

Effectiveness of Face to Screen Learning Versus Face-to-Face Mode of Imparting Knowledge and Attitude on Organ Donation among Nurses

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Abstract-With the increasing use of technology in education, online training has become a mainstream teaching method. How effective is online learning for education of professional nurses in India remains unknown. This study is pathbreaking as the concept online is still nascent and more so among professional nurses. This research aims to unravel the impact of on line and offline teaching on organ donation amidst a group of nursing professionals. The study was conducted among nurses drawn from eight departments working in six reputed hospitals. A total of 509 nurses attempted the knowledge and attitude pre-test, a self-report 84 item questionnaire, following which they underwent either the offline or online modules on organ donation. The face-to-face sessions were delivered in person in a classroom setting and the-online lectures were made available via WISE App, a software to access the online sessions. Among the 509 only 191 (37.52%) completed the post-test which was administered after a period of 7 to 10 days.

Repeated measures Anova test was used to compare the effect of mode of teaching over pre and post test scores on knowledge and attitude on organ donation. The post test scores of those who attended the offline sessions significantly improved compared to those who attended the online session. The difference observed between pre and post scores with respect to the mode of teaching was statistically significant. (Knowledge score $P=0.002$, Attitude score, $P<0.0001$).

Conclusion: The study concluded that working nurses preferred offline modes of teaching over the online method. This debunked the commonly held notion that the functionality of offline is better than online mode and challenges the assumptions generally held owing to the advancements in the digital space and thus provides a fresh look at shaping the mode of nursing impartation.

Keywords: Online education, offline education, Nursing education, academic achievement, instruction method

INTRODUCTION

With the significant advancements in the medical and paramedical sciences it is imperative that nursing professionals keep abreast of and are up-to-date with the changing nuances in practices protocols and processes. With the increased boom in and access to technology online based learning or face to screen learning is fast growing and, in some instances, considered better than face to face. All learning that takes place digitally in an online environment is covered by the phrase "online learning"[1]. On the other hand, offline/face-to-face learning refers to instruction that is given face-to-face, whether it be in a group setting or one-on-one [2]. The quest is to assess the efficacy of an online vis a vis an offline model of training among the nursing workforce.

PURPOSE OF THE STUDY

To compare the differences in achievement between online and offline instruction methods among nurses working in six reputed hospitals in Mumbai and Navi Mumbai. The topic 'Organ donation' (OD) was identified as it is an evolving discipline with limited exposure to the nursing population.

RESEARCH QUESTION

Is there a significant difference in nurses' achievement between the incorporation of the online instruction method and usage of the offline instruction method?

RESEARCH METHODOLOGY

A comparative pre-experimental design adopting a data triangulation approach was employed in this

study. The study examined the effect of online and offline learning on the knowledge and attitude of nurses regarding organ donation.

A total of the 509 nurses were engaged in this study among them, 50.49% (257) nurses went through the online mode of teaching and 49.51% (252) adopted the offline method. A total of 37.52% (191) participated in the post test, among them 56.02% (107) took the online mode and 43.98% (84) were exposed to the offline mode of training. The nurses who were exposed to the online mode of training (n= 257) were drawn from three hospitals. They were provided training via Wise App a SAAS application accessed online. The control group were professional nurses drawn from three other tertiary hospitals of Mumbai and Navi Mumbai (n= 252) who were exposed to OD in a classroom setting. Both online and offline sessions were carried out by the researcher and the course content shared was identical. To communicate with the online participants a WhatsApp group was initiated, a detailed welcome note with the rationale for the study, expectations from the participants, relevance of the study, technical aspects of the Wise-App, a step-by-step process flow including the pre-test and post-test was outlined. Participants were required to also provide an ethical consent.

Instrument: The instrument used for data collection was a structured, copy-righted [3] multiple-choice questionnaire (MCQ) configured in three parts encompassing knowledge and attitude on OD. The first part of the questionnaire included the demographic profile of the nurses, the second part tapped into their familiarity with organ donation, which included 36 MCQ's on knowledge. The third part covered 48 attitude questions under 10 categories and was rated on a five-point Likert scale (5= Strongly agree, 4= Agree, 3= unsure/ no opinion, 2=disagree, 1=strongly disagree) of these twenty-four were

Table I Comparison of demographic variables online and offline post test

N=191

Demographics:	Online (n=107)		Offline (n=84)		p-value
	Number	Percentage (%)	Number	Percentage (%)	
1. Age					0.038
<25 Years	39	36.45	48	57.14	
25 - <35 Years	47	43.93	24	28.57	
35 - <45 Yrs	14	13.08	9	10.7	
45 & above	7	6.54	3	3.57	
2. Gender					0.000
Female	107	100	74	88.1	

positively anchored and the remaining twenty-four were negatively anchored statements. The negatively pitched questions were reverse scored for analysis. The mean Content Validity Index (CVI) was tabulated and the score was 0.756. The reliability of the tool was calculated using test- retest method and was found excellent. Cronbach's alpha for both knowledge and attitude questionnaires were computed as 0.795 and 0.85 respectively.

Ethical Consideration and Pilot study: Ethical approval was obtained from the University's Institutional Ethical committee and consent was obtained from the nurses. A pilot study was conducted among 30 nurses to assess the feasibility;15 nurses underwent offline classes and 15 were exposed to the online module. The drawbacks were rectified and integrated into the final study.

DATA COLLECTION AND ANALYSIS

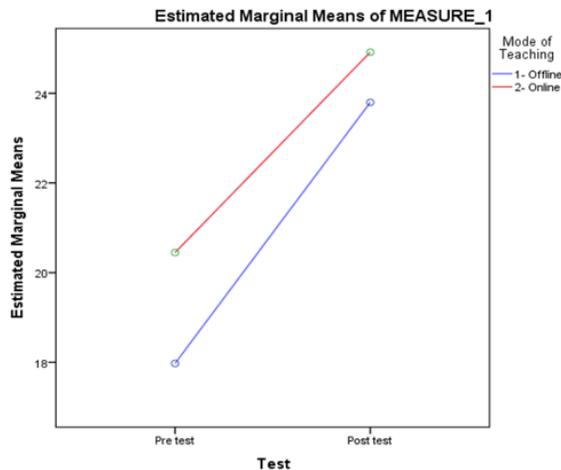
509 nurses were administered the pre-test following which the group selected for the offline mode attended a 90 mins session on organ donation which was facilitated by the researcher including a question answer session. The online group downloaded the app and the links for the 6 modules were accessed. The nurses could view the videos at their own pace. The post-test was administered through the WhatsApp on google form. The videos included the same topics discussed during the offline session. The self-prepared videos were validated by experts in the field of organ donation before being piloted. Among the 509 nurses the post test was completed only by 191 nurses among them 107 (56.02%) nurses attended the online session and 84 (43.98%) nurses attended the offline session. The final analysis was done only among the nurses who attended the sessions either virtually or physically and had completed the post test.

Male	-	-	10	11.9	
3. Education					0.246
Diploma in Nursing	30	28.04	33	39.29	
Bachelors in Nursing	68	63.55	44	52.38	
PBSc/Msc Nursing	9	8.41	7	8.33	
4. Position:					0.506
Staff Nurse	94	87.85	71	84.52	
Hear/Supervisor/Ward	13	12.15	13	15.48	
5. Current Clinical Practice					0.007
Medical Ward	39	36.45	16	19.05	
Surgical Ward	17	15.89	13	15.48	
Operation Theatre	4	3.74	7	8.33	
Maternity	11	10.28	5	5.95	
Emergency / Casualty	0	0	6	7.14	
OPD	3	2.8	1	1.19	
ICU	33	30.84	36	42.86	
6. Experience Years					0.495
< 2 Years	85	79.44	70	83.33	
3-5 years	22	20.56	14	16.67	
Mean ± SD (range)	1.68 ± 1.25				1.55 ± 1.15
7. Religion					0.001
Hindu	30	28.04	46	54.76	
Muslim	3	2.8	4	4.76	
Christian	73	68.22	34	40.48	
Buddhist	1	0.93	0	0	
8. Marital Status					0.065
Single	64	59.81	61	72.62	
Married	43	40.19	23	27.38	

Table II Online versus Offline Pre and Post-test Knowledge scores

Mode of teaching	Pre-score	Post score	RMANova - F	p-value
1- Offline (n=84)	17.98 ± 4.96	23.8 ± 5.75	10.13	0.002*
2- Online (n=107)	20.45 ± 4.59	24.92 ± 5.65		
Total (n=191)	19.36 ± 4.90	24.42 ± 5.71		

Figure 1: Improvement effected on Knowledge via the mode of teaching

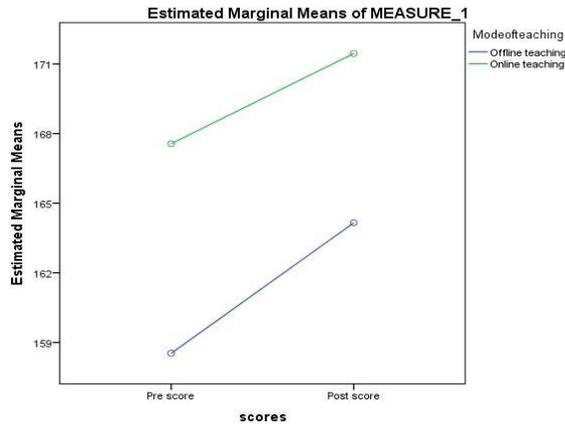


Percentage change:	Offline	Online
	32.37%	21.86%

Table III Online versus Offline Pre and Post-test Attitude scores

Mode of teaching	Pre-score	Post score	RM Anova - F	p-value
1- Offline (n=84)	158.54 ± 14.4	164.15 ± 15.4	19.73	<0.0001
2- Online (n=107)	167.56 ± 12.9	171.45 ± 13.7		
Total (n=191)	163.59 ± 14.3	168.24 ± 14.9		

Figure 2: Improvement effected on Attitude via the mode of teaching



Percentage change:	Offline	Online
	3.54%	2.32%

Table IV Comparison of Online and Offline across knowledge categories

Knowledge on Organ Donation	Online =107				p-value	Offline =84				
	Pre		Post			Pre		Post		p-value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
1. Basic concepts	3.8	0.97	4.26	1.03	0.000	3.51	1	3.85	1.3	0.052
2. Living donation	2.84	1.06	3.19	1.17	0.123	2.46	1.15	2.81	1.3	0.096
3. Deceased donation	3.94	0.89	4.23	0.84	0.013	3.48	1.17	4.02	0.97	0.002
4. Certification of Brain Stem Death (BSD)	3.09	1.18	3.83	1.22	0.0000	2.8	1.16	3.75	1.19	0.000
5. General Information related to Organ donation	2.53	1.13	3.2	1.28	0.0000	1.94	1.12	3.76	1.15	0.000
6. Legal and Ethical aspects of Organ donation	1.98	1.11	2.77	1.33	0.0000	1.87	1.21	2.52	1.43	0.003

Table 3 Data presents the knowledge levels of participants on organ donation before and after the intervention, both online and offline, and allows for comparative analysis between the two modes of delivery.

Table V Comparison of Online and Offline across Attitude categories

Attitude on Organ Donation	Online =107					Offline =84				
	Pre		Post		p-value	Pre		Post		p-value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
1. General Attitude	29.92	3.81	30.83	3.85	0.02	27.67	4.09	29.49	3.52	0.0001
2. Religious Belief	21.25	2.12	20.98	2.1	0.32	19.84	3.19	20.46	2.5	0.075
3. Family	20.47	2.57	20.57	2.14	0.71	19.61	2.29	19.92	2.7	0.306
4. Body Image	7.12	1.49	7.48	1.49	0.029	6.23	2.08	6.89	2.19	0.002
5. Medical Care	7.68	1.38	7.85	1.19	0.25	7.06	1.39	7.27	1.44	0.205
6. Role as a Nurse	12.78	1.62	13.73	2.03	0.000	12.69	1.61	13.15	2.03	0.049
7. Live Vs Cadaver	19.59	2.42	19.9	2.41	0.268	18.98	2.01	19.13	2.14	0.576
8. Legal	19.99	0.22	20.64	2.33	0.006	19.08	2.24	19.58	2.22	0.087
9. Discrimination	15.04	2.46	15.19	2.35	0.521	13.94	2.46	14.4	2.49	0.033
10. Finance	13.7	1.98	14.25	2.16	0.015	13.44	2.00	13.84	1.89	0.108

Table V displays the mean and standard deviation (SD) of respondents' attitudes towards organ donation from both online and offline sources.

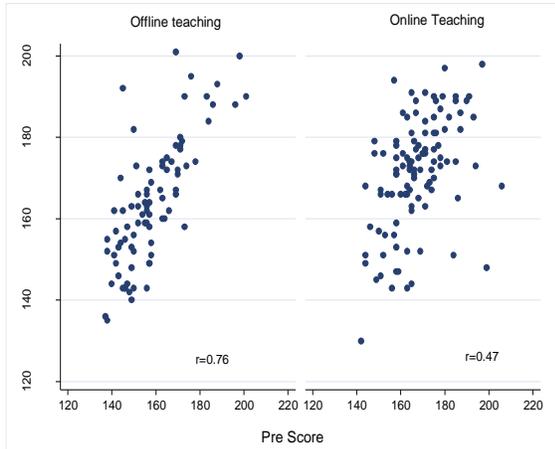


Figure 3 The scatter plot depicts the positive correlation between attitude score between Pre and Post scores in Offline & Online mode of teaching which was highly significant ($p=.000$, $r= 0.795$)

RESULTS

Of the 509 nurses on whom the study was conducted 50.49% (257) nurses went through the online mode of teaching and 49.50% (252) adopted the offline method. A total of 37.52% (191) participated in the post-test, among them 56.02% (107) took the online mode as against 43.98% (84) who were exposed to the offline mode of training. These nurses were drawn from six different hospitals across Mumbai and Navi Mumbai, wherein nurses from three hospitals were imparted training online and the four were given offline inputs. The maximum number of participants were aged 28.08 ± 8.16 . 94.76% were females and only 5.24% were males. Majority, 58.64% (112) had completed bachelors in nursing whereas 32.98% (63) were diploma holders, only 7.85% (15) were PBBSC certified and a mere 0.25% (1) with a post graduate degree. A significant majority, 86.39% (165) were staff nurses whereas 6.28% (12) held a position of head nurse/ ward sister, 2.62% (5) were team leaders, 3.14% (6) were supervisors and 1.57% (3) were nurse educators. The largest group of nurses 36.13% (69) were drawn from the ICU followed by 28.8% (55) from medical ward, this was closely followed by 15.71% (30) from the surgical ward. 8.38% (16) were maternity nurses and 5.76% (11) worked in operation theatres. 3.14% (6) and 2.09% (4) were drawn from emergency/ casualty and OPD respectively. The mean duration of experience was 1.63 with a SD of 1.21 and

range of 1-5 years, thus most of the nurses were comparatively young at age with a bulk 73.82% (141) having an experience of one year. 7.33% (14) had an experience of two to three years while 6.28% (12) and 5.25% (10) had an experience of five and four years respectively. Just under 60% (107) were Christians and about 40% were Hindus. While a majority 65.45% (125) were single, 34.55% (66) were married. The comparison of demographic variables of the online versus offline group are detailed in Table No: I.

Repeated measures Anova test was used to compare the effect of Mode of teaching over pre and post test scores on Knowledge and Attitude [Table No: II and Table No: III]. The comparison knowledge levels of participants on organ donation before and after the intervention, both online and offline, and allows for comparative analysis between the two modes of delivery. The mean scores of online participants in all categories of knowledge on organ donation were higher than the offline participants in both pre and post-test. The standard deviation for both online and offline participants were relatively similar indicating that both groups had a similar spread of scores [Table IV].

The results indicated a 21.86% improvement on the online group whereas a 32.37% enhancement was clocked among the offline group [Figure No:1], and for attitude a 2.32% improvement on the online group whereas a 3.54% improvement in the offline group post the training [Figure No: 2]. The difference observed between pre and post scores with respect to the mode of teaching was statistically significant Knowledge ($p =0.002$) Attitude ($p <0.001$) proving that the offline mode of teaching was more effective for the nursing population studied. No statistically significant association was observed between the knowledge or attitude scores with the demographic variables.

DISCUSSION

Across the board, the knowledge scores significantly improved on the offline mode or the class room teaching. This is in line with several existing studies conducted in recent times, albeit on non-nursing professionals. The findings were supported by studies done by [4] [5] [6] [7]. Research by Kasim MM and Shohor who studied on nurses working in critical care units, found education on OD enhanced their awareness of donor eligibility and brain death. [8]

Another study by Kim M and Shin M compared the effectiveness of an online education program to a traditional face-to-face program on knowledge regarding stem cell donation among nursing students found that both modes of learning were equally effective [9]. Study by Steenaart E, Crutzen R, Candel MJM, de Vries NK also pointed to face to-face education [10]. However, a study by Paul J and Jefferson F who compared student performance between online vs. face-to-face found improvement across both online and offline mode [11]. Conversely, research by Shahzad SK, Hussain J, Sadaf N, Sarwat S, Ghani U and Saleem R concluded that online training improved overall knowledge scores [12]. Overall, the research carried out presents a range of conclusions albeit a majority of the studies reiterate an edge towards classroom training.

The attitude scores of the present study on OD showed an improvement of 2.32% and a 3.54% post the face to screen exposure and face to face mode respectively, concluding that the offline group were more positively impacted in terms of their attitude shift as compared to the online group. This relationship was found to be statistically significant ($p < 0.001$).

The attitude was categorized under 10 buckets and the analyses are as follows: For role as a nurse, the mean score increased by 7.44% in the online group (from 12.78 to 13.73) and by 3.63% in the offline group (from 12.69 to 13.15). The p-value for the online group was 0.000, indicating a significant improvement in attitude towards organ donation, whereas the p-value for the offline group was 0.049, suggesting a lower level of significance. In terms of live vs. cadaver, the mean score increased by 1.63% in the online group (from 19.59 to 19.9) and by 0.78% in the offline group (from 18.98 to 19.13). However, the p-value for both groups was not significant, indicating that the change in attitude was not statistically significant. For legal, the mean score increased by 3.25% in the online group (from 19.99 to 20.64) and by 2.16% in the offline group (from 19.08 to 19.58). The p-value for the online group was 0.006, indicating a significant improvement in attitude towards organ donation, whereas the p-value for the offline group was 0.087, suggesting a lower level of significance.

On discrimination the mean score for the online group increased slightly from 15.04 to 15.19, which represents a 0.99% improvement. The offline group

had a larger increase from 13.94 to 14.40, which represents a 3.31% improvement. The p-value indicates that the difference in improvement between the two groups is statistically significant ($p=0.002$). In this comparative analysis of attitudes towards organ donation, it was observed that the mean scores for most attitude categories were higher in the post-test for both online and offline groups, indicating a positive change in attitude towards organ donation. Table V displays the mean and standard deviation (SD) of respondents' attitudes towards organ donation from both online and offline sources. The efficiency of offline and online interventions in changing attitudes towards organ donation. The results imply that both interventions can improve attitudes, but offline interventions are more successful. [Table no: V]

However, the percentage improvement of attitude scores was higher in the offline group (3.54%) compared to the online group (2.32%). This suggests that the offline intervention was more effective in improving attitudes towards organ donation. This is in line with studies by other researchers who evidenced a similar positive change in attitude while adopting a classroom training approach [8] [12] [13] [14].

The findings suggest that both interventions can be effective in improving attitudes, but offline interventions were found to be more effective. This could be attributed to the opportunities for dialoguing and clarifying the questions and concerns that the offline group had thereby providing a platform for a healthy debate and discussions which brought a more pronounced positive shift in their attitude.

It was interesting to note that the online group had a higher mean on most of the categories in the pre and post assessments. This may be attributed to the composition of the nursing professionals drawn from high end hospitals in Mumbai/ Navi Mumbai. It is surmised that these nurses owing to their placement having had a higher exposure, a better environment and a deeper understanding of organ donation thereby predisposing to a more positive outlook with regards to OD thus resulting in higher pre-test scores. However, the percentage improvement was observed in the cohorts exposed to the classroom training. The scatter plot depicts the positive correlation between attitude score between Pre and Post scores in Offline & Online mode of teaching which was highly significant ($p=.000$, $r= 0.795$). [Figure 3] This signifies that the classroom interactions bring about a higher

shift in the attitude of the participants such a shift in the improvement may be attributed to the interactions, dialoguing, discussions and iterations that the classroom training offered. Thus, a deeper understanding of OD is perhaps evidenced among the classroom trained cohorts. Radunz S, Juntermanns B, Heuer M, Frühauf NR, Paul A, Kaiser GM, researched the effect of education on the attitude of medical students towards organ donation. The study revealed that 42% of the students' attitude towards organ donation enhanced, while 57% of the students said it had no impact at all [15].

The findings of the present study did not surface any association between the post-test knowledge and demographic variables. Study conducted by Jain M, Yadav NR, Sharma A, Singh S, Jain V, Khanna B, Singh A, Chhibber R on Fostering cognizance of organ donation: An education-based approach where the knowledge and attitude ratings were associated across a range of characteristics like gender, education, and age. After the educational programme, it was discovered that there was a statistically significant difference between knowledge scores between males and females. Whereas when additional variables were evaluated, there was no discernible difference. Also, it was observed that when the variables were examined for attitude scores, a significant difference was only detected between the study participants' age groups and there was no statistical difference between any other factors [14].

The qualitative analysis of feedback received from the participants pointed to the online modules being rated very highly with an average of 4.5. on a 5point scale. However, when they were quizzed on the preferred mode of learning, nine out of ten participants stated their propensity to adopt offline method for learning. The reason being the opportunities for interactions, internalizations and integration of learning in offline mode of delivery is viewed as much more value adding vis- a -vis an online mode. Thus, factors such as opportunities to question, clarify, engage and experience sharing were seen to be important elements of the learning paradigm. This is validated in the results that emerged in the quantitative analysis and supported by other researchers. A study done to assess the effectiveness between online and offline class, among 16 students of university Ibnu Khaldun found that the class room sessions were significantly effective compared to the online sessions where the

school children found the classes more interesting, due to better understanding of the topic, classroom interaction with the lecturer and students made the whole learning an enjoyable experience [16].

According to Paul and Jefferson, Face-to-face dialogues in the classroom cover the main topics and offer prompt responses that assist students in resolving their concerns. A well-organized classroom speeds up higher order thinking, which may be very helpful in pursuing research projects and other class assignments [11]. Overall, offline sessions promote class interactions and encourage students to become active participants in the learning process. The present study is in contrast with a study done by Kemp and Grieve, where teachers could immediately alter and improve their teaching methods in offline mode to increase student performance and engagement [17]. Whereas it was contrast to a study performed by Zheng, M., Bender, D. & Lyon, C. The findings concluded that while the average score for the online class was 78, the average score for the offline course was 70. The students rated their levels of satisfaction and learning using a 7-point Likert scale. The average satisfaction score for the online class was 6.15 while the average satisfaction score for the offline class was 5.90 [18]. A study by Zulaikha Mohd Basar, Azlin Norhaini Mansor, Khairul Azhar Jamaludin, et al. in 2020 asserted that attitude towards the use of technology in learning plays a pivotal part in developing acceptance to use the technology. Undeniably, the shift from face-to-face to online learning has provided students with personal experiences in using technology as a learning platform during the pandemic. Thus, their attitude might lead to behaviour intention to use technology for learning [19].

Limitations: The key limitation of the study was that the sampling was taken from merely six hospitals. Government hospitals were untapped. A convenience sampling was employed which may not be representative of the larger universe of nurses.

IMPLICATIONS FOR NURSING PRACTICE AND ADMINISTRATION

This study debunks the myth that the online mode of training is better when compared to a face-to- face intervention. Thus, any Continuing Nursing Education

(CNE) initiatives should necessarily integrate a face-to-face component in the impartation to ensure maximal impact.

IMPLICATIONS FOR NURSING EDUCATION

The current study has demystified the notion and has pointed the need for face-to-face interaction as a critical component in the learning paradigm. Thus, there is a significant need to adapt the education strategies to continue the face to-face interactions in the curriculum built up and delivery.

SUGGESTIONS FOR FURTHER RESEARCH

Given the plethora of contradictory research findings with regards to online and face-to-face learning it is appropriate to invest significantly on multi-dimensional, multi-geographical studies to unravel the nuances of online versus offline training. Additionally, given the inhibitions of the nurses to embrace online mode there is a need for research around the psychosocial factors that contribute to such reticence and find effective coping mechanisms to address these squarely such that maximal benefit of the online mode is realised by the nursing community.

CONCLUSION

The study concluded that while improvement was evident across both online and offline mode of training, the extent of improvement was higher in the offline group in knowledge and attitude. This reiterates the need to review the pedagogy and curriculum construction to ensure a comprehensive approach is leveraged.

REFERENCE

- [1] Sander Tamm What is the Definition of E-Learning? Defining what is e-learning is not as easy as it might first appear Jan 11, 2023 <https://e-student.org/what-is-e-learning/>
- [2] Georgina Cooke Online learning vs face to face training July 5, 2022 <https://www.elucidat.com/blog/online-learning-vs-face-to-face-learning/>
- [3] The Knowledge and Attitude of Nurses on OD questionnaire was copyrighted by Copyright office Government of India, Registration number L-116937/2022, Diary no: 15297/ 2021-CO/L.
- [4] Fiqhi Liesdistiana F and Rachmah N J ETALL English Language Education Study Program, FKIP Universitas Lambung Mangkurat Banjarmasin Volume 3 Number 1 2020 ELF Online vs offline 26th Feb 2023.pdf
- [5] Mohd Basar Z, Mansor A N , Jamaludin K A , Alias B S. The Effectiveness and Challenges of Online Learning for Secondary School Students – A Case Study <https://eric.ed.gov/fulltext/EJ1309475>.
- [6] Weaver M, Spigner C, Pineda M, Rabun KG, Allen MD. Knowledge and opinions about organ donation among urban high school students: pilot test of a health education program. *Clin Transplant*. 2000 Aug;14(4 Pt 1):292-303. doi: 10.1034/j.1399-0012.2000.140404.x. PMID: 10945199.
- [7] The Effectiveness and Challenges of Online Learning for Secondary School Students – A Case Study Zulaikha Mohd Basar¹ , Azlin Norhaini Mansor² , Khairul Azhar Jamaludin^{3*} , Bity Salwana Alias - *International Journal of Academic Research in Business and Social Sciences* DOI- 10.6007/IJARBSS/v11-i6/10089 <https://files.eric.ed.gov/fulltext/EJ1309475.pdf>
- [8] Kasim, M. M., & Shohor, N. A. (2021). The Effectiveness of Organ Donation Education on Knowledge and Attitude Among Intensive Care Nurses. *International Journal of Academic Research in Business and Social Sciences*, 11(6), 115–126.
- [9] Kim M, Shin M. Effect of Educational Program on Knowledge, Attitude, and Willingness of Nursing Students for Hematopoietic Stem-Cell Donation. *Int J Environ Res Public Health*. 2019 Oct 1;16(19):3696. doi: 10.3390/ijerph16193696. PMID: 31581423; PMCID: PMC6801682. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6801682/>
- [10] Steenaart E, Crutzen R, Candel MJJM, de Vries NK. The effectiveness of an interactive organ donation education intervention for Dutch lower-educated students: a cluster randomized controlled trial. *Trials*. 2019 Nov 21;20(1):643. doi: 10.1186/s13063-019-3882-6. PMID: 31752975; PMCID: PMC6873467.
- [11] Paul J and Jefferson F (2019) A Comparative Analysis of Student Performance in an Online vs. Face-to-Face Environmental Science Course

- From 2009 to 2016. *Front. Comput. Sci.* 1:7. doi: 10.3389/fcomp.2019.00007
- [12] Shahzad SK, Hussain J, Sadaf N, Sarwat S, Ghani U and Saleem R Impact of Virtual Teaching on ESL Learners' Attitudes under COVID-19 Circumstances at Post Graduate Level in Pakistan *English Language Teaching*; Vol. 13, No. 9; 2020 ISSN 1916-4742 E-ISSN 1916-4750 Published by Canadian Center of Science and Education <https://files.eric.ed.gov/fulltext/EJ1266603.pdf>
- [13] Thapa P, Bhandari SL, Pathak S. Nursing students' attitude on the practice of e-learning: A cross-sectional survey amid COVID-19 in Nepal. *PLoS One.* 2021 Jun 24;16(6):e0253651. doi: 10.1371/journal.pone.0253651. PMID: 34166444; PMCID: PMC8224981. {objective 4}
- [14] Jain M, Yadav NR, Sharma A, Singh S, Jain V, Khanna B, Singh A, Chhibber R. Fostering cognizance of organ donation: An education-based approach. *J Family Med Prim Care.* 2019 Dec 10;8(12):4021-4026. doi:10.4103/jfmpc.jfmpc_762_19. PMID: 31879653; PMCID: PMC6924223.
- [15] Radunz S, Juntermanns B, Heuer M, Frühauf NR, Paul A, Kaiser GM. The effect of education on the attitude of medical students towards organ donation. *Ann Transplant.* 2012 Jan-Mar; 17(1):140-4. doi:10.12659/aot.882648. PMID: 22466921. <https://pubmed.ncbi.nlm.nih.gov/22466921/>
- [16] Ibnu Khaldun. (2019). The effectiveness of classroom training compared to online training for employee development. *International Journal of Scientific & Technology Research*, 8(10), 1872-1878.
- [17] N. Kemp, R. Grieve, Face-to-Face or face-to-screen? Undergraduates' opinions and test performance in classroom vs. online learning. *Front. Psychol.* 5, 1278 (2014). <https://doi.org/10.3389/fpsyg.2014.01278>
- [18] Zheng, M., Bender, D. & Lyon, C. Online learning during COVID-19 produced equivalent or better student course performance as compared with pre-pandemic: empirical evidence from a school-wide comparative study. *BMC Med Educ* 21, 495 (2021). <https://doi.org/10.1186/s12909-021-02909-z>
- [19] Zulaikha Mohd Basar, Azlin Norhaini Mansor, Khairul Azhar Jamaludin, et al. (2020). Effectiveness and challenges of online learning for secondary school students: A case study in Malaysia *Journal of Educators Online*, 17(2), n2. Face 2 F better