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Perception and Effectiveness of Online Anatomy Lab Exercise on Undergraduate Students of BPKIHS During COVID-19 Pandemic

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ABSTRACT:

Introduction: Online mode of teaching learning activities were started for medical students of Nepal to reduce the risk of spreading virus during COVID-19 pandemic. BPKIHS started the modified online lab exercise (LABEX) for the undergraduate students after six months of pandemic.

Objective: The main objective of study was to evaluate the student's perception and effectiveness of modified online LABEX (prior content video uploading) during pandemic.

Methods: The mixed method cross-sectional study design using semi-structured questionnaire was conducted. The questionnaire had sub-sections such as questions regarding students' means of study, students' perception on modified online lab exercise during pandemic and reflective writing. We collected the responses from 129 students after institutional ethical clearance and informed consent. Student's paired test for analysis of effectiveness of modified online LABEX was done by using pre-test/post-test score. Thematic analysis was performed for reflective writing. A $p<0.05$ was considered as statistically significant.

Results: The mean age was calculated as 20.84 year. The modified online LABEX increase the scoring of students for three consecutive sessions with an average score of 1.71; 1.55 & 1.09 respectively ($p<0.001$). We formulated 15 codes and 3 themes from reflective writing such as strength, weakness and recommendation of modified online LABEX. We found that "Accessibility of recorded Labex" (n=54) was major strength and "less efficient of online LABEX" (n=57) was major weakness.

Conclusions: Although physical form of anatomy education is best way of learning but modified online LABEX can be used as alternative during pandemic like situations in future.

Keywords: Anatomy; COVID-19; LABEX; pandemic; reflective.

INTRODUCTION

The Corona Virus Disease 2019 (COVID-19) outbreak had a tremendous effect on medical education.[1]

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Universities across the world had reacted quickly to the crisis, having announced immediate closures.[2] Lectures had rapidly been developed to be delivered online as webinars using various platforms such as zoom for medical students.[3]There has been a major pattern shift in health professional education from passive, didactic, and teacher-centered approach to active, clinical-based, and student-centered approach.[4]

Although classical teaching is impossible to replicate through E-learning, still it is feasible

method that helps one to continue their studies in this difficult situation. Due to COVID-19, medical educations are also affected as a result of changes in current teaching methodology due to cancellation of classical "teaching classroom".[5]

Medical students in Nepal were engaged in online mode of teaching learning activities to reduce the risk of spreading virus during COVID-19 pandemic. B.P. Koirala Institute of Health Sciences (BPKIHS) started the modified online lab exercise (LABEX) for the undergraduate students after six months of complete academic pause.

The main objective of study was to evaluate the student's perception and effectiveness of modified online LABEX (prior content video uploading) during pandemic. It will be the first step in formulating the ways in which online learning can be made more effective in country like Nepal.

METHODS

A mixed method cross-sectional study design using semi-structured questionnaire was conducted during pandemic. The questionnaire was developed by authors with consensus. Pretesting was done in 10% of the participants to ensure accuracy and validity of content and information of questionnaire. The sampling technique used in the study was census sampling technique. All the undergraduate students of first year (Batch 2019) M.B.B.S. and B.D.S. were recruited in our study. Thus, the total sample size was 148. Ethical clearance from Institutional research committee of BP Koirala Institute of Health Sciences (59/078/079) and Participant's written informed consent from Google form were obtained for the study.

The data collection tool (questionnaire) was comprised of two sections; a) Socio-demographic profile and b) Contextual matter. Contextual Matter again consist of two sub-sections. First sub -section consists of seventeen questions regarding the students' means of study and their perception on Anatomy education during pandemic. Second sub-section consists of reflective writing (200 words) on modified anatomy LABEX during pandemic. LABEX is Lab exercise refers to practical session in our institute.

We arranged the special interactive online session with participants for disseminating the information of study. In this session, we shared the participant's information sheet and questionnaire with reflective writing. The time period of one week was given for the participants to fill up the questionnaire in Google form format. We had also sent the reminder email requesting them to fill the form on 6th day of first email. For effectiveness of LABEX of unit 2 (for three LABEX), we took pre-test and post-test after modified online LABEX using 10 single response multiple choice questions (MCQs) formulated by co-authors. The MCQs were validated by subject

experts of our department who were not involved in this study.

The data were entered in MS Excel sheet and all statistical procedures were performed on SPSS version 11.5. Student's paired test was applied for analysis of effectiveness of LABEX. The categorical variables were tested for association using Pearson's chi-square test. A $p<0.05$ was considered as statistically significant. Thematic analysis for reflective writing, we firstly generated 15 initial codes from data then we searched for themes. We reviewed themes and grouped the similar codes in 3 different themes such as strength, weakness and recommendations of modified online LABEX.

Thus, we formulated two null hypotheses such as (i) there was no change in mean score of tests taken during modified online anatomy LABEX (ii) there were no differences in perception of modified online anatomy LABEX among the undergraduate students of BPKIHS during COVID -19 Pandemic.

RESULTS

The response rate of our study was 87.16% (n=129). The mean age was calculated as 20.84 year. Table 1 shows mean age of male (21.0 year) was slightly higher than female (20.58 year). Whereas, the mean age of Nepalese students (20.75 year) found to be less than Non-Nepalese Students (21.47 year). The medical students (20.90 year) had higher mean age than dental Students (20.68 year).

Table 1: Showing the mean age of participants

Gender	Age (Mean± SD) in year
Male (n=81)	21.0±1.13
Female (n=48)	20.58±1.01
Nationality	
Nepalese (n=112)	20.75±0.98
Non-Nepalese (n=17)	21.47±1.59
Stream	
MBBS (n=98)	20.90±1.15
BDS (n=31)	20.68±0.95
Total (N=129)	20.84±1.10

Table 2 shows students' means of study and their perception on modified online LABEX during COVID-19 pandemic. In our study, we found 59.7 % students were unable to continue practical learning as before during pandemic. Although 49.6% students reported that technology is helpful in anatomical studies but 61.2% students were unable to understand cadaveric & histological studies through classical internet teaching and 87.6% students felt at loss for not being able to perform the practical manually in lab. Further, 80.6% students agreed that peer pressure is a motivating factor which is missing in the times

of pandemic and 93.8% students agreed that recorded videos help in attending class anywhere & anytime.

Table 2: Showing students' means of study and their perception

Questions (Q1-Q17)	Frequency (%)
1. Device used to study	Laptop (55%); Mobile (49%); Computer (4%); Other (5%)
2. Internet source commonly used for study	Wi-Fi (79.8); Data (20.2%)
3. Apps beneficial for online anatomy study	Zoom (81.4%); YouTube (12.4%); Dudal (8%)
4. Monthly expenditure for online learning (in NRS)	1000-1500 (48.1%); 500-1000(30.2%) ;> 1500(13.2%) ;< 500(8.5%)
5. You are able to continue practical learning as before:	Disagree (59.7%); Neutral (27.1%); Agree (13.2%)
6. Technology is helpful in anatomical studies:	Agree (49.6%); Neutral (33.3%); Disagree (17.1%)
7. You are able to understand cadaveric & histological studies via internet:	Disagree (61.2%); Neutral (33.3%); Agree (5.4%)
8. You feel at loss for not being able to perform the practical manually in lab:	Agree (87.6%); Neutral (8.5%); Disagree (3.9%)
9. You are getting sufficient time for self-study:	Agree (55.8%); Neutral (35.7%); Disagree (8.5%)
10. You are facing inadequate interaction with teachers:	Agree (72.9%); Neutral (23.3%); Disagree (3.9%)
11. Online study hampers your concentration:	Agree (59.7%); Neutral (27.1%); Disagree (13.2%)
12. Recorded videos help you in attending class anywhere & anytime:	Agree (93.8%); Neutral (5.4%); Disagree (0.8%)
13. There is no possibility of missing class as in case of traditional study:	Agree (62.0%); Neutral (26.4%); Disagree (11.6%)
14. Are you facing any communication barriers in online classes?	Yes (73.6%); No (26.4%)
15. If yes, then what barrier are you facing:	Poor Network (81%); Poor Electricity supply (14.7%) Lack of facility (gadgets etc) (4.3%)
16. Are you satisfied with the knowledge you are gaining via internet?	No (69.8%); Yes (30.2%)
17. Do you think peer pressure is a motivating factor which is missing in the times of pandemic?	Yes (80.6%); No (19.4%)

Table 3 shows the effectiveness of modified online LABEX using Pre-test and post-test using 10 single response multiple choice questions formulated by co-authors. The result of our study showed that the modified online LABEX increase the scoring of students for three consecutive sessions with statistically significant average score of 1.71; 1.55 & 1.09 respectively ($p<0.001$). Further, we reject the null hypothesis because we have significant evidence ($P<0.05$) that modified online LABEX changes the scoring.

Table: Effectiveness of modified online LABEX

LABEX	Pretest Score (Mean ±SD)	Post test Score (Mean ±SD)	Sig. (2-tailed)*
LABEX 1	5.57±1.37	7.29±1.32	<0.001
LABEX 2	6.04±1.99	7.60±1.63	<0.001
LABEX 3	7.52±1.70	8.61±1.15	<0.001

* Student's paired test was applied.

Table 4 shows associations among student's perception from question number 5 to question number 13. All the values of X^2 except for Q10 for gender, were <5.99 (from chi-square table for df=2) with p>0.05, we accept the null hypothesis. But, for Q10, we reject null hypothesis because X^2=8.845 >5.99 with p=0.012.

Table 4: Showing Pearson chi-square (X^2) for df=2 to show associations among students' perception

Association	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
Gender Male Female P=value	0.656 0.72	0.448 0.799	2.041 0.360	2.669 0.263	0.833 0.660	8.845 0.012	0.857 0.651	5.054 0.080	1.540 0.463
Stream MBBS BDS P=value	0.558 0.756	2.867 0.238	4.239 0.120	0.906 0.636	1.046 0.593	1.274 0.529	2.192 0.334	0.719 0.698	0.935 0.627
Nationality Nepalese Non-Nepalese P=value	1.028 0.598	3.725 0.155	0.049 0.976	1.015 0.602	1.706 0.426	1.092 0.579	0.911 0.634	0.160 0.923	3.941 0.139

Table 5 shows the 15 codes were derived from reflective writing on modified online LABEX during COVID pandemic with their number of repetitions in response. Similar codes were grouped in 3 themes such as strength, weakness and recommendations of modified online LABEX. Accessibility of recorded LABEX (n=54) was most repeated code under strength theme; Less efficient than physical LABEX (n=57) was most repeated code under weakness theme and Physical form of LABEX is best (n=32) was most repeated code under recommendation theme.

Table 5: Thematic Analysis of reflective writing

Themes and Codes	Number of repetition of codes
A. Strengths of modified online Labex	
1. Accessibility of recorded Labex	**54**
2. It is good alternative of traditional Labex during pandemic	48
3. Atleast it engaged the students towards learning	18
4. Extra time for self-study	12
B. Weaknesses of modified online labex	
1. Less efficient than physical Labex	**57**
2. Technical issues (Unstable network; power cut; communications barrier)	43
3. Not able to feel the anatomical structure	43
4. Limited Interpersonal (peer & teacher) interactions	28
5. Hampers concentration and confidence	24
6. Misplaced the meaning of Labex	10
7. Harmful to eyes	8
C. Recommendations	
1. Physical form of Labex is best	**32**
2. Pretest and posttest with prior video uploading increases the efficacy of online Labex	22
3. Teacher's hard work during pandemic was appreciated	15
4. Special anatomy teaching apps can be used in future	3

DISCUSSION

In our study, we found laptop (55%) was most common device for online study. The monthly expenditure of participants (48.1%) in Nepali Rupees was in range of 1000-1500.The study done by Verma et al. in Rohtak, India reported 99% students found online sessions to be relevant in their learning needs during their academic course. He further reported around 57% agreed the online sessions were comfortable and understandable and only 47% agreed that online classes to be made part of their curriculum.[5] In present study, we found similar result such as 69.8% students were not satisfied with online mode of education at BPKIHS. About 93% of students agreed that recorded videos help in attending class anywhere & anytime. Further 87.6% of students agreed that they felt at loss for not being able to perform the practical manually in lab.

A similar study was done by Longhurst et al. in UK and Republic of Ireland (Roi) on "SWOT analysis of adaptations to anatomical education" to identify the approaches taken to deliver anatomical education through online means during this pandemic. For online lectures around 50% of the colleges used "Panopto" app while 36% university also used "ZOOM" app". For practical 29 % universities used "Digitalized Cadaveric Resources", 7% used "3D virtual

resources".43% universities provided support by hosting live tutorials using ZOOM app. The result also showed that 50% of the Colleges' major concern was lack of cadaveric based teaching that led to absence of better understanding.[6] At BPKIHS, mainly Dudal app was used by our administration but 81.4% of students prefer Zoom app for anatomy education according to our study. In our study we found 69.8 % students were not satisfied with the knowledge gain through internet.

Another study was conducted in Iran showed the effect of COVID-19 and application of Virtual Medical Education.[7] They concluded that, Virtual E-Learning based medical education, including multimedia study material is extremely vital to provide an acceptable education for the undergraduate medical students during this outbreak which showed agreement with our findings that is we have significant evidence ($P<0.05$) that modified online LABEX changes the scoring with an average of (1.71;1.55 & 1.09 respectively).

A study conducted by the Rajab Mohd. et al. at college of Medicine, Al Faisal University, Riyadh Saudi Arabia showed 59% of students faced the problem in communication during online session.[8] In our study, we found higher value that is, 73.6% of students responded for facing communication barrier. In present study, after thematic analysis of reflective writing, three themes were framed. Some students mentioned unique phrases in strength of modified online LABEX theme such as: The best Part of online LABEX is that we have access to recorded materials which can be used whenever we want; During pandemic it was better alternative to continue our academics because something is better than nothing.

Further under weakness of modified online LABEX theme, some of students mentioned: Online LABEX was less effective than physical LABEX for me due to poor internet and electricity in my village; Not able to touch the anatomical specimen and lack of peer interactions are major drawbacks of online anatomy LABEX.

Under Recommendation of modified online LABEX theme some students wrote: Online LABEX done until now were somewhat impressive due to YouTube videos and pre-test/post-test. But physical form of LABEX is best; By saying all this I don't mean that our teachers did not put effort to teach us better. They did hard work during pandemic which is highly appreciated.

The implication of all three themes shows all the aspects of modified online lab exercise in anatomy education. In future, the result of this study helps to reframe the mixed type of teaching-learning tool in field of medical education for better understanding for students. Due to pandemic situation, we cannot perform face to face interaction with students rather we collected the Google form from email, which was major limitation of our study.

CONCLUSIONS

Thus, modified online LABEX helps students in better understanding during COVID-19 pandemic. Although physical form of anatomy education is best way of learning but modified online LABEX can be used as alternative during pandemic like situations in future. We strongly recommend that it will be better if we can use special tools for LABEX such as digitalized cadaveric resources or 3D virtual resources in future at our institute for better understanding in Anatomy Education.

Conflict of interest: None.

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