COVID-19 pandemic: turmoil and way forward to developing country of South Asia-Nepal. *Journal of Research in Innovative Teaching & Learning, ahead-of-p*(ahead-of-print). <https://doi.org/10.1108/JRIT-10-2020-0051>

- Gonzalez, T., de la Rubia, M. A., Hincz, K. P., Comas-Lopez, M., Subirats, L., Fort, S., & Sacha, G. M. (2020). Influence of COVID-19 confinement on students' performance in higher education. *PLOS ONE*, 15(10), e0239490. <https://doi.org/10.1371/journal.pone.0239490>
- Horspool, A., & Yang, S. (2010). A comparison of University student perceptions and success learning music Online and Face-to-face. *Journal of Online Learning and Teaching*, 6(1), 15–29.
- Ionescu, C. A., Paschia, L., Nicolau, N. L. G., Stanescu, S. G., Stancescu, V. M. N., Coman, M. D., & Uzlau, M. C. (2020). Sustainability analysis of the e-learning education system during pandemic period—covid-19 in Romania. *Sustainability (Switzerland)*, 12(21), 1–22. <https://doi.org/10.3390/su12219030>
- Lai, J. W. M., & Bower, M. (2019). How is the use of technology in education evaluated? A systematic review. *Computers & Education*, 133, 27–42. <https://doi.org/10.1016/j.compedu.2019.01.010>
- Mac Callum, K., & Jeffrey, L. (2013). The influence of students' ICT skills and their adoption of mobile learning. *Australasian Journal of Educational Technology*, 29(3), 303–314. <https://doi.org/10.14742/ajet.298>
- Mcfarlane, A. (2019). Growing up digital: *What do we really need to know about educating the digital generation?* <https://www.nuffieldfoundation.org/sites/default/files/files/Growing Up Digital - final.pdf>
- Ministry of Health and Population. (2020). *SitRep Health Sector Response to Novel Coronavirus (2019-nCoV) Confirm Result* (Issue January).
- Nepal Telecommunications Authority. (2020). *MIS Report (17 August 2020-16 September 2020)* (Vol. 173, Issue 141).
- Outhwaite, L. (2020). Briefing Note: Inequalities in resources in the home learning environment. *Centre for Education Policy and Equalising Opportunities, UCL Institute of Education*, 19–21. <https://ideas.repec.org/p/ucl/cepeob/2.html>
- Patricia Aguilera-Hermida, A. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open*, 1, 100011. <https://doi.org/10.1016/j.ijedro.2020.100011>
- Picciano, A. G. (2021). Theories and frameworks for online education: Seeking an integrated model. In *A guide to administering distance learning* (79-103). Brill. <https://files.eric.ed.gov/fulltext/EJ1154117.pdf>
- Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online University teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education*, 2(3), 923–945. <https://doi.org/10.1007/s42438-020-00155-y>
- Schofield, P., Gough, K., Lotfi-Jam, K., & Aranda, S. (2012). Validation of the supportive care needs survey-short form 34 with a simplified response format in men with prostate cancer. *Psycho-Oncology*, 21(10), 1107–1112. <https://doi.org/10.1002/pon.2016>
- Suryasa, W., Mendoza, J. R. Z., Mera, T. M., Martinez, M. E. M., & Gamez, M. R. (2020). Mobile devices on teaching-learning process for high school level. *International Journal of Psychosocial Rehabilitation*, 24(04), 330–340. <https://doi.org/10.37200/IJPR/V24I4/PR201012>
- UNESCO. (2020). *COVID-19: Impact on Education*. <https://en.unesco.org/covid19/educationresponse>

Annex I :

Results of EFA: factor loading employing principal component analysis with Varimax rotation method (factor loading above 0.5 coefficient)

Item	Component					
	1	2	3	4	5	6
Instructors explained the pedagogical model (such as the Course Implementation Plan) to the students.	0.603					
Instructors explained how learning would be assessed for good grades in online classes.	0.694					
Digital Pedagogy [instructors kept track of students' progress to give immediate feedback.	0.672					
Instructors encouraged being more interactive in the online classes.	0.609					
Instructors encouraged the students to support collaborative learning with each other in online classes.	0.655					
Instructors guide students in planning their learning with technology.	0.733					
Your instructors solve ICT-related problems on their own.	0.662					
Your instructors guide students to use technology for study.	0.740					
Your instructors use content-specific ICT tools in class.	0.757					
Your instructors use different technologies to illustrate difficult content in the subject as needed.	0.700					
Your college provided sufficient orientation classes to handle ICT tools (Zoom/TEAMS/G Suite/Moodle etc.)						
Your college IT staff cooperates with you whenever you require help.						
You can access any information regarding classes, course materials and college examinations promptly because of online classes.						
You have a reliable electricity supply.			0.701			
You have reliable fast internet connectivity.			0.719			
You have access to technology devices that could be used for educational purposes at home			0.726			
Do you have a comfortable room or space for online classes at home?			0.746			
You have supportive family members for online class			0.586			
Do you think you have sufficient knowledge of MS Office (word, excel, PowerPoint)				0.747		

You think you have confidence in the utilization of ICT even when no one is there for assistance.	0.827
You believe you possess the necessary skills to use ICT.	0.866
You feel confident when using ICT features.	0.801
You think ICT is a temporary solution during the COVID-19 pandemic.	0.640
You think ICT is a requirement for students to continue the learning process.	0.595
You think your college and university are ICT friendly.	0.643
You think your courses and curriculum are ICT-friendly.	0.754
Do you think ICT-friendly courses should be made mandatory during and after the COVID-19 pandemic?	0.616
You are satisfied with the online course teaching methodology.	0.547
A teacher's ICT skill is supportive towards your learning effectiveness.	
The online class helps you to improve your course knowledge.	0.594
The online class improves your ICT skills.	
ICT used in classes helps me to increase my creativity.	0.510
Your college support and arrangement during online class is helpful in learning.	
Your family environment creates learning motivation during online classes.	
Learning via online classes is superior to face-to-face classrooms.	0.681
The online classes help in my time management.	0.575
Due to online classes, your class attendance is better than it was before before COVID.	0.591
My academic performance is more effective because of ICT learning.	0.764
My final score/grade will increase due to online classes learning.	0.780

Contribution Factors

% of variance explained	17.24	12.37	9.12	8.68	7.06	6.60
Cumulative % of variance extracted	17.244	29.619	38.739	47.427	54.49	61.09
					2	7

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 a. Rotation converged in 7 iterations.