Beliefs and expectations on digital learning and examinations among adult learners of a tertiary level health-care institution

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Abstract:

BACKGROUND: Coronavirus disease 2019 (COVID-19) constrained the regular teaching in educational institutions and hampered the teaching–learning process across the globe. E-learning method is widely used in higher education in the current situation. the objective is to assess the beliefs and expectations of the students on e-learning among adult learners of a tertiary level health-care institution.

MATERIALS AND METHODS: A single group pre-post design was adopted. Microsoft Go two-in-one devices were used to find the effectiveness of e-learning, including digital exam solution. Depending on the availability of device, 25 participants were selected for the study from three different steams. A 5-point Likert scale was used for assessing the quality, adoptability, and acceptance of digital education developed by the researchers. Chi-square/Fisher's exact or McNemar's test was used to test the association between independent or related categorical variables. Comparison of the average score between different courses was performed using the Kruskal–Wallis test.

RESULTS: Twenty-two participants who completed the final assessment were retained for the analysis. Majority of the participants believed that e-learning helps to achieve personal learning goals or objectives and bridge skill or knowledge gaps and caters to learning preferences. However, the overall quality score across the study groups was found to be statistically insignificant (Kruskal–Wallis statistic: 1.26; *P* value: 0.533).

CONCLUSION: The findings show that the adult learners in higher education, irrespective of their age differences, believe that intense e-learning support with Microsoft Go two-in-one device has a complementary effect on their learning outcome.

Keywords:

Adult, belief, COVID-19, digital education, digital learning, examinations, expectation

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Introduction

Coronavirus disease 2019 (COVID-19) constrained the regular teaching in educational institutions and hampered the teaching–learning process across the globe. Amidst the unprecedented situation, teachers used electronic technology, or e-learning platforms, which provided flexibility irrespective of the geographic location and time zones. However, adoption of a digital mechanism in the higher education system, especially health sciences education, through online lectures, teleconferencing, digital open books, online examination, and effective interaction at virtual environments, posed certain limitations.[1,2]

Facilitating the teaching–learning process during this pandemic era, Ppyrus India, a

fully owned subsidiary of Littlemore Innovation Labs Pte. Ltd, Singapore, introduced an e-learning platform and a pilot program to make digital exams and digital learning available to the Indian students who have limited access to technology and devices. The innovative remote digital exam evaluation software solution on two-in-one Intel-based PC systems allowed handwritten exams and provided cloud analytics. The present study is a part of a Project Vidhya, a pilot program at the National Institute of Mental Health and Neuro Sciences (NIMHANS) that aims to understand the belief and expectation of students on learning and examination with digital education initiatives. In addition, digital learning was evaluated with regards to usability, adaptability, and acceptability among students. The study followed an implementation and evaluation approach with newer digital pedagogy as a two-in-one teaching, learning and evaluation model as part of a funded project at the national institution.

Materials and Methods

Study design and setting
To achieve the primary outcome of the study, which was to assess the belief and expectation of the students on digital learning and its impact, a single-group pre–post design was adopted. The study was conducted at NIMHANS, a tertiary care mental health care educational institution in India.

Study participants and sampling
Depending on the availability of device, one batch of diploma, basic degree, and postgraduate students and staff was selected for the study. The representative stream of students and staff included were from Post Basic Diploma in Neuroscience Nursing (DNN) (eleven), BSc Anesthesia Technology (eight), and Master of Public Health (six). All the students belonging to the respective batches were taken as study participants.

Ethical consideration
This study was approved by the Institution Ethics Committee (No.NIMHANS/26th IEC [BS & NS DIV.]/2020-21 dated 10/16/2020). Written informed consent was taken from all the participants.

Microsoft Go two-in-one devices were used to find the effectiveness of e-learning, including the digital exam solution. These devices were also used by the students to write exams like on paper and use drawing plus other tools available in the exam software. This enhanced the students' exam writing experience and enabled the university to pilot exams using the same device with proctoring provisions.

With respect to the training, separate learning and exam cycles related to the digital learning system were assigned to the faculty and students. One feedback per cycle was also obtained to understand the issues and difficulties experienced, and an examination was conducted to students through the device. A dedicated Microsoft account was provided to each of the participants, and MS Teams platform was used for the e-learning process. This learning process was facilitated with ease of accessing online resources (like e-Journal, e-Books, and Web Browser), ease of relating the online resources with subjects/module/content, ease of handling assignments, and examinations with adequate training for the learners and faculty before the implementation.

The devices became part of the students' daily curricular activities and any digital exams conducted by the institute. Online sessions were conducted by the faculty-in-charge and students, and feedback was obtained from all users. Clear instructions were provided about the Dos and Don'ts of handling the devices.

Data collection tool and technique
The assessment tool consisted of a) demographic variables of the candidates and b) a 5-point Likert scale consisting of 24 questions for assessing the quality, adoptability, and acceptance of digital education developed by the researchers. A baseline assessment of overall impressions of the learners and their beliefs and expectations about the digital learning facility was sought on a monthly basis for 6 months. Further, responses to the general questions related to the beliefs and expectations of students about the e-learning process were obtained before initiation of learning program and Google forms were used to document the same. Responses to the same set of questions were obtained during the post pilot phase also.

There were three questions related to their beliefs and four questions related to their expectation on digital learning. Especially, the questions on beliefs in digital learning were focused on achieving personal learning goals or objectives, bridging the skill or knowledge gaps, and catering to learning preferences. However, the questions related to expectations were focused on their expectation about thinking differently on some specific topic, timely feedback on the areas for improvement, its capacity in interactivity, and challenges.

Statistical analysis
Data were captured in the Google form and transferred to appropriate spreadsheet format after data cleaning. Qualitative variables were summarized using frequencies and percentages. Test of normality was assessed using the Shapiro–wilk test. Quantitative variables were summarized using median (Q_1, Q_3) for non-normally distributed data. Comparison of averages between the different courses was carried out using the

Kruskal–Wallis test followed by post hoc analysis. Moreover, test of association between the independent or related categorical variables was performed using the Chi-square/Fisher's exact test or McNemar's test. In addition, the internal consistency among the set of items in the 5-point Likert scale for assessing the quality of digital education was assessed using Cronbach's alpha. All statistical analyses were carried out using the software IBM Statistical Package for the Social Sciences (SPSS), version 28.0.

Results

Twenty-five students were involved at the beginning, of whom 23 had completed the baseline assessment. However, 22 of them could complete the final assessment and were retained for the analysis. One candidate discontinued the course, and hence could not take up the final assessment.

We observed a statistically significant difference in age distribution between the different study groups; the highest median age of 46 (39,48) was in DNN batch [Table 1]. The post hoc analysis also showed that there existed a statistically significant difference in average age distribution between all study groups.

The beliefs and expectations of the participants on e-learning were assessed through dichotomous responses. However, the responses did not show any statistical significance before and after the e-learning process. Eventually, this indicated that their beliefs and expectations have been maintained by the digital learning process. Majority of the participants believed that e-learning helps to achieve personal learning goals or objectives and bridge skill or knowledge gaps and caters to learning preferences. Similarly, most of them expected that e-learning allows to think differently on some specific topic and receive timely e-learning feedback that focused on areas for improvement [Table 2].

The 5-point Likert scale assessed the quality of digital education and achieved a Cronbach's alpha, the measure of internal consistency, of 0.966, and this indicated that the set of items within the scales are close to each other as a group. However, the average quality score with respect to the course under study was not statistically different across the courses offered by three streams. This indicates that the difference in overall quality score was equal in all the three groups of participants (Kruskal–Wallis statistic: 1.26; *P* value: 0.533) [Table 3].

Although computers and devices are used widely in teaching and learning at higher education, the outcomes largely depends on modifying the content and fulfilling the expectations of the learners. This study has shown that e-learning experience was much satisfying. Also,

Table 1: Distribution of baseline demographic characteristics (*n*=23*)

	BScAT (*n*=7)	DNN (*n*=11)	MPH (*n*=5)	Test statistic	*P*
	Md (Q$_1$, Q$_3$)				
Age#	19 (19, 20)	46 (39, 48)	27 (26.5, 32)	17.11	<0.001
Gender					
Male	6 (85.7)	0 (0)	4 (80)	2.13	0.35$
Female	1 (14.3)	11 (100)	1 (20)		

BScAT=BSc Anesthesia Technology, DNN=Diploma in Neuroscience Nursing, Md=median, MPH=Master of Public Health, Q$_1$=first quartile, Q$_3$=third quartile *At baseline, only 23 participants responded. #Kruskal–Wallis test. $Asymptotic significance was considered

Table 2: Distribution of beliefs and expectations on e-learning (*n*=22*)

Baseline	Post evaluation, *n* (%)		McNemar's *P*
	No	Yes	
Believe that e-learning helps to achieve personal learning goals or objectives			
No	0 (0)	4 (100)	0.38
Yes	1 (5.6)	17 (94.4)	
Believe that e-learning helps to bridge skill or knowledge gaps			
No	0 (0)	3 (100)	0.66
Yes	3 (15.8)	16 (84.2)	
Believe that e-learning caters to learning preferences			
No	0 (0)	5 (100)	0.45
Yes	2 (11.8)	15 (88.2)	
Expect that e-learning would allow to think differently on some specific topic			
No	1 (20)	4 (80)	1.00
Yes	2 (11.8)	15 (88.2)	
Expect to receive timely e-learning feedback that focuses on areas for improvement			
No	1 (20)	4 (80)	0.13
Yes	0 (0)	17 (100)	
Expect that the e-learning platform possesses enough interactivity			
No	3 (33.3)	6 (66.7)	0.75
Yes	4 (30.8)	9 (69.2)	
Expect that the e-learning platform is too challenging			
No	10 (83.3)	2 (16.7)	1.00
Yes	1 (10.0)	9 (90.0)	

*Only 22 responded in both baseline and final assessments

73% of the participants felt it was very much useful, 77% of them felt the device was very much helpful in completion of the homework and assignments, and 82% of the learners felt the e-learning facility was very good.

Majority of the students (59%) reported that they did not face any problem during the e-learning

Table 3: Comparison of average scores on quality e-learning between the batches (n=22*)

	BScAT (n=7)	DNN (n=11)	MPH (n=4)	Test statistic#	P
		Md (Q₁, Q₃)			
Total score	88 (71, 100)	95 (75, 103)	80 (69.8, 94.8)	1.26	0.533

BScAT=BSc Anesthesia Technology, DNN=Diploma in Neuroscience Nursing, Md=median, MPH=Master of Public Health, Q_1=first quartile, Q_3=third quartile. *Only 22 responded in both baseline and final assessments. #Kruskal–Wallis test

cycle. Some reported connectivity issues (4.5%) and technical glitches (4.5%). Around 18% felt that they need further training to handle the device and examination.

The faculty who were involved in the program felt the Microsoft Go two-in-one device was very useful in content delivery, providing link for resources, providing timely feedbacks, and conducting tests both online and offline. The monthly feedback collected from the students helped the faculty members to fine-tune their schedules and content delivery.

Discussion

The findings of the present study suggest that e-learning has a complementary effect on students' learning outcome, which corroborates with the findings of Jun *et al.*,[3] which showed that e-learning has a complementary role in medical education and augments the level of motivation among medical students.

Scott *et al*.[4] found that locally produced e-learning resources were beneficial for learning among medical students, and the same is opined by majority of the participants in the present study.

The present study results are in concurrence with the results of a study on online learners' perception survey conducted by Balamurugan *et al.*,[5] which reported that majority of the learners perceived that online learning is effective in meeting their learning needs.

The major strength of the study is intense training, monitoring, and supervision of 25 candidates with the devices for one complete year, including various online examinations that were conducted. This exercise has given confidence to both teachers and learners who took part in the project. However, there is lack of a standardized tool to assess the quality of online or e-learning programs, which needs to be prepared for various levels of learners. Moreover, lack of a comparison group is a limitation in this study. In another qualitative study, the medical students expressed their positive view of the online learning program which was conducted during the COVID-19 period and was well accepted by the participants. Further, the authors

suggested monitoring the e-learning process in line with basic online teaching principles regularly for improving the quality and consistency of the education.[6] In spite of several positive study results toward online education and the effectiveness of online teaching in the medical field, some of the previous authors identified and concluded in their study that the medical students reported an experience of reduced learning output during the COVID-19 pandemic through the online mode of learning. Their findings specified that lack of inspiration and lack of satisfaction in clinical learning were the biggest negative contributing factors in online or digital education.[7,8,9,10] However, the present study findings revealed that the majority of the participants felt satisfied to learn through the digital pedagogy with Microsoft Go two in one. Further, the device was applied for the evaluation process too. Moreover, the present study finding is supported by many of the previous studies.[11-16] A meta-analysis from China reported that virtual reality education methods can improve nursing students' knowledge. However, it concluded that there is no difference between virtual reality and other education methods.[17] Hence, more experiments are necessary to generalize the present study findings.

Conclusion

The study results provided a comprehensive evaluation of the use of online education. The findings suggest that the adult learners in higher education, irrespective of their age differences, believe that intense e-learning support with Microsoft Go two-in-one device has a complementary effect on their learning outcome. However, for the outcomes, the regular teaching and learning process cannot be replaced totally by the e-learning system. Scrupulously planned large-scale controlled trial studies are essential to further confirm and generalize the current results.

Conflicts of interest
There are no conflicts of interest.

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