



Effect of Cooperative Jigsaw Learning Strategy on Community Nursing Students' Attitude and Achievement

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ABSTRACT

The jigsaw technique is a cooperative learning approach that reduces racial conflict among students, promotes better learning, improves student achievements. Aim of the present study was to evaluate the effect of the cooperative jigsaw learning strategy on community nursing students' attitudes and achievements. Research design: A quasi-experimental study was utilized. Sample: A convenient sample of 23 participants recruited from fourth-year nursing students at the faculty of nursing- Benha University during the course entitled community health nursing in the academic year 2020-2021. Those students were divided into two groups, control group (12) "lecture group" and study group (11) "jigsaw group". Tools of data collection; 1) self-administered questionnaire, 2) Learning's achievement tool, 3) Likert attitude scale, 4) cooperative jigsaw opinion sheet, in addition to supportive material related to jigsaw strategy. Results: There were statistically significant differences between jigsaw and lecture groups regarding learning achievements immediately after intervention as p-value ≤ 0.05 , also there were statistically significant differences between both groups in follow up test with p-value ≤ 0.001 . Additionally, the students in the jigsaw group exhibited a more positive attitude regarding the jigsaw strategy than the students in the lecture group. Conclusion: The jigsaw learning strategy is effective in enhancing community nursing students' attitudes and achievements during geriatric health nursing course. Recommendations: Apply cooperative jigsaw learning strategy as a teaching method in nursing student curriculums. Further research is still needed to study the effect of jigsaw learning strategy on clinical achievement.

Keywords: Cooperative Jigsaw Learning Strategy, Learning Achievement, Students' Attitude

Introduction

Cooperative learning is one kind of student learning approaches. It has been documented throughout the literature as effective in helping students obtain practical learning skills, effective communication, and proficiency in terms of understanding knowledge, and promoting positive student attitudes towards their learning (Tekdal and, Sonmez, 2018). Recently; there have been efforts to implement student-centered approaches to provide

students with an interactive approach, to try and make better learning achievements. In traditional learning, most interactions are teacher-student channels. It can create a competitive environment and produce a passive attitude toward learning as students vie for the teacher's approval rather than developing cooperative learning. one alternative teaching strategy to lecture-based teaching is a cooperative jigsaw learning strategy, a kind of cooperative learning method (Yazdanpoor et al., 2016).

The Jigsaw method is beneficial for students learning. As a form of cooperative learning; it is a teaching strategy that helps students to develop skills for working effectively in teams, an important competency for Socio-Environmental Synthesis. Grounded in social interdependence theory. Cooperative learning is an established educational approach robustly supported by over 1,200 research studies. The central tenet of cooperative learning is that rather than competing or being indifferent to each other, students engaged in cooperative learning “work together to maximize their own and each other’s learning” (Cooperative Learning Institute, n.d. para.5) Typically, when undergraduate students are organized into groups to accomplish a learning task or assignment, few if any supports are offered to help the group manage itself. Group dynamics are often left to chance and as a result group members may or may not learn from each other (Parvaneh et al., 2019).

Benefits of the Jigsaw method improves team and class dynamics by helping to build trust, creating a space for candor and for respectful disagreement, and making a safe space for taking emotional risks. Helps build cohorts by enabling students to really get to know each other in one class, which can translate to more interactions outside of class in departmental and campus activities. Fosters student engagement through peer learning and more equal participation by everyone in the group by empowering individual students to share their own “expertise” or contribution to the Jigsaw group. Requires students who are shy or quiet to participate more fully in active ways. And efficiency (time saving): possible to cover more material rapidly when students are assigned different readings/roles/etc. and then teach each other in the jigsaw (Tekdal & Sonmez, 2018 & Pedagogia, 2019). The jigsaw method can also be used to build research skills in working

with data by requiring students to gather and/or analyze data sets generated by different disciplinary research methods and then reshuffle to determine how to synthesize understanding across multiple types of data sets (qualitative and quantitative; ecological and sociological data collected at different spatial and temporal scales; etc.) (Chen & Liu, 2017).

The jigsaw method Steps: Firstly, split the students into groups depending on how many “chunks” of information you have. I would recommend 4-6 students in each group. These groups are called the Jigsaw Groups. This strategy works best when you have the same number of students in each group, but our classrooms rarely work out that way, so try to get as close as you can. 2. Give one “chunk” of information to each person in the Jigsaw Group, making sure that each group has one person in charge of each “chunk” of information. This student will be responsible for teaching their information to the rest of the group. 3. Each student should read over their information quietly by themselves. 4. After each student has gone over their information alone, they get together with all the students in the room that have the same “chunk” as they do (Kritpracha et al., 2018). These groups are called the Expert Groups. Within each Expert Group students work together to process the information. Then they prepare a way to share that information with their Jigsaw Groups. Are the looking for a cooperative learning activity that will put the students in charge of their own learning and teaching it to others? Give the Jigsaw Method a try! 5. Best Practices for Teaching S-E Synthesis with Case Studies (Brame & Biel, 2015 & Aronson, 2015).

Community health nursing courses prepare nursing students to work with the individual, family, mother, and neonate, public and community in an intensive working environment. Those who want to

work in community nursing must have a high level of advanced specific knowledge & practices to perform their jobs. Jigsaw as a learning strategy has shown to improve long-term retention of acquired knowledge among students due to active engagement in the learning process. Also, students' decision-making and problem-solving, critical thinking skills independently improved. As well, these criteria need to be provided in community health nursing, to be able to achieve the individual, family, mother and neonate, public and community safety (Fadlallah and McKenna, 2018).

1.1. Significant of the Study

Cooperative learning strategies could have psychological and social benefits. Working in a non-threatening and tense- reduced atmosphere might develop students' self-esteem; enhance motivation and cooperation (Ameiratrini, 2017 & David Foley 2018). Given the importance of learning from both cognitive and non-cognitive aspects of development in medical science education specialty nursing education, the selection of appropriate educational strategies is a key structural issue. The jigsaw method is used in cooperative learning to improve cognitive and non-cognitive skills. In Egypt the dominant educational method at most universities is in the form of a lecture that 80% of educational content is forgotten within 8 weeks. The students in the jigsaw group exhibited a more positive attitude regarding the jigsaw strategy than the students in the lecture group (Abd El Aliem et al., 2019 & Susani and Subeki 2020). That will be reflected in students' attitudes, achievements and subsequently on the rank of the faculty among the other nursing faculties. Considering the lack of Egyptian studies that addressed jigsaw strategy in community specialty, therefore this study was conducted to evaluate the effect of the cooperative jigsaw learning strategy using on community nursing students' attitude

and achievement.

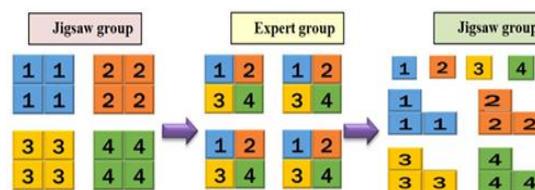


Figure 1. Jigsaw formation groups adapt from Dhull, P., and Verma G. (2019): Setting up and facilitating group work using cooperative learning groups effectively, Jigsaw Teaching Technique for Teaching Science, retrieved from <http://cft.vanderbilt.edu/guides-sub-pages/setting-up-and-facilitating-group-work-using-cooperative-learning-groups-effectively>. Available at: www.jigsaw.org/overview.htm. Accessed on: 22-9-2021.

1.2. Aim of the Study

The present study aimed to evaluate the effect of cooperative jigsaw learning strategy on community health nursing students' attitudes and achievement. This aim was achieved through:

Assess the existing level of knowledge on communicable diseases lecture among community nursing students.

1. Plan and utilize the cooperative jigsaw learning strategy as a learning strategy for community nursing students related to the theoretical part of communicable diseases lecture.
2. Evaluate the attitude and achievements of community nursing students in both groups.

1.3. Research Hypotheses

1. The community nursing students who are subjected to Jigsaw learning strategy will have better achievement compared to their peers in the lecture group.
2. The community nursing students who are subjected

to Jigsaw learning strategy will have a positive attitude compared to their peers in the lecture group.

2. Subject and Methods

2.1. Research Design

A quasi-experimental study and control design were used.

2.2. Setting

The study was conducted at the Faculty of Nursing, Benha University during community health nursing course.

2.3. Sampling

A convenient sample of 230 nursing students was recruited from the fourth year. They are divided into two groups according to the timing of the study. Students attended the first semester for the academic year (2020-2021) were control (lecture) group (n=120 students) who follow the traditional method of teaching regarding communicable diseases lecture, while students attended the second semester from the academic year (2020-2021) were the study (jigsaw) group (n=110 students) who utilize cooperative jigsaw learning strategy regarding to communicable diseases lecture. The study group divided into 10 heterogeneous subgroups each group includes (10) students vary in their academic abilities.

2.4. Tools of Data Collection

2.4.1. A Self-administered Questionnaire

The researchers constructed a questionnaire sheet after reviewing the related literature. It was used to assess the personal characteristics of students as age, gender, marital status, residence, and educational background (secondary or technical school). (Questions: 1 - 6). It took 5 minutes to be filled by students.

2.4.2. Learning's Achievement Questionnaire

It was designed by the researchers to assess the

student's knowledge achievement through different strategies of learning among both control and study groups before and after the intervention. it included 35 questions (Questions: 6- 41) regarding the theoretical content communicable diseases lecture, presenting in two parts:

Part one: consisted of 20 multiple choice questions and 5 true and false questions regarding meaning, epidemiological triad, different terminology, chain of infection, foodborne diseases airborne diseases, blood borne diseases, sexual transmitted diseases, zoonotic diseases, integumentary transmitted diseases.

Part two: it consisted of 7 multiple choice questions and 3 true and false questions regarding Role of CHN regarding prevention and control of communicable diseases. It took 45 minutes to be answered by students.

Scoring system:

i. A score (1) indicates a correct answer.
ii. A score (0) indicates an incorrect answer. The total achievement scores range from 0– 35 according to the operational scoring system at the academic setting in Egypt as the following.

1. Excellent: 85% -100% (29-35 degree)
2. Very good: 75% -<85% (26 - <29 degree)
3. Good: 65% -<75% (22 - <26 degree)
4. Pass: 60% -<65% (21 - <22 degree)
5. Poor:<60% (<21 degree)

2.4.3. Nursing Student Attitude Measuring Scale

It was adapted from (*Tran & Lewis, 2012*): and modified by the researcher to assess nursing students' attitudes toward both methods of teaching strategies. It consists of eighteen statements with three levels of responses: disagree, uncertain and, agree. It took 10 minutes to be filled by students. Scoring system: Students attitude toward the currently used teaching

methods was based on 3 points of Likert scale: - a score (2) for agree, a score (1) for uncertain, a score (0) for disagree. While the total score ranged from (0) to (36) then the total attitude score was classified as the following:

Negative attitude less than 70% (0-24)

Positive attitude 70% - 100% (25-36)

2.4.4. Cooperative Jigsaw Opinion Scale (CJoS)

It was developed by the researcher based on the related literature to assess the opinions of the study group regarding the jigsaw method of cooperative learning at the end of the study. It includes 14 statements implied their responses, positive (score 1) or negative (score 0) opinions. In addition to a handout material for the study group to describe jigsaw strategy as a teaching method including "concept of jigsaw strategy, objectives, purpose and steps"

2.5. Validity and Reliability

These tools were reviewed by a jury of 3 experts in the field of community health nursing department to test its contents. Reliability was done by Cranach's Alpha coefficient test which revealed $r=0.82$ for learning's achievement questionnaire, $r=0.88$ for Nursing student attitude measuring scale and $r=0.78$ for cooperative jigsaw opinion scale.

2.6. Administrative Design and Ethical

Considerations

The necessary official approval was obtained from the Dean of the Benha Faculty of Nursing. The aim of the study was explained to each student and informed consent to participate was obtained. They were allowed to refuse to participate, and they could withdraw at any stage of the research. Additionally, they were assured that the information would be confidential and used for the research purpose only without any effect on their current and future academic

course assessment.

2.7. Field Work

The researchers first explained the aim of the study to the participants and reassure the students that information collected would be treated the confidentiality and that would be used only for. The study was carried out through three following phases: planning, implementation, and evaluation.

2.7.1. Planning and Assessment Phase

It started by preparing all information regarding the concept of jigsaw strategy, the main purpose, and technique. The researchers determined the objectives of study subjects related to communicable diseases lectures. Then prepared the study material and tools based on recent textbooks, research articles, websites, references, etc. the traditional strategy of teaching "Lectures" was developed for the control group. Researchers prepared theoretical content "handout" to be given to the students. Lectures designed for both groups were delivered according to (table 1) and taught through ten sessions as follows:

Table1: Lectures of communicable diseases.

Communicable diseases and its epidemiologic triad
Different terminology related communicable diseases
Chain of infection
Food borne diseases
Airborne diseases
Blood borne diseases
Sexual transmitted diseases
Zoonotic diseases
Integumentary transmitted diseases
Role of CHN regarding prevention and control of communicable diseases

1. Also, the researchers designed the evaluation tools in this stage.
2. All students were firstly assessed for personal characteristics in the classroom by self-administered questionnaire (tool I).
3. Students' level of knowledge regarding

communicable diseases lectures were assessed by using pre-test (Tool II).

4. And then the students from both groups were then informed about the time of the posttest (Immediate after intervention) and follow up exam (after four weeks of intervention).

2.7.2. Pilot Study

A pilot study was conducted for (21) students of the total sample size. It was conducted to evaluate the efficiency and content validity of the tool, find the possible obstacles and problems that might be faced during data collection and for the feasibility of the research process. Students included in the pilot study were included the sample, to avoid contamination of the research sample.

2.7.3. Implementation Phase:

For the control group (lecture group): The Researchers presented scientific content in form of lecture for the control group in two teaching sessions, every session was taking two hours per day, for two days for two weeks according to a pre-designed schedule of the community health nursing course timetable. The lecture was presented for students as PowerPoint presentations. The researchers conducted a classroom group discussion for all students to clarify any missing point of contents. And at the end of the lecture, the main points of content were summarized.

A. For study group (Jigsaw group): Implementation phase included eight teaching sessions through 4 weeks as the following consequence.

Session 1(orientation Session):

1. Before starting communicable diseases lectures, the study group attended an orientation session for two hours, to be trained on the process of jigsaw strategy as a teaching method.

First, the researchers (teachers) explained in detail the jigsaw as a learning strategy including its concept,

objectives, steps, and benefits to the students through a lecture by using PowerPoint presentations. Further, the researchers distributed an illustrated handout describing jigsaw strategy to students. Then the researchers divided students into 10 groups, each group consisted of 10 students. These were the “jigsaw groups”.

A team leader from students was assigned to each group. Their function was to facilitate group discussions and sharing.

2. The communicable diseases lectures were divided into 10 different subtopics including communicable diseases and its epidemiologic triad, different terminology related communicable diseases, chain of infection, food borne diseases, airborne diseases, blood borne diseases, sexual transmitted diseases, zoonotic diseases, integumentary transmitted diseases, and role of CHN regarding prevention and control of communicable diseases.

3. Each student of the jigsaw group was assigned for one sub-topic and received a card with his subtopic, as well as a few leading questions to help them learn about their topic.

4. Next, the students who were assigned for the same sub-topics in all the 10 jigsaw groups collected to form “expert groups” as depicted in (table 2). The students were asked to prepare the subtopics for discussion in their expert group in the next session after one week.

Table 2. Formation of jigsaw groups and expert groups.

jigsaw groups							
	(A)	(B)	(C)	(D)	(E)	TOPIC	
Expert Group	G1	A1	B1	C1	D1	E1	1. Communicable diseases and its epidemiologic triad
	G2	A2	B2	C2	D2	E2	2. Different terminology related communicable diseases
	G3	A3	B3	C3	D3	E3	3. Chain of infection
	G4	A4	B4	C4	D4	E4	4. Food borne diseases
	G5	A5	B5	C5	D5	E5	5. Airborne diseases
	G6	A6	B6	C6	D6	E6	6. Blood borne diseases
	G7	A7	B7	C7	D7	E7	7. Sexual transmitted diseases
	G8	A8	B8	C8	D8	E8	8. Zoonotic diseases
	G9	A9	B9	C9	D9	E9	9. Integumentary transmitted diseases

G10	A10	B10	C10	D10	E10	Role of CHN regarding prevention and control of communicable diseases.
G1	H1	I1	J1	F1	G1	Communicable diseases and its epidemiologic triad
G2	H2	I2	J2	F2	G2	Different terminology related communicable diseases
G3	H3	I3	J3	F3	G3	Chain of infection
G4	H4	I4	J4	F4	G4	Food borne diseases
G5	H5	I5	J5	F5	G5	Airborne diseases
G6	H6	I6	J6	F6	G6	Blood borne diseases
G7	H7	I7	J7	F7	G7	Sexual transmitted diseases
G8	H8	I8	J8	F8	G8	Zoonotic diseases
G9	H9	I9	J9	F9	G9	Integumentary transmitted diseases
G10	H10	I10	J10	F10	G10	Role of CHN regarding prevention and control of communicable diseases

Researchers provided the same handout given for the control group regarding communicable diseases lectures to the study group. Also, the researchers suggested resources (textbooks, research articles, websites, etc....), to direct the students and help them in preparing their topics. The groups were instructed to prepare the topic well, read them well, and do extra reading than the hand out within one week.

The researchers ensured that all information about the prepared subtopics by students was accurate and it could be corrected before the students started their discussion in front of their groups and clearing their doubts.

Session 2: (Expert groups discussion):

The expert group worked together for two hours in the next week, discussing their topics. Each student shared his acquired knowledge regarding the topics. The others noted down additional points, and clearing their doubts, if any, to the researchers (teachers).

Session 3: (jigsaw groups discussion):

The students returned to their jigsaw group again to present their subtopic to others. This session took about 2 hours so that each student could present his subtopic. Finally, they discussed topics together to improve their thinking ability, cooperation, interactions, and active learning. The researchers floated between groups and facilitated the whole process.

Session4: (cooperative learning):

The last session was of 4 hours duration during the third week, in which one student from each “jigsaw group” was randomly selected and asked to teach a particular topic to the whole class. The student was permitted to use the board. Since all topics could be discussed. The students were also encouraged to ask questions if they had any to the presenter, and the researchers clarified their inquiries. Finally, cooperative jigsaw's opinion sheet (tool IV) was distributed to assess the study group's opinions related to the jigsaw strategy as teaching strategies.

2.7.4. Evaluation Phase

All the students for both groups were assessed for their achievements regarding the theoretical part of normal & high-risk pregnancy lectures through before, after, and follow up exam by using the tool (II). Assessment of the students' attitude regarding the two teaching strategies used among both groups was done using (tool III). Then a comparison between two groups (jigsaw group and lecture group) was done to evaluate the effect of two teaching strategies in order to investigate the research hypotheses.

2.8. Statistical Analysis

Data entry and statistical analysis were done using the Statistical Package for Social Science (SPSS), version 25.0, a statistical software package. The collected data was analyzed and results were presented in tables and graphics using frequency distribution tables. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables. Analytical tests were used to determine the relations; qualitative variables were compared using chi-square as the test of statistical significance and the p-value is the degree of significance. Also, the Pearson correlation (r) test was used for the association between total scores. A

statistical significance was considered when P-value ≤ 0.05 , the non-significance difference obtained when P-value > 0.05 , while a highly significant difference at P-value ≤ 0.001 .

2.9. Limitation of the Study

1. The time limitation to implement jigsaw activity in the routine course sessions.
2. A dropout rate of 20 students in both groups because of student absenteeism during any session or due to incomplete data filled by students.

3. Results

Table 3: Shows, the mean age of the jigsaw and lecture groups were 20.3 ± 0.46 and 20.2 ± 0.52 respectively with no statistical significance between both groups regarding Socio-demographic characteristics as p-value was $P > 0.05$.

Table 4: Notifies that there was no statistical significance between jigsaw and lecture groups before intervention as p-value was $P > 0.05$ while immediately after intervention there was a statistically significant difference between both groups as p-value ≤ 0.05 . Moreover, in follow up (one month after intervention) there was a highly statistically significant difference between both groups with p-value ≤ 0.001 .

Table 5: Portrays that total mean achievement scores were 64.7 ± 1.01 in the jigsaw group and 50.9 ± 1.20 the lecture group, with a highly statistically significant difference as the p-value, was ≤ 0.001 .

Figure 2: Presents that 76.4% of the Jigsaw group had a positive attitude regarding Jigsaw strategy in comparison to 82.8% of the lecture group had a positive attitude regarding the lecture method with a significant statistical difference between both groups as p-value was ≤ 0.05 .

As shown in Table 6: (96.6%) of the jigsaw group stated that improved critical thinking & decision-making skills and (95.8%) of them reported that jigsaw learning strategy enhanced teamwork cooperation and (93.3%) recommended applying jigsaw strategy as a teaching method in other nursing courses "(theory & practice).

Table 7: Emphasizes a highly statistically positive correlation between jigsaw group's total achievement scores and their total attitude and also opinion regarding cooperative jigsaw as a learning strategy before, immediately after and follow up the intervention as ($P \leq 0.001$).

Table 3. Socio-demographic characteristics for the studied groups.

Socio-Demographic Characteristics		jigsaw group (n=120)				
Age						
Mean \pm SD	20.3 \pm 0.46	20.2 \pm 0.52	11.21	0.031 ^{ns}		
Gender						
Female	98	81.6	93	84.5	1.38	0.21 ^{ns}
Male	22	18.4	17	15.5		
Marital Status						
Single	114	95.0	100	90.9	0.42	0.49 ^{ns}
Married	6	5.0	10	9.1		
Education						
secondary school	99	82.5	97	88.2	1.98	0.11 ^{ns}
Technical school	21	17.5	13	11.8		
Residence						
Urban	80	66.7	73	66.4	0.72	0.42 ^{ns}
Rural	40	33.3	37	33.6		

Ns. no Statistical significant differences $P > 0.05$.

Table 4. Comparison between jigsaw and Lecture groups regarding their learning achievement before, immediately after and follow up intervention (one month after intervention).

Achievement Levels	No	%	jigsaw group (n=120)				
			No	%	No	%	
Before intervention ^a	Good	37	30.8	32	29.1		
	Pass	32	26.6	34	30.9	0.072	0.87
	Fail	54	45	49	44.5		
	Excellent	34	28.3	17	15.4		
	Very Good	43	35.8	29	26.3		
Immediately after Intervention	Good	19	15.8	13	11.8	12.68	0.05*
	Pass	11	9.1	40	36.3		
	Fail	5	4.1	9	8.1		
	Excellent	29	24.1	20	18.1		
	Very Good	49	40.8	31	28.1		
Follow Up	Good	20	16.6	10	9.0	11.97	0.001**
	Pass	7	5.8	41	37.2		
	Fail	3	2.5	7	6.3		

a. there is no excellent or very good level, * no Statistical significant differences $P > 0.05$, ** Statistical significant differences $P \leq 0.05$, ***highly statistically significant differences $P \leq 0.001$.

Table 5. Comparison between mean total achievement` scores in both groups before, immediately after and follow up intervention (n=230)

Items	jigsaw group (n=115) Mean ± SD	Lecture group (n=115) Mean ± SD	Independent P-value test	
Before intervention	22.3±0.52	20.4±0.031	1.47	0.05
Immediately after Intervention	24.3±0.33	20.7±0.62	0.54	0.001**
Follow Up	26.3±0.19	21.6±0.39	3.97	0.001**
Total achievement` scores	64.7±1.01	50.9±1.20	4.86	0.001**

**highly statistically significant differences P≤0.001.

Table 6. Distribution of positive students' opinions regarding cooperative jigsaw learning strategy among jigsaw group (n=115).

students' opinions	jigsaw group n=115	
	No.	%
1-It made the course content easy for us to understand.	106	88.3
2-It ensured the correction of our misinformation.	105	87.5
3-It made us learn better.	99	82.5
4-it increased the possibility of the teacher's interested in each student.	100	83.3
5- The dependence of the students upon the teacher was lessened.	98	81.6
6-It enhanced communication skills & self-confidence.	106	88.3
7-It enhanced teamwork cooperation.	115	95.8
8- Everyone in the group shared responsibility.	111	92.5
9-it made the ideas within the group to be discussed more positively.	103	85.8
10- It improved critical thinking & decision making skills.	116	96.6
11-It facilitated applying knowledge into clinical practice.	105	87.5
12-It was the innovative teaching-learning method.	108	90.0
13-Overall I am satisfied with this teaching method.	96	80.0
14-Applying jigsaw strategy as a teaching method in other nursing courses " (theory & practice).	112	93.3

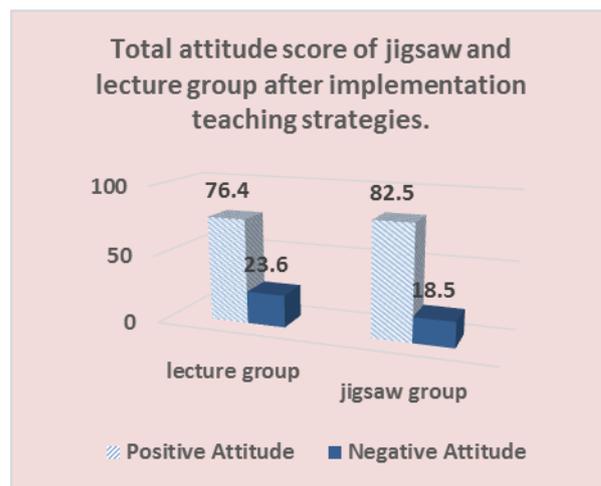


Figure 2. Total attitude score of jigsaw and lecture group after implementation teaching strategies.

Table 7. The correlation coefficient among the jigsaw group's total achievement scores, total attitude and cooperative jigsaw opinions at a different time of assessment (n=115).

Variables	Time	Total attitude scores		Total jigsaw opinion`s scores	
		r	p-value	r	p-value
Total achievements scores	Before	0.423	0.000**	0.532	0.000**
	Immediately After	0.397	0.000**	0.476	0.000**
	follow up	0.58	0.000**	0.69	0.000**

**A highly statistically significant difference (P ≤ 0.001).

4.Discussion

The Jigsaw Strategy is an efficient way to learn the course material in a cooperative learning style. The jigsaw process encourages listening, engagement, and empathy by giving each member of the group an essential part to play in the academic activity. Group members must work together as a team to accomplish a common goal; each person depends on all the others. No student can succeed completely unless everyone works well together as a team. This "cooperation by design" facilitates interaction among all students in the class, leading them to value each other as contributors to their common task (Susanti and Subekti, 2020).

Recently, the jigsaw had valuable implications for teaching, learning, and nursing educational research, as it is one of the innovative teaching strategies which can be incorporated in the nursing curriculum for the better results, and it is a great tool that can be used to enhance

and promote higher nursing student achievement. Therefore, the present study aimed to evaluate the effect of the utilization cooperative jigsaw learning strategy on community health nursing students' attitudes and achievement. This aim was achieved through 1. Assess the existing level of knowledge on communicable diseases lectures among community nursing students 2. Plan and utilize the cooperative jigsaw learning strategy.

The present study revealed that, the mean age of the jigsaw and lecture groups were 20.3 ± 0.46 and 20.2 ± 0.52 respectively with no statistical significance between both groups regarding Socio-demographic characteristics as p-value was $P > 0.05$ (table.3). These results were supported by Dhull and Verma (2019) who studied "Jigsaw Teaching Technique for Teaching Science" University, Rohtak, found that; the mean age of their jigsaw and lecture groups were 20.3 ± 0.46 and 21.2 ± 0.52 respectively with no statistical significance between both their groups regarding Socio-demographic characteristics as p-value was $P > 0.05$.

The present study revealed that, there was no statistical significance between jigsaw and lecture groups before intervention as p-value was $P > 0.05$ while immediately after intervention there was a statistically significant difference between both groups as p-value ≤ 0.05 . Moreover, in follow up (one month after intervention) there was a highly statistically significant difference between both groups with p-value ≤ 0.001 (table.4). This might be due to the subsequent presentation helped the students in overcoming hesitation and shyness. This was in the same line with Garcia et al., (2017) that studied "using the jigsaw method for meaningful learning to enhance learning and retentions" an educational leadership graduate school course the University of Texas at Rio Grande Valley Brownsville Campus one West University Blvd.

who presented that, there was no statistical significance between jigsaw and lecture in their groups before intervention as p-value was $P > 0.05$ while immediately after intervention there was a highly statistically significant difference between their both groups with p-value ≤ 0.001 . Moreover, in follow up after four weeks there was a statistically significant difference between their both groups as p-value ≤ 0.005 . While the above findings discordance with Tagreed Bajes Abed (2019) who studied "The implementation of jigsaw as a cooperative learning strategy to improve Birzeit University EFL students' reading comprehension at Birzeit University, in Palestine. And reported, there is no significant difference in the test mean scores of students who used cooperative learning and those taught traditionally" was true or not, an Independent-sample t-test analysis for the data collected by means of posttest was done.

Regarding the total mean achievement scores were 64.7 ± 1.01 in the jigsaw group and 50.9 ± 1.20 the lecture group, with a highly statistically significant difference as the p-value, was ≤ 0.001 (table.5). This might be due to the achievement of the experimental group in the posttest was better than that of the control group, which indicates the effectiveness of jigsaw as a cooperative strategy. This finding agreed with Nurbianta, (2018), who investigated "The effectiveness of Jigsaw method in improving students reading comprehension" and found that, total mean achievement scores were 63.7 ± 1.01 in their jigsaw group and 49.9 ± 1.20 their lecture group, with highly statistically significant difference as the p-value, was ≤ 0.000 . Also this finding agreed with, Walker et al., (2015) who studied "The jigsaw technique of peer teaching and learning: An efficient and enjoyable teaching strategy in medicine. Stony Brook University School of Medicine, Stony Brook, NY, 11794-8432,

USA. they examined the pre- and post-session exam scores. Indeed, exam scores improved from the pre- in their jigsaw session exam (0.59 ± 0.18) to post- in their jigsaw session exam (0.78 ± 0.15 , $t(32) = -5.25$, $p < 0.001$), showing that residents knowledge increased as a result of the session.

The current finding revealed that, more than three quarters of the Jigsaw group had a positive attitude regarding Jigsaw strategy in comparison to most of the lecture group had a positive attitude regarding the lecture method with a significant statistical difference between both groups as p-value was ≤ 0.05 (figure. 2). This might be due to the jigsaw strategy empowers the students to take charge of their learning, retention, peer tutoring, communication skills and retrieval of concepts. It was also this strategy decreases stress, tension, and absent-mindedness. This was consistent with Awgichew et al., (2015), who found in study Action research: Improving students' achievement through cooperative learning. In Middle Eastern. And revealed that, more than two thirds of their Jigsaw group had a positive attitude regarding Jigsaw strategy in comparison to majority of their lecture group had a positive attitude regarding the lecture method with a highly statistically significant difference between both groups as p-value was ≤ 0.001 . According to Nurbianta and Dahlia, (2018) "Teachers expressed positive attitudes towards jigsaw learning and enjoyed the group spirit".

Concerning students' opinions regarding cooperative jigsaw learning strategy among most of the jigsaw group who stated that, improved critical thinking & decision-making skills and majority of them reported that, jigsaw learning strategy enhanced teamwork cooperation and recommended applying jigsaw strategy as a teaching method in other nursing courses "(theory & practice) (table. 6). These results

were supported by Dhull and Verma (2019) who studied "Jigsaw Teaching Technique for Teaching Science" University, Rohtak. And. suggested that science teachers can develop the cognitive skills of students by employing the jigsaw technique and integrating it into laboratory practices. The jigsaw technique is effective for teaching theoretical and practical aspects of science. According to Fadilah and Mckenna, (2018), who studied "New nurses and community maternal care education: A qualitative study" stated that, thematic analysis was used to analyze data. Three key themes emerged: Practice context, Professional role delineation, and Education programs. Nurses reported encountering a range of aspects of maternal care, and community expectations of their skills and knowledge. This might be due to if implemented well, cooperative learning strategies increased students' motivation, learning, reasoning, thinking skills, student achievement and active learning. These techniques less the anxiety and disruptive behavior of students. By working in a 'team' or 'cooperative groups' the students get an opportunity to develop interpersonal skills which will be helpful in their future careers. Unlike personal learning or competition in the classroom, this approach encourages students to sink or swim together. Here, the students are responsible for the learning of others as well as themselves.

The current finding revealed, a highly statistically positive relation between jigsaw group's total achievement scores and their total attitude and opinion regarding cooperative jigsaw as a learning strategy before, immediately after and follow up the intervention as ($P \leq 0.001$). This finding agreed with Tran & Lewis (2012): Effects of Cooperative Learning on Students at An Giang University Vietnam. who investigated students' attitudes toward Jigsaw

cooperative learning in the Vietnamese setting of higher education and indicated that students working in cooperative learning groups enjoyed cooperative activities and obtained more knowledge because cooperative learning improved their relationships with their peers, decreased conflict in the group and enhanced their self-esteem? Also, students in the cooperative learning groups felt more interested in learning, and less anxious, perceiving cooperative learning as a valuable way to effectively increase their knowledge. a highly statistically positive correlation between their jigsaw group's total achievement scores and their total attitude and opinion regarding cooperative jigsaw as a learning strategy immediately after and follow up the intervention as ($P \leq 0.000$). Also, this finding agreed with Ameiratrini, (2017). Reported; a highly statistically positive relation between their jigsaw group's total achievement scores and their opinion regarding cooperative jigsaw as a learning strategy before, immediately after the intervention as ($P \leq 0.00$).

1. Conclusion

Based on the results of the data analysis and discussion, the researchers conclude that, the hypotheses of the current study were achieved, Jigsaw strategy is appropriate to be used for reading comprehension, because it can make the students more active and motivated. It also improves the participation as students' learning achievement of communicable diseases lectures were higher scores among jigsaw group than lecture group immediately after intervention with a statistically significant difference and at follow up exam with highly statistically significant differences. A highly statistically positive relation between jigsaw group's total achievement scores and their total attitude and opinion regarding cooperative jigsaw as a learning strategy before, immediately after

and follow up the intervention as ($P \leq 0.001$). Moreover, finding information details is the aspect of reading which improved the most, because the students are directed to work related to it.

2. Recommendations

1. Future application of the jigsaw technique could focus on professional team learning in interdisciplinary groups. Which would be highly beneficial for fostering career development skills in nursing students.
2. Apply cooperative jigsaw learning strategy as a teaching method in nursing student curriculums.
3. Training workshops should also be conducted for course planners and educators (faculty staff members) to adapt the jigsaw technique as an innovative teaching and learning strategy.
4. Nursing programs need to implement many innovative teaching strategies like a jigsaw to make learning more students centered.
5. Further research is needed to study the effect of jigsaw learning strategy on clinical achievement, also to explore the obstacles hindering the implementation of the jigsaw learning strategy in nursing education.

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