

THE EFFECTIVENESS OF JIGSAW COOPERATIVE LEARNING STRATEGY AMONG BACHELOR NURSING STUDENTS AT ZIAUDDIN UNIVERSITY, KARACHI

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ABSTRACT

Objective: This study aimed to determine the effectiveness of the jigsaw cooperative learning strategy among Bachelor nursing students.

Material and Methods: The quasi-experimental study was conducted from July to December 2021 at Ziauddin University Faculty of Nursing and Midwifery, Karachi, among 60 students of 4th year BSN, approached by non-probability consecutive sampling method. The willing students of BSN year VI were included. The participants were divided into A and B groups. Group A was interventional, and group B was non-interventional. Independent t-test, Mann-Whitney U test, and Fisher exact test were applied for inferential statistics.

Results: The majority, 80% of the participants were female, and almost half, 31 (51.67%) study participants were between 23-26 years. The average score of the participants through jigsaw cooperative learning and lecture method was 18.73 ± 3.5 and 14.13 ± 2.42 , respectively. Moreover, it was also found to be statistically significant (p -value < 0.001).

Conclusion: It is concluded that the jigsaw cooperative learning strategy was found effective as compared to the traditional teaching style. To increase the quality of education in the health sectors, the educational system must accept and apply modern interactive technologies.

Keywords: Jigsaw method, lecture method, nursing students

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INTRODUCTION

The learning technique has a great influence on the learner's understanding of knowledge, efficient exchange of ideas or information, and exhibits a positive attitude toward their education.

Teaching contains traditional and cooperative learning techniques, where the cooperative is called the student-based learning approach because of their full involvement.¹

Cooperative learning is a method that aroused widespread research interest in recent years and is hailed as one of the greatest innovations in the education sys-

tem. In it, learners are not only responsible for their learning but also the learning of others.

Learners help each other in groups to learn educational content, carry out group projects, and master different subjects by cooperating and consulting with peers and imparting knowledge to them.²⁻⁶ The JCL or jigsaw puzzle constitutes a well-structured cooperative learning technique that has been successfully used to improve student academic performance.

Jigsaw puzzle technology is based on the philosophy that when the subject of learning can be taught to others, once it is acquired, learning can be best developed.⁷

In the 21st century, the current education system demands stimulating students' critical thinking with active class participation to promote effective and quality education. Cooperative teaching-learning (CTL) is a student-centered approach that enables them to remain engaged in learning activities with personal interest.¹

Moreover, CTL is a method to allocate students in small groups so that students work together to maximize

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their own and each other's learning.⁸ Whereas, the lecture method (LM) is a traditional teaching method (TTM), where teachers play an active role in delivering the lecture by using the board, while, students are just listeners.⁹

On the other hand, in Jigsaw, students are divided into small groups and provided content material in a different piece of information, shared notes and references to read in the group is called Home-Group; after reading, the new groups are developed by involving one student from each group with the different objective to share.¹⁰

In addition, this learning activity decreases conflict among students and offers better opportunities, improving students' understanding of the learning content.¹¹

Taiwan Study suggested that group-based learning can improve student learning, satisfaction, and self-confidence.¹² That activity provides a platform to keep students engaged and allow them to become active in an educational setting.¹³

Therefore, the need to implement this technique to help nursing students in education, will promote in-depth learning.¹⁴ Similarly, the jigsaw technique keeps students more friendly, learning by themselves with interest, focusing on academic activities, and giving the best performance.¹⁵

Eventually, in Pakistan, most of the teachers still prefer to use the TTM and ignore the students' level of understanding of a particular topic.¹⁶ Therefore, this study was conducted to evaluate the effectiveness of the jigsaw cooperative learning (JCL) strategy among Bachelor of Science Nursing (BSN) students at a private nursing institute in Karachi.

MATERIAL AND METHODS

An institutional-based quasi-experimental study was conducted at Ziauddin University Faculty of Nursing and Midwifery (ZUFONAM) Karachi, after formal permission from the Dean of the department and Ethical Review Committee (Ref: 4270921ARNUR) from July to December 2021, among 4th year BS Nursing students.

The sample size was calculated based on the previous study mean (19.16 ± 4.45). The calculated sample size was 60. The consecutive sampling technique was used for participant selection and unwilling participants were excluded.

The questionnaire was developed after an extensive literature review and content validity was determined by an expert group in the field of education and the nursing department.

Their opinions were elicited about the format, layout, consistency, accuracy, and relevance of the tools. Reliability was checked by Cronbach's Alpha test ($r = 0.766$). The questionnaire consists of two sections, demographic

and 30 multiple-choice questions. The intervention was divided into three days.

Day One: Participants were allocated randomly into two groups, A & B. Group A was interventional JCL, and B was non-interventional TTM. The primary investigator (PI) described the study purpose and written consent was obtained.

Day Two: 30 students of group A were facilitated for the jigsaw method, while, the rest of the (30) participants of group B were taught by the lecture method as a routine activity.

Jigsaw strategy

Students were divided into 6 home groups.

Each group has 5 students.

Every group provided puzzle material.

Each student was assigned to learn one segment and make sure every student should have direct access to only their segment.

Time was provided in class to read their segment at least twice.

"Expert Group" was formed by having one student from each jigsaw group.

After sharing their assigned material, students go back into their "Home-group".

Assess the group, and if any group has queries facilitate an expert team leader to handle this task.

By the end, the post-test was taken from group A for 30 minutes.

Day Three: A similar topic was taught to non-interventional (group B) through the lecture method and by the end of the third day, a post-test was taken through quiz material from both groups.

RESULTS

The majority of 48 (80%) of the participants were female, most of the 31 (51.67%) of the study participants were aged between 23-26 years, and the lowest 4 (6.66%) were > 26 years; the mean age was 23.12 ± 1.72 years.

The mean score of the cooperative jigsaw method was found to be higher compared to the lecture method and it is also found statistically significant (Table 1). An Independent t-test was applied for significance, P-value < 0.05.

The satisfaction was measured into three categories: > 75% (high), 50-74% (average), and < 50% (low). None of the participants were highly satisfied with the lecture method. In the JCL technique, almost one-fourth study subjects were highly satisfied and this variable is

also found statistically significant (Table 2).

It was observed that the age of participants was not statistically significant with the satisfaction level of learning by the jigsaw cooperative learning technique. However, most of the study participants fall under the category of high satisfaction (Table 3).

It was observed that the age of the study participants was not significantly associated with a high satisfaction level of learning by lecture technique. However low level of learning by lecture method was found to be common in all age groups as compared to the jigsaw method (Table 4).

It was seen that gender was not significantly associated with high satisfaction of learning by jigsaw meth-

ods. Both males and females showed a satisfactory level of learning by this method (Table 5).

Gender was not significantly associated with satisfaction of learning by lecture method. A low level of learning with lecture technique has been observed with the highest frequency in male and female participants of the study (Table 6).

DISCUSSION

The present study indicated that CLT has more impact than traditional and but with average satisfaction. This study found that the JCL method is an effective approach to improving student learning outcomes, as reflected by the average score of the students as compared to the TTM.

It showed that fewer students are at a low level of learning satisfaction, while in TTM, the average and low level of learning was higher. Therefore, the present study identifies the significant difference between the effectiveness of the JCLvs. TTM technique among BSN students and TTM's failure to satisfy students in their learning process ($p < 0.001$).

Table 1: Heart Rate HR Comparison between Experimental and Control Groups

Learning Techniques (n=60)	Average Score (Mean ±std.)	p-value
Jigsaw Cooperative Method (n=30)	18.73±3.5	<0.001
Lecture Method (n=30)	14.13±2.42	

An Independent t-test was applied for significance, P-value < 0.05.

Table 2: Association of satisfaction level with learning technique

Learning Technique	High Satisfaction Frequency (%)	Average Satisfaction Frequency (%)	Low Satisfaction Frequency (%)	Satisfaction Level	p-value
Jigsaw method (n=30)	8(26.7%)	19(63.3%)	3(10%)	30(100)	<0.001
Lecture method (n=30)	0(0%)	6(20%)	24(80%)	30(100)	

The chi-square test was applied to the association.

Table 3: Association between satisfaction level with jigsaw cooperative learning technique and age groups

Jigsaw method (n=30)	Age Groups				p-value
	<23 years Frequency (%)	23- 26years Frequency (%)	>26 years Frequency (%)	total	
high Satisfactory	6(20)	6(20)	1(3.3)	13(43.3)	0.666
Average satisfactory	8(26.7)	3(10)	0(0)	11(36.7)	
Low satisfactory	3(10)	3(10)	0(0)	6(20)	

Fisher's exact test was applied for the association.

Table 4: Association between satisfaction level with lecture technique and age groups

Lecture method (n=30)	Age Groups				p-value
	<23 years Frequency (%)	23 - 26years Frequency (%)	>26 years Frequency (%)	Total	
High Satisfactory	0(0)	0(0)	0(0)	0(0)	0.386
Average satisfactory	4(13.3)	7(23.3)	0(0)	11(36.70)	
Low satisfactory	4(13.3)	12(40)	3(10)	19(63.3)	

Fisher's exact test was applied for the association.

Table 5: Association between satisfaction level with jigsaw cooperative learning technique and gender

Jigsaw method (n=30)	Gender			
	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)	p-value
High Satisfactory	4(13.3%)	9(30.0%)	13(43.3%)	0.691
Average satisfactory	3(10%)	8(26.7%)	11(36.7%)	
Low satisfactory	3(10%)	3(10%)	6(20%)	

Fisher's exact test was applied for the association..

Table 6: Association between satisfaction level with lecture technique and gender

Lecture method (n=30)	Gender			
	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)	p-value
High Satisfactory	0(0)	0(0)	0(0)	0.126
Average satisfactory	2(6.7)	9(30)	11(36.7)	
Low satisfactory	0(0)	19(63.3)	19(63.3)	

Fisher's exact test was applied for the association

According to Hazmira et al & Shahri et al. found that the jigsaw technique is better as students were actively involved in jigsaw class (26) and tutorial (41) whereas; (15) were active in teaching cooperative learning (TCL), the moderate involvement 56 and 56 in jigsaw class and tutorial but TCL higher (60) and passive involvement was also higher (25) than jigsaw class and jigsaw tutorial were lower (18 & 3)¹⁷ respectively.

Similar findings were given during the mathematical statistics course; three different classes were taken classes A, and B as a jigsaw teaching strategy, and only C for the traditional method. The result was measured in with distribution of grades where approximately 50% of students from class A scored 95 to 100; only 30% were less than 75. In the meantime, only 20% of participants scored 95 to 100 and 50% below 75%. This shows the great impact and interest of participants in the Jigsaw teaching method.^{18, 19} Moreover, students enjoyed this learning atmosphere that increased their participation, and understanding, improved teamwork, and motivated them to study themselves before class activities began.²⁰

The lecture method is considered teacher-centered and knowledge is transferred among students via this passive method. The organization demands graduates not only to have good hard skills but also to think rationally, have analytical skills, critical and creative thinking, work in a team, have excellent communication skills, and other soft skills. As a result, there is an imbalance between the abilities possessed by college graduates and the expected abilities in the practical world. For this reason, the learning process requires a paradigm shift, from teacher-centered to student-centered. Student-centered learning requires behavioral change in teachers to make students responsible for their learning and play the role of

facilitator in their learning process.¹⁴

The current study reveals that participants who were involved in the jigsaw group had a higher mean score of 18.73 ± 3.5 than the lectured method 14.13 ± 2.42 with significant p-value = < 0.001 . The same results were found in Iran quasi-experimental study⁷, that the lecture group of nursing student's mean score was little improved in the post-test 39.77 ± 5.52 to 40.95 ± 5.39 , but the jigsaw group increased from 39.9 ± 6.87 to 57.46 ± 5.64 ($p = 0.000$) with a significant difference then lecture method due to self-involvement in the learning process.

It showed that Jigsaw teaching could be used for nursing students' theoretical education to improve self-regulated learning and academic motivation.²¹ Similarly, another study indicated that learning through the jigsaw technique influenced the self-regulated learning of the students. Even at the secondary level, the jigsaw is a suitable technique to increase satisfaction through academic motivation ²² Research study found that the jigsaw learning technique is effective in enhancing students' motivation and satisfaction levels. The current study reveals that participants who were involved in the jigsaw group had a higher mean score of 18.73 ± 3.5 than the lectured method 14.13 ± 2.42 with a significant p-value = < 0.001 . The same outcome was shown in Iran quasi-experimental study⁷, that the lecture group of nursing student's mean score was little improved in the post-test 39.77 ± 5.52 to 40.95 ± 5.39 , but the jigsaw group increased from 39.9 ± 6.87 to 57.46 ± 5.64 ($p = 0.000$) with a significant difference then lecture method due to self-involvement in the learning process²⁴.

Furthermore, another study reveals no difference between a lecture and the jigsaw group 20 ± 1.9 and $20 \pm$

1.6, respectively with insignificant $p=0.801$. It seems that, in traditional instructional methods, like lectures, learners make little attempt to fulfill their educational needs.²⁵

The use of the cooperative learning approach as a modern teaching method can lead to active participation in the learning process and active engagement of both male and female students.^{26, 27} The present study also found that there is an insignificant association among age groups ($p = 0.666$) of participants and as well as gender ($p = 0.691$) among jigsaw group and respectively ($p=0.386$) and ($p=0.126$) in lecture technique. Insignificant difference among gender was presented $p = 0.729$ by quasi-experimental study. Moreover; gender gender-based experience of Spain's study contradicts this result of gender with significant findings with $p = 0.017$.

The active engagement of learners can promote their collaboration and satisfaction.^{28, 29} The results of our study are in line with this research. The current study highlighted that student involvement in the jigsaw was observed better than the traditional. However, in the previous research, the main gender differences found indicate that women rate the need to link cooperative learning with future teaching roles ($p=0.017$) and understand cooperative tasks ($p=0.035$) more than males. Female students prefer to organize groups according to academic standards and should remain stable throughout their studies. Both sexes believe that jigsaw technology is a good way to develop social skills, although they are more neutral when considering it to improve academic performance effectively.³⁰

CONCLUSION

It concluded that JCL is an effective technique over TTM). Students participated interestingly and learned with major objectives with active learning. Therefore, there is an immense need for the education system to adopt and use new interactive technology to improve quality education in health sectors.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Rehman A	✓	✗	✓	✗	✓	✗
Raja	✓	✓	✗	✓	✓	✗
Husain A	✓	✗	✗	✓	✗	✗
Ghouri A	✓	✗	✓	✗	✓	✗

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Committee of Ziauddin University Hospital, Karachi Vide No. 4270921ARNUR.

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