Online Learning in the Face of COVID-19 Pandemic: Assessment of Students' Satisfaction at Chitwan Medical College of Nepal

Sharma K,[1] Deo G,[2] Timalsina S,[3] Joshi A,[1] Shrestha N,[4] Neupane HC[5]

[1]School of Nursing,

[2]Department of Anesthesia,

[3]Research Unit,

[4]Department of Community Medicine,

[5]Department of Surgery,

Chitwan Medical College,

Bharatpur, Nepal.

Corresponding Author

Kalpana Sharma

School of Nursing,

Chitwan Medical College,

Bharatpur, Nepal.

E-mail: sharma.kalpana@cmc.edu.np

ABSTRACT

Background

Online learning can play a vital role in the process of teaching and learning during Corona Virus Disease 2019 (COVID-19) pandemic. However, learners' satisfaction is extremely important in effective implementation of the online learning, especially at institutions where it is newly adopted.

Objective

To assess satisfaction towards online learning and its predictors among students at Chitwan Medical College, Bharatpur.

Method

A web-based cross-sectional survey was undertaken among 434 undergraduate and postgraduate students from various academic programs who had participated in the online classes started during this COVID-19 pandemic. A structured questionnaire consisting of 31 items (5-point Likert scale) covering four major student satisfaction domains (learners' dimensions, technological characteristics, instructors' characteristics and course management and coordination) was distributed to the students using Google Form.

Result

More than half (53.5%) of the students were satisfied with the online learning, while 29.7% gave neutral views. Bivariate analyses found that all four domains scores were positively correlated with each other as well as with the students' overall satisfaction towards learning. In multivariate analysis, female gender [aOR: 2.72, p = 0.013], WiFi as internet modality for learning [aOR: 3.36, p = 0.001) and learners' dimension score [aOR: 1.27, p<0.001] were the significant predictors of students' satisfaction.

Conclusion

Although recently adopted, the satisfaction of the students towards online classes appears good, and prioritizing the identified predictors and working on the weak links could assist in enhancing students' satisfaction and better outcomes.

KEY WORDS

COVID-19 pandemic, Learners' satisfaction, Online learning

INTRODUCTION

Corona Virus Disease 2019 (COVID-19), that started from Wuhan, China gained pandemic status on March 12, 2020.[1] The Government of Nepal decided to enforce countrywide lockdown since March 24, 2020 in order to curtail the spread of the corona virus.[2] Since then, the lockdown has been extended several times and, has deleteriously affected several sectors including education. The pandemic has led to disruption in teaching/learning activities globally. The medical schools have not been spared either, with concerns about academic continuity and maintenance of efficiency of the health care system.[3] Consequently; several medical institutions worldwide have been trying to adopt innovative technology enabled online learning as core method of teaching by making use of applications such as Zoom, Google Classroom and Google Docs among many others.[4,5]

Evidences show that online learning can play the role of catalyst for active learning, enhancing creativity, motivation for learning and updating existing body of knowledge and communication.[6,7] The transformation from traditional learning to complete web-based learning, however presents several challenges to medical educators as well as the students.[8-10] Therefore, it is imperative to understand learners' satisfaction towards online learning for effective implementation of the program.

Learners', technological and instructors' characteristics along with course design and coordination significantly determine the learners' satisfaction.[11-13] We started online classes for various academic programs at our medical school since April 14 2020. This study aimed at assessing the satisfaction for online learning among undergraduate and postgraduate students of our medical college and providing insights on steps necessary for further improvement.

METHODS

This cross sectional survey included 1st and 2nd year students of Chitwan Medical College (CMC) enrolled in various Undergraduate (UG) and Postgraduate (PG) academic programs (except for Nursing programs, where students from 3rd and 4th year were also included), actively involved in online learning. The UG programs included Bachelor in Medicine and Bachelor in Surgery (MBBS), Bachelor in Dental Surgery (BDS), Bachelor in Public Health (BPH), Bachelor in Pharmacy (B Pharmacy), Bachelor in Science in Nursing (B.Sc. Nsg), Bachelor in Nursing Science (BNS) and Bachelor in Medical Laboratory Technology (B.Sc. MLT). The PG programs included Masters in Nursing (MN) and Masters in Public Health (MPH). Ethical approval was obtained from Chitwan Medical College Institutional Review Committee (Ref. no: CMC-IRC 076/077-150).

A structured self-administered questionnaire was developed based on prior literature that relate to online

learning and consultation with experts in the field of medical education.[14,15] It consisted of four domains: Learner's dimension, Instructors' characteristics, Technological characteristics and Course management and co-ordination. Learner's dimension (9 items) measured the students' characteristics. Instructors' characteristics (9 items) measured teachers' characteristics, frequency of interaction, feedback and way of content delivery. Technological characteristics (7 items) measured the effectiveness of electronic media during the content delivery. Course management and co-ordination (4 items) measured the curriculum components and learning material in the learning environment. Each item of the domains was rated in 5-point Likert scale (Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, and Strongly Agree-5). There were 2 items (rated on 1 to 5 scale) at the end of the questionnaire that measured the students' overall perception on helpfulness of online classes in context with learning process and overall satisfaction toward online learning. The questionnaire was then imported into Google Forms and was piloted among 50 students of different disciplines (who were not included in the final analysis). To verify the reliability of the instrument, Cronbach's alpha was calculated using the pilot study data. One of the items in course management and co-ordination domain ,"I feel difficulty in understanding the course content without face to face interaction" was removed because of its' poor inter-item correlation in the domain. The resultant Cronbach's alpha for the instrument was 0.89 indicating that the tool was reliable for further study.

All the eligible 577 (out of total 627 students) students were sent an email inviting them to participate in the study. The email outlined the purpose, the voluntary nature of participation and emphasized the anonymity of the respondent. It also contained a web link to the online survey form created using Google Forms. The form was made accessible to the students from June 12 2020 to July 11, 2020. The survey response data was collected online and was only available to the researchers in a non-identifiable form. The data was exported to Microsoft Excel 2016 and was analyzed using IBM SPSS (Statistical Package for Social Sciences) version 20 for window.

Standard descriptive statistics was used to describe the data, utilizing mean (SD) or frequency (percentage) as appropriate. The relationship between different domain scores was expressed by Spearman's rank correlation coefficient. A multivariate logistic regression model was constructed to identify the predictors of overall satisfaction towards online classes. P value < 0.05 was considered to be statistically significant.

RESULTS

Out of the 577 eligible participants, 434 responded and completed the survey in full with a response rate of 75.2%.

The mean age of the students was 21.8 years (Range: 17 - 39 years). Majority of the students were females (77.6%), belonged to nuclear family (73.3%), and most of them lived in municipality (90.6%). The highest proportion of the study participants were from B.Sc. Nursing Program (28.4%) and 1st and 2nd academic years i.e. 36.3% and 36.3% respectively.

A significant majority of the students (85.7%) had internet facility i.e. WiFi at their residence that they used during the online classes. The remaining 14.3% (n = 62) primarily used data package from telecommunication service provider. The median number of classes per week was 16 (6 - 18). The average number of classes attended by the students per month was 40 (25 - 50). [Table 1]

Table 1. Baseline Characteristics of the Students (n=434)

Characteristics	Number	Percentage
Sex		
Male	97	22.4
Female	337	77.6
Type of family		
Nuclear	318	73.3
Joint	116	26.7
Residence		
Municipality	393	90.6
VDC	41	9.4
Academic Year		
1st	157	36.2
2nd	158	36.4
3rd	80	18.4
4th	39	9.0
Programs		
Undergraduate	391	90.1
MBBS	94	21.9
B.Sc. Nsg	122	28.4
BDS	40	9.3
BNS	65	15.1
BPH	49	11.4
B Pharm	14	3.3
BSc MLT	3	0.7
Post graduate	43	9.9
MN	35	8.1
MPH	8	1.9
Internet accessibility (WiFi) at home or residence		
Yes	372	85.7
No	62	14.3
Participation in class through		
WIFI	372	85.7
Data Package	62	14.3

Online Learning Domains

Regarding learners' dimension (domain 1), majority of the students agreed that they "need to be updated with the latest technology" (82.4%), "online class is effective to bridge the gap of missed time period" (71.8%), they "got enough time to study on their own", and it "enhances self-studying habit" (61.5%). However, considerable proportion of the students were unbiased on the statements like "I feel confident and enjoy using the online platform applications" (35.7%), "I feel online learning is comfortable and enjoyable" (32.9%), "I frequently interacted with other students and instructors during the courses" (28.6%). Furthermore, nearly one third of the students showed disagreement on the statements like "I feel online learning is comfortable and enjoyable" (30.0%), "I frequently interacted with other students and instructors during the courses" (28.6%). [Table 2]

Regarding instructors' characteristics (domain 2), majority of the students agreed that they are satisfied with the instructors' supportiveness and responsiveness towards their questions (81.1%), accessibility and professional behavior during the class (73.3%) and efforts in maintaining distraction free classes (69.9%). However, a significant proportion of the students were neutral on the statements like "I like the instructors teaching ability with the use of various communication techniques" (27.6%) and "I am satisfied with instructors providing clear instructions about the course prior to the classes" (27.0%). Adding further, certain proportion of the students showed disagreement on the statements like "1 am satisfied with the instructors reviewing the topic covered in the previous sessions" (17.3%) and "I am satisfied with the instructor pace of punctuality in starting the starting the class" (15.0%). [Table 2]

Regarding domain 3, majority of the students agreed that online applications are easy to use (79.2%) and internet connection strength determines the effective learning opportunity (76.3%). However, more than one third of the students were neutral on the statements like "I feel the response time from teachers and assistants is quicker in online courses" (33.9%). Furthermore, more than two third (73.7%) of the students disagreed on the statements like "I feel sudden interruption in delivering the information due to technological error (internet) hinders the learning process" and 53.0% felt that "the internet charges is expensive for online learning". [Table 3]

Regarding domain 4, majority of the students agreed that they are satisfied with the ability to contact concerned department personnel via internet (67.7%), instructions about student participation are clearly presented (65.2%) whereas, nearly one thirds of the students were not sure on the statements like "I feel the course materials are accessible after the completion of each classes" (27.6). In addition, 19.8% of the students disagreed on the statements like "I feel the course materials are accessible after the completion of each class"[Table 3].

Table 2. Distribution of Responses of the Students in Learners' Dimension and Instructors' Characteristics (n = 434)

Statements	SD	D	N	A	SA	Mean (SD)
Domain 1: Learner's Dimension						
I feel confident and enjoy using the online platform applications	23 (5.3)	66 (15.2)	155 (35.7)	161 (37.1)	29 (6.7)	3.2 (0.9)
I feel students need to be trained before undergoing online learning activities	16 (3.7)	56 (12.9)	87 (20.0)	199 (45.9)	76 (17.5)	3.6 (1.0)
I feel students need to be updated with the latest technology	21 (4.8)	12 (2.8)	43 (9.9)	212 (48.8)	146 (33.6)	4.0 (0.9)
I feel online learning orients my study plan and enhances students' motivation, creativity, cognitive skills and problem solving skills	31 (7.1)	65 (15.0)	121 (27.9)	170 (39.2)	47 (10.8)	3.3 (1.1)
I feel online learning is comfortable and enjoyable	33 (7.6)	97 (22.4)	143 (32.9)	126 (29.0)	35 (8.1)	3.1 (1.0)
I frequently interacted with other students and instructors during the courses	31 (7.1)	86 (19.8)	124 (28.6)	171 (39.4)	22 (5.1)	3.1 (1.0)
I got enough time to study on my own, enhancing my self-studying habit	23 (5.3)	44 (10.1)	100 (23.0)	211 (48.6)	56 (12.9)	3.5 (1.0)
Online class is effective in bridging the gap of missed academic period	16 (3.7)	32 (7.4)	74 (17.1)	212 (48.8)	100 (23.0)	3.8 (0.9)
The advantages of taking classes via internet outweighed the disadvantages during college lock down	17 (3.9)	32 (7.4)	101 (23.3)	203 (46.8)	81 (18.7)	3.7 (1.0)
Domain 2: Instructors' Characteristics						
I like the way my instructor make students feel a sense of belongings	15 (3.5)	26 (6.0)	111 (25.6)	248 (57.1)	34 (7.8)	3.6 (0.8)
I feel the instructors organization and preparation for class provides comfortable learning environment	14 (3.2)	36 (8.3)	109 (25.1)	238 (54.8)	37 (8.5)	3.6 (0.9)
I like the instructors teaching ability with the use of various communication technique	14 (3.2)	46 (10.6)	120 (27.6)	214 (49.3)	40 (9.2)	3.5 (0.9)
I like when instructor emphasizes in maintaining the distraction free classes	14(3.2)	21 (4.8)	96 (22.1)	245 (56.5)	58 (13.4)	3.7 (0.9)
I am satisfied with instructors providing clear instructions about the course prior to the classes	12 (2.8)	40 (9.2)	117 (27.0)	216 (49.8)	49 (11.3)	3.6 (0.9)
I am satisfied with the instructors accessibility and professional behaviour during the class	9 (2.1)	23 (5.3)	84 (19.4)	270 (62.2)	48 (11.1)	3.7 (0.8)
I am satisfied with the instructor pace of punctuality in starting the starting the class	17 (3.9)	48 (11.1)	108 (24.9)	199 (45.9)	62 (14.3)	3.5 (1.0)
1 am satisfied with the instructors reviewing the topic covered in the previous sessions	22 (5.1)	53 (12.2)	99 (22.8)	210 (48.4)	50 (11.5)	3.5 (1.0)
I am satisfied with the instructors supportiveness and responsiveness towards my questions	11 (2.5)	10 (2.3)	61 (14.1)	265 (61.1)	87 (20.0)	3.9 (0.8)

SD-Strongly disagree D-Disagree N-Neutral A-Agree SA-Strongly Agree
Overall Domain 1 mean score (SD): 31.5 (6.3)   Overall Domain 2 mean score (SD): 32.7 (5.9)
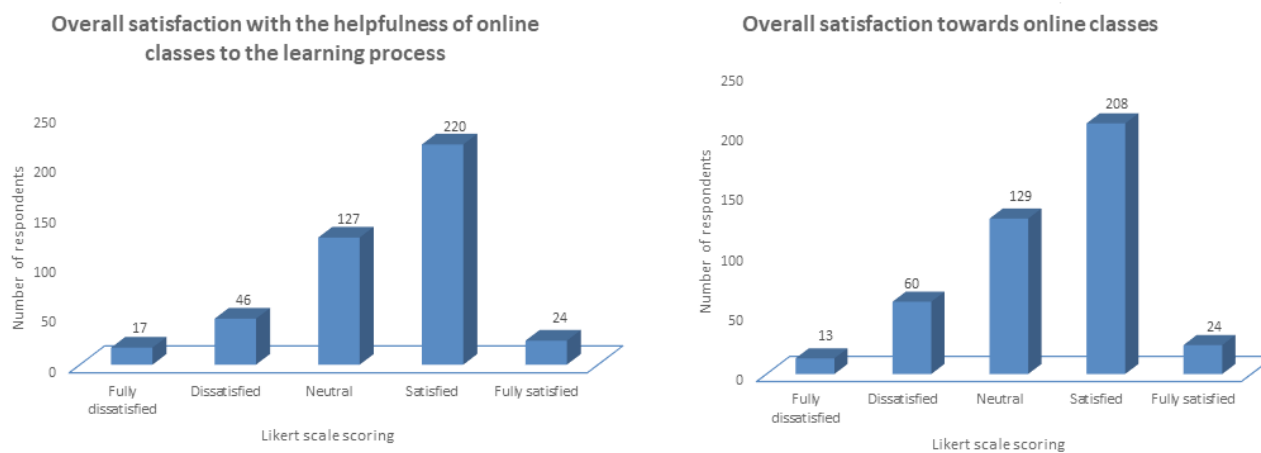

Figure 1. Bar Diagrams Showing Overall Satisfaction of the Students towards Online Classes (n = 434)

Table 3. Distribution of Responses of the Students in Technological Characteristics and Course Management and Coordination (n=434)

Statements	SD	D	N	A	SA	Mean (SD)
Domain 3: Technological Characteristics						
I feel the online applications is easy to use	14 (3.2)	14 (3.2)	62 (14.3)	257 (59.2)	87 (20.0)	3.9 (0.9)
I am satisfied with the quality of graphic aids such as sound and picture (ppt) being displayed	16 (3.7)	33 (7.6)	100 (23.0)	222 (51.2)	63 (14.5)	3.6 (0.9)
I feel confident that classes will not be cancelled due to weather	107 (24.7)	117 (27.0)	109 (25.1)	73 (16.8)	28 (6.5)	2.5 (1.2)
I feel the response time from teachers is quicker in online courses	23 (5.3)	67 (15.4)	147 (33.9)	169 (38.9)	28 (6.5)	3.3 (1.0)
I feel internet connection strength determines our effective learning opportunity	15 (3.5)	22 (5.1)	66 (15.2)	183 (42.2)	148 (34.1)	4.0 (0.9)
I feel charges to connect to the internet is expensive	18 (4.1)	60 (13.8)	126 (29.0)	147 (33.9)	83 (19.1)	3.5 (1.1)
I feel sudden interruption in delivering the information due to technological error (internet) hinders the learning process	24 (5.5)	22 (5.1)	68 (15.7)	158 (36.4)	162 (37.3)	3.9 (1.1)
Domain 4: Course Management and Coordination						
I am satisfied with the content of topic covered during the classes	14 (3.2)	50 (11.5)	92 (21.2)	238 (54.8)	40 (9.2)	3.5 (0.9)
I feel the course materials are accessible after the completion of each classes	20 (4.6)	66 (15.2)	120 (27.6)	194 (44.7)	34 (7.8)	3.4 (1.0)
Instructions about student participation are clearly presented	9 (2.1)	35 (8.1)	107 (24.7)	248 (57.1)	35 (8.1)	3.6 (0.8)
I am satisfied with the ability to contact concerned department personnel via internet (mail, WhatsApp's group etc.)	17 (3.9)	26 (6.0)	97 (22.4)	240 (55.3)	54 (12.4)	3.7 (0.9)

SD-Strongly disagree D-Disagree N-Neutral A-Agree SA-Strongly Agree
Overall Domain 1 mean score (SD): 24.8 (4.2) Overall Domain 2 mean score (SD): 14.2 (2.8)

The four domain scores had significant correlation with one another, Pearson's correlation coefficient r ranging from 0.54 - 0.67, p < 0.01. Upon further analysis, the mean individual domain score for domains 1, 2 and 4 were significantly higher in the postgraduate students compared to total undergraduate students (p <0.001). No significant differences were observed between the scores of different undergraduate programs.

Overall Satisfaction

Two hundred and thirty two (53.5%) students were satisfied or fully satisfied towards the online classes being conducted. Only 16.8% (n = 73) were dissatisfied or fully dissatisfied with the online classes. The remaining 29.7% (n = 129) gave neutral scores. [fig. 1]

Model of Predictors for Satisfaction towards Online Learning

The students who were neutral regarding satisfaction towards online classes (n = 129) were excluded from the analysis. There were 232 participants in the satisfied group and 73 participants in the dissatisfied group. In univariate analysis, age, female gender, modality of internet facility used for online classes: WiFi, level of academia: postgraduate, individual domain scores were significantly associated with satisfaction. Place of residence, type of family, type of undergraduate program had no significant relationship with satisfaction. In multivariate analysis, female gender [aOR: 2.72, 95% CI: 1.23 - 6.02, p = 0.013], WiFi as the internet modality users for online classes [aOR:

Table 4. Results of Multivariate Logistic Regression Analysis for Satisfaction towards Online Learning (n=434)

Predictor Variables	Unstandardized β	aOR (95% CI)	p value
Age	0.001	1.00 (0.88-1.14)	0.992
Female gender Ref: Male	1.002	2.72 (1.23-6.02)	0.013*
Place of residence: Municipality Ref: VDC	0.055	1.06 (0.38-2.96)	0.917
Type of family: Joint Ref: Nuclear	-0.061	0.94 (0.49-1.80)	0.853
Internet modality used: WiFi Ref: Data package	1.211	3.36 (1.60-7.03)	0.001*
Academic level: Postgraduate Ref: Undergraduate	1.036	2.82 (0.41-19.33)	0.292
Learners' dimension (Domain 1) score	0.239	1.27 (1.16-1.39)	<0.001*
Instructors' characteristics (Domain 2) score	0.053	1.05 (0.95-1.17)	0.314
Technological characteristics (Domain 3) score	0.013	1.01 (0.89-1.15)	0.832
Course management and co-ordination (Domain 4) score	0.017	1.08 (0.90-1.30)	0.414

Ref: Reference category, VDC: Village Development Committee, aOR: adjusted Odds ratio

3.36, 95% CI: 1.60 - 7.03, p = 0.001) and learners' dimension score [aOR: 1.27, 95% CI: 1.16 - 1.39, p = <0.001] were the significant predictors of students' satisfaction adjusted for all the other variables. The variables included in the model explained 55.2% variability in the model (Nagelkerke R^2 = 0.552) [Table 4].

Lastly, a majority (89.8%) of the students answered that they would like to continue the online classes during this COVID-19 pandemic, when asked upon their views.

DISCUSSION

The current state of alarm due to the COVID-19 pandemic has led to abrupt changes in the education system of medical students; a shift from traditional to online learning. The use of information technology (IT) in the current situation can be a solution for educational institutions and students to continue and improve the learning process, with acquisition of new skills. However, retaining students is a greater challenging problem for on-line courses than it is for face-to-face courses.[16] Hence, it has been a concern in medical education institutions in Nepal.

We found that only 53.5% of students were satisfied with online learning, with almost 30% giving neutral views. Our satisfaction rate was lower compared to other studies, where satisfaction rates as high as 93.4% have been reported.[17,18] On the contrary, a systematic review has reported extremely low level of satisfaction (14.0%) among health profession students (e.g. medicine, dentistry, pharmacy and allied medical sciences) towards online learning compared to traditional learning.[19] Furthermore, Pourghaznein reported that students' satisfaction from online learning was significantly lower than lecturing and role-playing.[20] The possible reasons could be that students are more familiar with the traditional learning environment and students may feel that they are generally more isolated in the virtual learning environment.

In our study, a majority (89.8%) of the students agreed to continue online classes, quite different from studies done in Pakistan and Kuwait where they reported a lower preference (77.0% and 51.2% respectively) for continuation of online classes in the future.[21,22] This might be due to the differences in cultures of learning system and its limitations in the development of skills using lab/clinical learning environment. In addition, our students might have preferred online learning in future to prevent the calendar lag caused by the COVID-19 pandemic.

Learners' characteristics play an important role in the students' satisfaction towards online learning. Students who are updated with the appropriate technologies are able to continue their study smoothly, with greater satisfaction.[23] Studies have pointed out that the students need to be updated with the latest technology to fulfil the targets of learning and needs and lack of training and technical support hindered users from making full utilization of system affecting the learner's satisfaction.[24,25] Our students also had good agreement with the statement that "online learning provides them enough time to self-study and enhancing their self-studying habit". Liaw et al. also reported a close relationship between learning at one's own pace and students' satisfaction towards the learning process.[26]

Majority of our students agreed that they were satisfied with the instructors' supportiveness, professional behaviour and efforts in maintaining distraction free classes. A study in Bangladesh showed that the teachers' performance significantly influences the students' satisfaction in online platform.[27] Likewise, Goh et al. concluded that interaction with instructors is positively related to learning outcome and satisfaction.[28] Similarly, access to technology is one of the most important factors influencing student satisfaction.[29] Evidences also showed that better quality of internet, proper availability of technical assistance and quality of online program positively influence students' satisfaction towards e-learning.[30,31] In our study, the provision of WiFi as learning modality (which indirectly means better internet compared to data packages in Nepal) is one of the strongest predictors of students' satisfaction. This finding is supported by other studies, where internet bandwidth, connectivity, availability of devices, downloadable resources, and mobile data connection were the key challenges to students' satisfaction on e-learning.[32,33] Furthermore, our students suggested that efforts should be made from stakeholders regarding the provision of cost-effective, high-speed data services from telecommunication service providers and unlimited time in Zoom sessions to reduce distractions during online learning.

Majority of our students were satisfied with the prompt response from the concerned faculties and department via internet and content of the classes. The efficiency and effectiveness in delivering the e-learning based components of a course is one of the most critical factors to students' acceptance and success of the learning process.[34] Online learning in medical education is very challenging because of the fact that the students have to learn and work directly with the patients (especially for the practical part). There are suggestions that some portion of practical/clinical classes be started through demonstration and presentation of related cases with simulation. It is evident in various studies that course materials prepared by instructors considering students' learning styles and learning methodology impacts the greatest in learner's satisfaction.[35,36]

Our findings indicated that the four domains under consideration: learners dimension, instructors' characteristics, technological characteristics and course management and coordination all had positive relationship with the overall satisfaction towards online learning, with learners' dimension being the strongest predictor where

the findings are supported by other studies.[37,38] In our study, female students had better satisfaction to the online learning. Evidences have been variable, with reports of no significant association between satisfaction and gender to female gender being a strong predictor of satisfaction in online learning.[39,40] It has been suggested that women are oriented to openness for other's proposals, willing to cooperate and prefer working in groups while men are more likely to solve problems on their own.[40] The variation however, can be due to the cultural differences across various countries.

This research adds value to the existing literature, through detailed analysis of students' satisfaction towards e-learning during the times of COVID-19 pandemic. It also provides some important practical insights into how satisfaction and adherence to online learning be achieved in developing countries such as Nepal. Various factors need to be considered for successful implementation of e- learning environment. Firstly, the e-learning system designers need to make the system simple and user-friendly. Secondly, the policy makers need to adopt new education policies and regulations to promote e-learning system among students and instructors in order to facilitate gradual transition from traditional learning to e-learning. These factors, if positively entertained, will result in the growth of online education in our country in the coming decade. Our study has certain limitations. The subjects of this study were from only one college, this is a threat to the external validity. This study could have yielded better results if a more diverse group of respondents had been reached.

CONCLUSION

Educational institutions in our county have recently adopted online learning to carry forward the education activities during this COVID-19 pandemic. Student's satisfaction is an important factor for successful e- learning adoption and effective outcome. Our study presents that more than half of the students are satisfied with online learning. Learning domains such as learners' dimension, technological characteristics, instructors' characteristics and course management and coordination are significantly associated with students overall satisfaction towards online learning. Gender, internet modality as WIFI and learners dimension score tends to influence more on the learners' satisfaction towards online learning. These factors need to be considered in unison while designing online learning program in order to increase the adoption and satisfaction rate among the students.

ACKNOWLEDGEMENT

REFERENCES

1. World Health Organization. Health topic: There is current outbreak of Coronavirus (COVID-19) disease. 2020.

2. The Kathmandu Post. Government extends lockdown until May 18. 2020, May 6.

3. Samarasekera DD, Goh DL, Lau TC. Medical school approach to manage the current COVID-19 crisis. Academic Medicine. 2020 Aug 1;95(8):1126-7.

4. Kaur N, Dwivedi D, Arora J, Gandhi A. Study of the effectiveness of e-learning to conventional teaching in medical undergraduates amid COVID-19 pandemic. *National Journal of Physiology, Pharmacy and Pharmacology.* 2020;10(7):1.

5. Bączek M, Zagańczyk-Bączek M, Szpringer M, Jaroszyński A, Wożakowska-Kapłon B. Students' perception of online learning during the COVID-19 pandemic: A survey study of Polish medical students.

6. Cidral WA, Oliveira T, Di Felice M, Aparicio M. E-learning success determinants: Brazilian empirical study. *Computers & Education.* 2018 Jul 1;122:273-90.

7. Pei L, Wu H. Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. Medical Education Online. 2019 Jan 1;24(1):1666538.

8. Dawadi S, Giri R, Simkhada P. Impact of COVID-19 on the Education Sector in Nepal: Challenges and Coping Strategies.

9. Zhao J, Xiao H, Li Y, Wen D, Xu P, Fu Y, et al. Experience of Massive Distance Online Education for Medical Colleges and Universities in China to Counter the COVID-19 Pandemic.2020.

10. Han H, Resch DS, Kovach RA. Educational technology in medical education. Teaching and Learning in Medicine. 2013 Jan 1;25(sup1):S39-43.

11. Rahamat RA, Shah PM, Din RO, Puteh SN, Aziz JA, Norman HE, Embi MA. Measuring learners' perceived satisfaction towards e-learning material and environment. *WSEAS Transactions on Advances in Engineering Education.* 2012;9(3):72-83.

12. Chow WS, Shi S. Investigating students' satisfaction and continuance intention toward e-learning: An Extension of the expectation-confirmation model. *Procedia-Social and Behavioral Sciences*. 2014 Aug 25;141:1145-9.

13. Al-Rahmi WM, Othman MS, Yusuf LM. Exploring the factors that affect student satisfaction through using e-learning in Malaysian higher education institutions. *Mediterranean Journal of Social Sciences.* 2015 Jul 3;6(4):299.

14. Biner PM. The development of an instrument to measure student attitudes toward televised courses. *American Journal of Distance Education.* 1993 Jan 1;7(1):62-73.

15. Wang YS. Assessment of learner satisfaction with asynchronous electronic learning systems. *Information & Management.* 2003 Oct 1;41(1):75-86.

16. Bawa P. Retention in online courses: Exploring issues and solutions-A literature review. *Sage Open.* 2016 Jan 5;6(1):2158244015621777.

17. Seada AI, Mostafa MF. Students' Satisfaction and Barriers of E-Learning Course among Nursing Students, Mansoura University. IDOSI Publications. 2017;3 (3): 170-178, 2017.

18. Singh A, Min AK. Digital lectures for learning gross anatomy: A study of their efficacy. *Korean Journal of Medical Education.* 2017 Mar;29(1):27.

19. George PP, Papachristou N, Belisario JM, Wang W, Wark PA, Cotic Z, Rasmussen K, Sluiter R, Riboli–Sasco E, Car LT, Musulanov EM. Online eLearning for undergraduates in health professions: a systematic review of the impact on knowledge, skills, attitudes and satisfaction. *Journal of Global Health.* 2014 Jun;4(1).

20. Pourghaznein T, Sabeghi H, Shariatinejad K. Effects of e-learning, lectures, and role playing on nursing students' knowledge acquisition, retention and satisfaction. *Medical Journal of the Islamic Republic of Iran.* 2015;29:162.

21. Abbasi S, Ayoob T, Malik A, Memon SI. Perceptions of students regarding E-learning during Covid-19 at a private medical college. *Pakistan Journal of Medical Sciences.* 2020 May 9;36(COVID19-S4).

22. Al-Fahad FN. The Learners' Satisfaction toward Online E-Learning Implemented in the College of Applied Studies and Community Service, King Saud University, Saudi Arabia: Can E-Learning Replace the Conventional System of Education? *Turkish Online Journal of Distance Education.* 2010 Apr;11(2):61-72.

23. Johnson AM, Jacovina ME, Russell DG, Soto CM. Challenges and solutions when using technologies in the classroom. *ERIC Clearinghouse.* 2016 Jun 17.

24. Bahramnezhad F, Asgari P, Ghiyasvandian S, Shiri M, Bahramnezhad F. The Learners' Satisfaction of E-learning: A Review. *American Journal of Educational Research.* 2016;4(4):347-52. [DOI]

25. Unwin T, Kleessen B, Hollow D, Williams JB, Oloo LM, Alwala J, et al. Digital learning management systems in Africa: myths and realities. Open Learning: *The Journal of Open, Distance and e-Learning.* 2010 Feb 1;25(1):5-23.

26. Liaw SS, Huang HM, Chen GD. Surveying instructor and learner attitudes toward e-learning. *Computers & Education.* 2007 Dec 1;49(4):1066-80.

27. Sultana T, Khan RH. Investigating University Students' Satisfaction on Online Class: Bangladesh Perspective. *Bangladesh Educational Journal.* 2019 Dec:23.

28. Goh C, Leong C, Kasmin K, Hii P, Tan O. Students' experiences, learning outcomes and satisfaction in e-learning. *Journal of E-learning and Knowledge Society.* 2017 May 29;13(2).

29. Adas D, Shmais WA. Students' perceptions towards blended learning environment using the OCC. *An-Najah University Journal for Research–Humanities.* 2011 25(6): 1681-1710.

30. Mirza AA, Al-Abdulkareem M. Models of e-learning adopted in the Middle East. *Applied Computing and Informatics.* 2011 Jul 1;9(2): 83-93.

31. Tarus JK, Gichoya D, Muumbo A. Challenges of implementing e-learning in Kenya: A case of Kenyan public universities. *International Review of Research in Open and Distributed Learning.* 2015;16(1): 120-41.

32. Mässing C. Success Factors and Challenges for E-learning Technologies in the Namibian Higher Education System: A case study of the University of Namibia.

33. Al-Azawei A, Parslow P, Lundqvist K. Barriers and opportunities of e-learning implementation in Iraq: A case of public universities. The International Review of Research in Open and Distributed Learning. 2016 Sep 26;17(5).

34. Keržič D, Tomaževič N, Aristovnik A, Umek L. Exploring critical factors of the perceived usefulness of blended learning for higher education students. *PLOS ONE.* 2019 Nov 21;14(11):e0223767.

35. Swan K. Learning effectiveness online: What the research tells us. Elements of quality online education, practice and direction. 2003;4(1):13-47.

36. Battalio J. Success in distance education: Do learning styles and multiple formats matter?. *The American Journal of Distance Education.* 2009 May 19;23(2):71-87.

37. Riaz A, Riaz A, Hussain M. Students' acceptance and commitment to e-learning: Evidence from Pakistan. *Journal of Educational and Social Research.* 2011 Dec 1;1(5):21.

38. Nadia AY, Iqbal S. Student Satisfaction with e-Learning achieved in Pakistan. *Asian Journal of Distance Education.* 2011 Jan 1;9(2):26-31.

39. Topal AD. Examination of University Students' Level of Satisfaction and Readiness for E-Courses and the Relationship between Them. *European Journal of Contemporary Education.* 2016;15(1):7-23.

40. González-Gómez F, Guardiola J, Rodríguez ÓM, Alonso MÁ. Gender differences in e-learning satisfaction. *Computers & Education.* 2012 Jan 1;58(1):283-90.