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Blended learning approach for teaching cardiac disorders on nursing students' learning outcomes

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Abstract---Background: Modern Education has been transformed into an instant and self-driven online learning. Blended learning is a way to get the best of both traditional classroom and online learning. Aim: The aim of the study was to find out the effectiveness of Blended learning on Nursing Students' learning outcomes regarding management of Cardiac Disorders. Methods: A True Experimental study with post-test only control group design was carried out among a Cluster random sample of 271 nursing students studying in Punjab and Haryana. The tools used for data collection were: Structured Knowledge Questionnaire for assessment of knowledge, OSCE for assessment of skills and Case Scenario based questionnaire for the assessment of clinical decision making. The students in Blended Learning group were taught regarding cardiac disorders by Blended learning including web environment as well as contact classes by the Researcher whereas the students in the Conventional Learning group received Conventional method of teaching. It was a double-blinded study. Results: SPSS 21.0 was used for data analysis. There were statistically significant differences between groups in skills and clinical decision-making but not in knowledge. Conclusion: Blended Learning is an effective method to improve learning outcomes of nursing students regarding management of cardiac disorders.

Keywords--- blended learning, nursing students, learning outcomes, cardiac disorders.

Introduction

Heart failure affects over 26 million individuals worldwide and is one of the top causes of hospitalisation in the United States and Europe. With patient-centered education in mind, student nurses must build theoretical understanding of heart failure management as well as abilities in providing patient education, which will aid them in making the essential transition from the clinical setting to real-world patient care. Although undergraduate nursing students are taught about heart disease concepts, primarily heart failure concepts, as part of their curriculum, it is unclear if they will be able to gain sufficient knowledge, skills, and confidence in caring for patients in hospitals.^[1] Since knowledge could well be taught to a large number of nurses at the same time, traditional lecture-style nursing education is most commonly used. Today, however, nursing educators are becoming increasingly conscious of the fact that e-learning is an innovative, learner-centered, and participatory approach of delivering instruction.^[2]

Need and Justification

Blended learning employs a variety of methodologies depending on the subject matter, including online learning strategies and cost-effective offline methods that emphasise on student collaboration. Blended learning has numerous advantages in terms of learning standardised patient care and hands-on learning, as well as increasing nursing students' performance and skills.^[3] In today's environment, healthcare necessitates experience, clinical judgement, speedier decision-making, clarity of communication, and a plethora of other abilities, many of which involve familiarity with dynamic healthcare technology. Blended learning is a requirement, not an option, to ensure that nursing students are well equipped, educated, and fortunate enough to make a meaningful influence in 21st-century healthcare.^[4] Despite the fact that blended learning approaches are increasingly being employed in several fields of education, there is little research on the impact of blended learning in nursing education. Furthermore, the researcher, who is also a nurse educator, intended to demonstrate the importance of the new teaching environment in equipping students to care for patients with heart disease.

Aim

The study was carried out with following objectives to achieve:

- To evaluate and compare the efficacy of a blended learning strategy on student nurses' knowledge, competencies, and clinical decision-making skills in managing cardiac ailments.
- To correlate the learning outcomes of nursing students i.e. "knowledge, skills, and clinical decision-making".

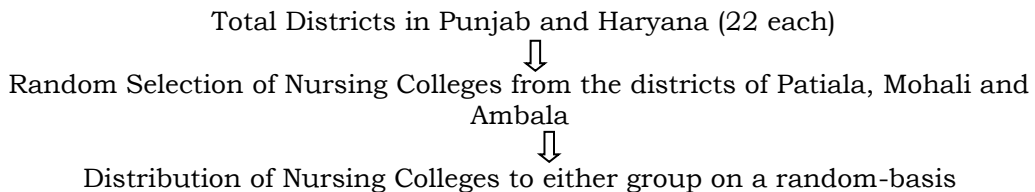
Materials and Methods

Study Design

It was a double-blinded true experimental study conducted at five nursing colleges of Punjab and Haryana. Students had no idea which group they were in, and data was collected by faculty members from the different colleges, who were also blind to student participation in both groups.

Setting and Participants

Students in the second year of nursing at five nursing colleges in Punjab and Haryana were chosen for this study. (A total of 271) They were divided into two groups (blended learning [n = 138] and traditional learning [n = 133]) at random. Nursing colleges were identified using a cluster sampling technique. The corresponding number of colleges in the states of Punjab and Haryana are 105 and 36. Using the lottery technique, nursing colleges were assigned to one of two groups: blended learning or traditional learning.



Flow-chart for Sampling Technique

For the calculation of sample size, results from evidences of already conducted studies were taken. Power analysis (Cohen's $d=0.39$) was carried and considering a sample attrition, ten percent additional sample of students was taken for the study. Data were collected in the months of September 2019 to December 2019.

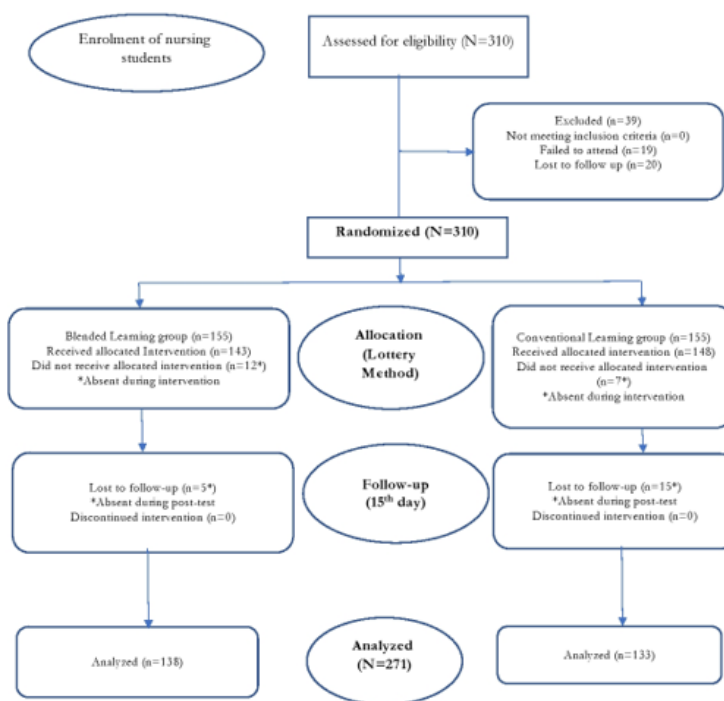


Figure I. Consort diagram for sample selection

Blended Learning as an Intervention

The objective was to provide the students with a blend of learning so that they can perform care of patients having cardiac disorders. A structured intervention in which teaching content was prepared in context of the learning outcomes of nursing students. The focused areas in the content included “discussion regarding Anatomy and Physiology of Cardiovascular system, assessment of the heart including diagnostic tests employed for the diagnosis and complete description of Myocardial Infarction and Heart Failure including etiology, pathophysiology, signs and symptoms, diagnosis and treatment”. The content was reviewed and validated by the experts. The teaching content including content, power-points and videos was uploaded on the weblink exclusively prepared for the purpose of this study. On the weblink, the teaching content was organized under two broad categories named as “Introduction about Cardiovascular System” covered in two modules about concept of heart (one hour) and procedures included in the assessment and diagnosis of cardiac disorders (two disorders); and the second category was “Cardiac disorders” having a total of three modules covering coronary artery disease (30 minutes), myocardial infarction (1 hour 30 minutes) and heart failure (3 hours). The modules had hours based upon the content given in the syllabus. Individual student usernames and passwords were generated and distributed. Because the researcher was able to track the pupils' progress, they received SMS texts as reinforcement. In the interim, the researcher planned to hold contact classes to clear up any doubts and demonstrate how to manage with heart illness to pupils.

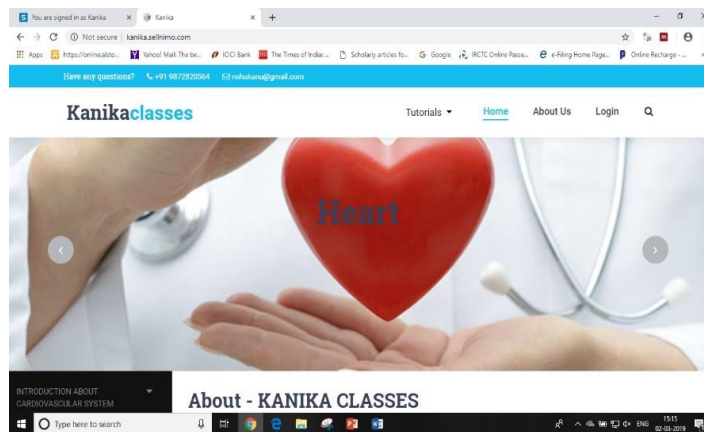


Figure II. Interphase of Web Portal

Outcomes and Instruments

The comparison of students' knowledge of cardiac disorders was done through the post-test of 35-item questionnaire. The knowledge was measured 15 days after the administration of blended learning and conventional learning to the respective groups. Students' skills related to care of patients was measured using an Objective structured clinical examination (OSCE). The OSCE consisted of 5 stations having specific skills at each station to be performed related to care of cardiac patients. The clinical decision-making of students was measured using a case scenario based structured questionnaire having two parts regarding Myocardial Infarction and Heart Failure. Part one included 9 items and part two had 12 items.

Data Collection

On the first day, all students completed a Proforma for socio-demographic information as well as a Questionnaire for general digital device anxiety. Students were randomly allocated to one of two groups: blended learning or traditional learning. Student in the blended learning group were given individual usernames along with passwords, and on the first occasion when the students logged in, the researcher ensured that they are able to see the content that was already uploaded on the web portal. The researcher then observed the students' progress on studying the content on a regular basis and sent text messages to the students to encourage them to read the topics carefully and in totality. The students allocated to the intervention group also received physical classes by the researcher in which the queries related to the online content or playing of videos were resolved as well as demonstrations of doing ECGs and interpretation of basic ECGs were given. During the face-to-face classes, two case studies were addressed to the students, which were similar to those obtained in the clinical decision-making evaluation post-test among students. On day 15, after the completion of classes in both groups, the post-assessment of knowledge, abilities, and clinical decision-making was conducted.

The socio-demographic characteristics form, as well as a questionnaire on general apprehension of digital devices, took the students roughly 15 to 20 minutes to answer. The knowledge assessment took the students roughly 30-35 minutes to complete. Each student took 5-7 minutes to complete the OSCE Post Skills Test. Finally, the students took 20-25 minutes to finish the clinical decision-making questionnaire. On the first day of class, students in the traditional learning group completed a form for socio-demographic information as well as a questionnaire on general anxiety of digital devices. Following that, the researcher took the heart disease lectures herself, applying the conventional teaching approach of both a chalkboard and power-point slides. The researcher also demonstrated how to perform an ECG and how to interpret an ECG. Following the completion of the course, a post-assessment of knowledge, abilities, and clinical decision-making was given on day 15.

Content Validity and Reliability of Tools

The items of the knowledge test were constructed from the content related to assessment and management of cardiac disorders. An objective structured questionnaire was developed and validated for the assessment of skills of students. For the assessment of clinical decision-making abilities, a case scenario-based questionnaire was prepared. A panel of content experts (nine members) reviewed the content, and suggested few minor changes. The pilot study was then carried out (N = 40), resulting in Kuder-Richardson 20 of 0.72 for knowledge questionnaire and a Cronbach's alpha value of 0.70 and 0.67 separately for OSCE and Clinical Decision-making Questionnaire.

Ethical Considerations

Ethical consideration for conducting the study was obtained from the institutional ethical committee and the ethical number was also issued. A formal regulatory permission for the present research was obtained from the respective nursing school administrators, and the context of the research study was informed to the sample of study prior to collecting the data. Participants gave their well-versed accord and were ensured that their responses would be treated confidentially.

Results

The analysis of collected data was carried out by using SPSS version 21.0.

Knowledge, Skills, Clinical Decision-making

The nursing students in both the groups were comparable and homogeneous in terms of digital device anxiety and previous session marks which was analysed using unpaired t-test. Kolmogorov Smirnov test was applied to check the normality of data. The extent of difference between knowledge, Skills and Clinical Decision-making between the groups was analysed using Mann-Whitney U test and unpaired t-test (Table 1). The results showed significant differences between the groups in terms of skills and clinical decision-making but there was no difference in knowledge scores of nursing students in both the groups.

Table I
Knowledge, skills and Clinical Decision-making scores for both groups

	Blended Learning ^a	Conventional Learning ^b	p-value
Knowledge	140.56	131.27	0.33 ^{U (M)}
Skills	13.78 (5.14)	12.63 (4.36)	0.05 ^{*t}
Clinical Decision-making regarding MI	12.44 (2.14)	11.84 (2.48)	0.03 ^{*t}
Clinical decision-making regarding Heart Failure	151.05	120.38	0.001 ^{* U (M)}

Data is presented as Mean (S.D)/ Mean Rank

^t unpaired t test value

^{U (M)} Mann Whitney U test value

Correlation

Karl Pearson Correlation coefficient was used to determine the correlation, the values of which reflected a moderate positive significant relationship between knowledge, skills and clinical decision-making. (Table 2)

Table 2
Correlation between Knowledge, skills and Clinical Decision-making

	Knowledge	Skills	Clinical decision-making HF
Knowledge	-	-	-
Skills	0.52 (0.000 ^{**})	-	-
Clinical decision-making HF	0.52 (0.000 ^{**})	0.54 (0.000 ^{**})	-
Data is presented as r (p-value)			

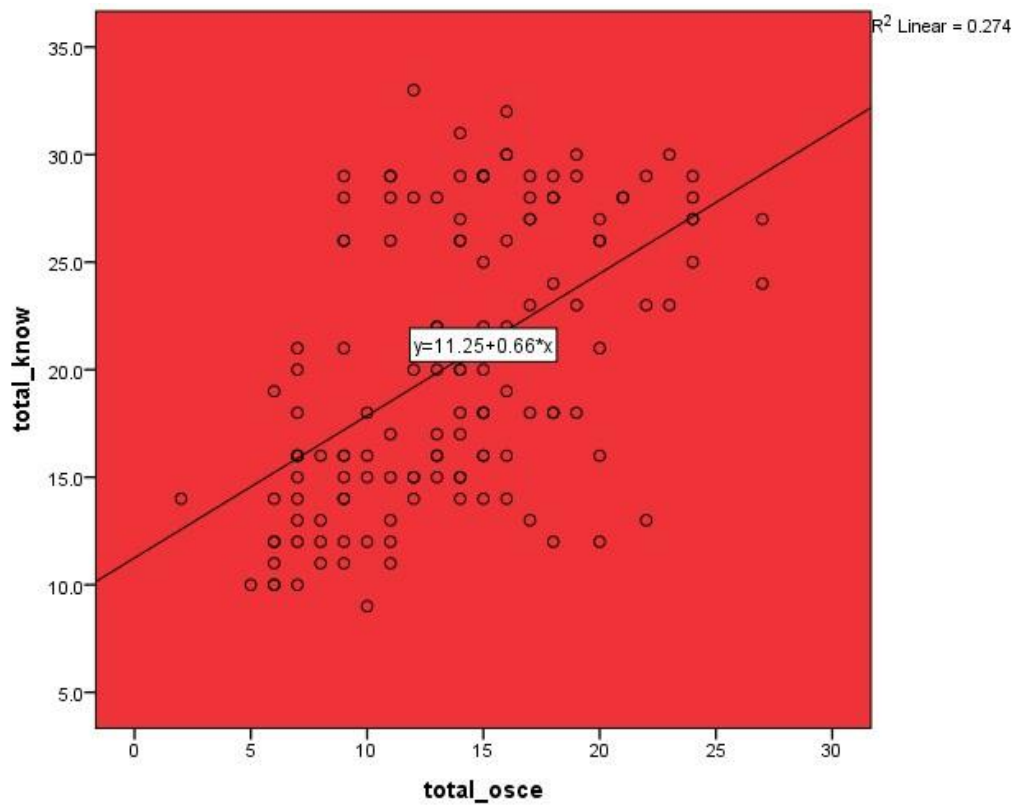


Figure III. Scatter plot showing Correlation between Knowledge and Skills of Nursing Students

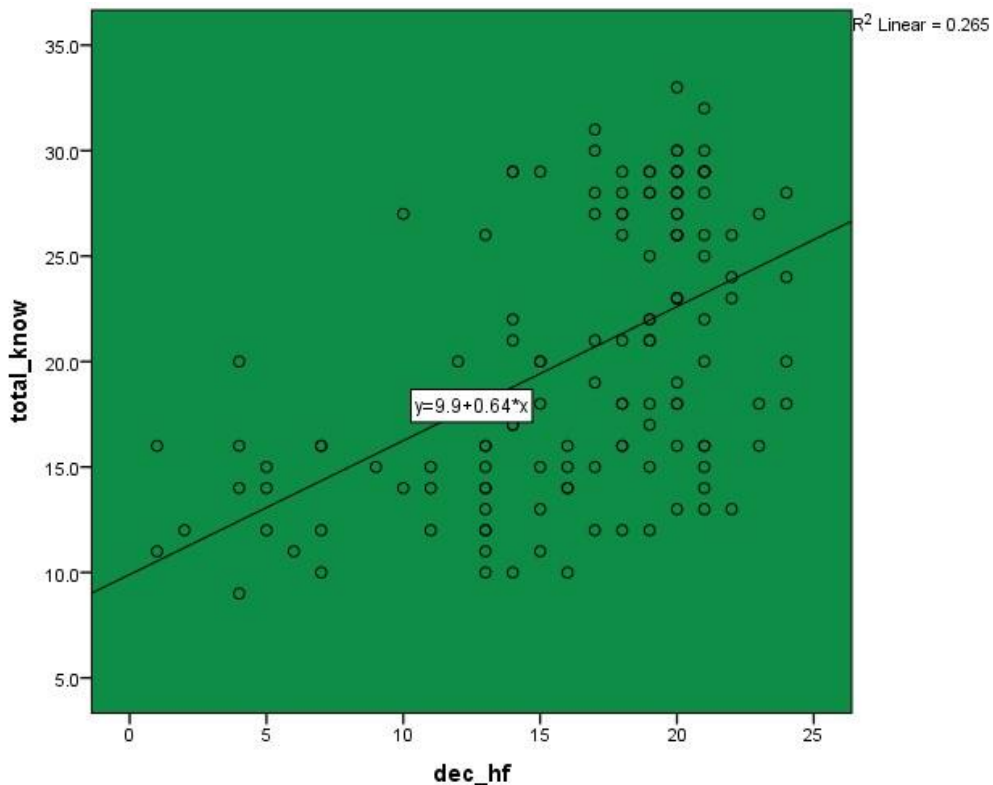


Figure IV. Scatter plot showing correlation between Knowledge and Clinical decision-making of Nursing students

Discussion

As there is a continuous increase in the utilization of web resources, there are so many options available for the educators to choose the best possible and suitable intervention for their students. Blended learning has proved to be effective in improving the achievement scores, level of understanding and knowledge score as well as performance of students. The present study reflected a significant difference in the learning outcomes except knowledge among students taught with blended or conventional learning. Some studies have demonstrated results in favour of blended learning where it was found to be effective in improving knowledge scores, satisfaction, clinical performance and critical decision-making of nursing students.^[5-7] These results were contradictory to the findings of previous literature that showed no significant difference between the different instructions i.e. e-learning and Lecture method or using blended learning in improvement scores of the students.^[8-10]

Limitations

Students' learning styles were not assessed prior to the intervention in this study, however this may be reasonable given students' increased interest in accessing online materials/educational websites to learn about the topics. This inspired the

researcher to create a teaching method that incorporates both e-learning and traditional lectures. Another study drawback was student attrition, since some students did not engage in the intervention or only a few in the post-test, and these students had to be excluded. Despite this limitation, the study's sample size requirement, as determined by the performance analysis, was met.

Conclusion

There is not much offerings from the literature that have been carried out on the effectiveness of blended learning particularly in the nursing field. Nurses require continual updates on disease conditions, treatments, and the development of new abilities, which necessitates the usage of e-learning in their jobs. The study can even be replicated on a larger sample of nursing students.

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