The Effect of Using Jigsaw Strategy on Cognitive Achievement, and the Attitude Towards Using Peer Teaching

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Abstract

The aim of this study is to identify the jigsaw strategy in teaching, it's effectiveness on cognitive achievement and the attitude towards using peer tutoring. The researchers prepared a teacher's guide and a student's book for the learning skills unit in the learning and research skills course for preparatory (first) year students at University of Imam AbdulRhman bin Faisal according to the jigsaw strategy. The researchers also prepared an achievement test and an attitude questionnaire as evaluation tools. These tools have been applied to a research sample consisting of (140) students. The results of the study showed the following:

- The average scores of the experimental group (those taught using the Jigsaw strategy) and the control group (those taught using the traditional method) in the post-application of the achievement test show a statistically significant difference at the level of (0.01) , favoring the experimental group.

- The average scores of the experimental and control groups on the attitude toward using peer tutoring in teaching in the post-application show a statistically significant difference, favoring the experimental group, at the level of (0.01).

- There is a positive significant correlation between the achievement test scores and the measure of attitudes towards using peer tutoring in teaching for the experimental arm in the post-measurement.

Considering the results of this study; The researchers presented a set of recommendations.

Keywords: *jigsaw strategy, Cognitive Achievement.*

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Introduction

First: Introduction:

Much of the complaint that is heard now about the level of university students or graduates is due to many reasons, including: the methods that are followed in the university education stage, where teaching is determined by what the lecturer and the textbook say, this method cannot create an open-minded citizen, or a scholar who thinks freely, if we want to change the nature of these learners, we must change the methods that we use in our teaching at all education stages, especially university level.

The time has come to provide students with what enables them to face life with open minds and insight, there is no doubt that choosing and directing the activity has a definite relationship to achieving this goal. In this regard, Robin Fogarty 2020 says, "We urgently demand that students bear greater responsibility in the learning process, teachers should choose activities that require their students to rely on themselves more often, and to have confidence in their students' ability to bear responsibility, and for the student to be the center of the educational process" (Robin Fogarty, 2020, 102)

The activity practiced by the learners contributes to satisfying some of their social motivations, developing research, investigation, and self-expression, as practicing the activity transfers the learners from the culture of memory to the culture of scientific thinking and creativity, in addition to providing fun and excitement inside the classrooms. (Millis & Cottell, (2020) (Khalil, Azza, 1998)

The university faculty members find it difficult to respond to the individual needs of the students, which makes them focus on the students helping each other. This type of learning usually occurs in a transient manner, but the faculty member can plan to use the peer teaching strategy to benefit from its results, in improving achievement, motivation, and utilization of teaching time .

Veen man, Simon & Others 2019, and Fried Stephen 2018 conducted a questionnaire on the importance of peer teaching in German universities. They conducted the questionnaire on the opinions of some faculty members and students on the importance of this strategy in teaching after studying one of the courses using this strategy, the results revealed students' positive attitude towards peer teaching, and about half of the faculty members admitted that their problem is monitoring group work during learning in the classroom. (Veenman, Simon & others, 2019)

Research problem:

We kill the love of learning in the souls of our children, which is at its highest level, by urging them to work towards obtaining the final grade. Thus, the feeling that some of them are better than others grow within them, in addition to this opinion, Johnson believes that "the cooperative learning environment supports the construction of knowledge through social negotiation". (Webb, N.M., 2019,23)

In 1900, the cooperative learning interest was identified in literature. In 1970 onwards, the focus was on its applications in the classroom. Different models of applying cooperative learning were developed, Numerous studies have examined these models in comparison to one another and to traditional learning models. Their findings vary, with some demonstrating that cooperative learning was successful in raising academic achievement.

Although some studies showed no difference in academic achievement, the majority of them concluded that cooperative learning improved attitudes, enhanced self-confidence, and fostered positive relationships with colleagues, and facilitated the growth of diverse interpersonal connections among student groups. (Kagon, S,2020)

Jean Piaget was one of the most important people who indirectly supported the idea of cooperative learning, as Piaget's theory confirms that learning and development comes from student groups' cooperation and discussions. This is different from what was presented by "Vygotsky", the author of the theory of the influence of society on mental development, he demanded that the main goal of teaching be to give students the chance to engage with people who have experience. This perspective gave rise to the Jigsaw concept, which stressed the importance of students receiving in-group education from someone in the classroom who is more knowledgeable about the subjects being studied.

There has been a desire among researchers to study the jigsaw strategy and reach results based on statistics regarding the effectiveness of this strategy at the university, especially for teaching to first-year university students, where students compete together in each track (health - engineering - scientific - human) to reach the college seats in which they seek to study according to each track. This research attempts to study the effectiveness of the combined group (Jigsaw) strategy as a model for peer teaching on cognitive achievement, and the attitude towards using peer teaching in teaching. Therefore, the research attempts to answer the following question:

• What is the effect of using the jigsaw strategy on cognitive achievement, and the attitude towards using peer tutoring in teaching?

Second: Research objectives:

The current research aims to study the impact of using the jigsaw strategy on developing:

1- Cognitive achievement among university preparatory year students at University of Imam Abdul Rahman bin Faisal?

2- The attitude towards using peer tutoring in teaching among students of preparatory year at University of Imam Abdul Rahman bin Faisal?

Third: research importance:

The importance of the current study is evident in that:

1- In that the jigsaw strategy is one of the distinct strategies, in addition to the fact that there is a scarcity of educational research that addresses its use in teaching in Arab universities.

2- Keeps pace with modern trends in the field of education by paying attention to peer teaching strategies and examining their importance in the educational process.

3- It can contribute to activating some peer teaching strategies in university teaching.

Fourth: Research hypotheses:

The aims of the current study are to test the following hypotheses' validity:

1-   The average scores of the experimental group (those taught using the Jigsaw strategy) and the control group (those taught using the traditional method) in the post-application of the achievement test show a statistically significant difference at the level of (0.01), favoring the experimental group.

2-   The average scores of the experimental and control groups on the attitude toward using peer tutoring in teaching in the post-application show a statistically significant difference, favoring the experimental group, at the level of (0.01).

3-   There is a positive significant correlation between the achievement test scores and the measure of attitudes towards using peer tutoring in teaching for the experimental arm in the post-measurement.

Fifth: Search terms:

- Peer Tutoring Strategy

It can be defined as "that type of learning based on student interaction in small groups, with heterogeneous abilities and aptitudes, in which the student plays the role of the teacher in teaching a group of students, with the aim of completing specific tasks in which they bear responsibility for the learning that occurs within each group, and the teacher's role in it is guidance and evaluation." (Johnson, D.W. & Johnson, R., 1989, p. 109)

The attitude towards using peer teaching:

Attitude is defined procedurally in this research as the group of students' responses to the items of the attitude scale towards using peer teaching in teaching, it is expressed as the average scores of students obtained on the attitude scale prepared for this purpose.

Jigsaw strategy:

Johnson, D.W., & Johnson, R.T. 1981 defines it as one of the models of cooperative learning that relies on peer teaching, in which each student becomes an expert in a field through in-depth study of a specific topic with a group of experts, and when each student returns to his group, he teaches what he has learned to his colleagues, and at the end of the lesson each student undergoes evaluation in the various areas of the lesson. (Johnson, D.W. & Johnson, R., 1989, p. 109)

Sixth: Limits of research:

This study adheres to the following limits:

1- Reorganizing the content of the "Learning Skills" unit in the Learning and Research Skills course for first year students at University of Imam Abdul Rahman bin Faisal, in the academic year (2021/2022) (first semester). This unit was chosen due to its importance to students at the university level, because it includes experiences that are compatible with the chosen strategy, and facilitates the measurement of students' acquisition of learning skills and cognitive achievement.

2- The research is limited to studying the effect of using the jigsaw strategy on:

 - Cognitive achievement (remembering, understanding, and application level).

- The attitude towards using peer teaching in teaching.

3- Measuring the impact of using the strategy is limited to students of the first year at University of Imam Abdul Rahman bin Faisal, who have not previously studied this unit.

Seventh: Search tools:

The current research uses the following tools:

1- Research tools: preparing the teacher's guide and student book for the jigsaw strategy.

2- Evaluation tools: cognitive achievement test, attitude scale towards using peer tutoring in teaching.

Eighth: Research methodology

This is a quasi-experimental design because the nature of the research aims to determine the effectiveness of the jigsaw strategy on cognitive achievement, and the attitude towards using peer tutoring in teaching, through testing a set of hypotheses, and this is done through pre-measurement and post-measurement for each of the two groups: the experimental and the control is as follows:

- Using pre-measurement for both groups: the experimental and control, to calculate homogeneity. Then the experimental group is exposed to the experimental treatment,

which is the unit prepared in a form that suits the nature of the jigsaw strategy, while the control group is taught in the traditional method.

- Using post-measurement for both the experimental and control groups to measure the effectiveness of these strategies on cognitive achievement, and the attitude towards using peer tutoring in teaching.

Theoretical framework and previous studies

The peer teaching strategy is one of the models of cooperative learning, which also includes the following: (Johnson, D.W. & Johnson, R., 1989)

1- Dividing learners into teams based on student team achievement division (STAD)

2- Team Game Tournaments (TGT).

3- Individualizing learning with the help of the Teaching team Assisted Individualism (TAT).

4- Learning Together Model (LTM).

5- Group Investigation Model (GIM).

6- Jigsaw groups (expert groups).

It has been recognized that peer teaching is a promising educational revolution that aims to improve the educational process's emotional, social, and cognitive outcomes. Currently, there are many methods and structures available for peer teaching.

Peer tutoring objectives:

This strategy aims to: (Aronson, E., Blaney & others, 2021)

1- Improving the learner's self-esteem by realizing that each individual has unique strengths that he can benefit from in peer teaching situations.

2- Increasing the student's internal motivation to increase his understanding and improving relationships inside and outside the classroom.

3- The individual performance of all students improved as a result of their learning together in varying ways.

4- Helping the teacher deal with large numbers of students.

5- Saving the teacher's effort and using peer groups to teach each other.

The importance of peer teaching:

The importance of peer teaching includes the following: (Aronson, E., Blaney & others, 2021)

1- It develops the student's ability to take responsibility for his learning. This makes him more integrated into the educational situation.

2- The student develops his higher-order thinking skills as students spend time synthesizing and integrating perceptions and concepts.

3- This type of learning leads to an increase in the learner's sense of satisfaction with the educational experience and to the growth of positive attitudes towards each other.

4- The peer teaching strategy deepens learners' learning by:

• Providing students with a common knowledge base. This means that ideas and concepts are transferred from one individual to another with the same meaning, and this is what Wheatly confirms when he says: The communication that you have with others

leads to the transfer of our ideas with the same meaning that exists in our minds. " (Coelho, E., 2012, p. 90)

• Developing students' social and group skills such as communication skills, group management skills, and leadership skills.

• Emphasizing the learner's formation of knowledge himself, and this is what "Glasrphia" emphasizes that knowledge is nothing but the learner's activity and that every knower must increase it himself.

Jigsaw technique:

- Definition:

It is one of the models of cooperative learning that relies on peer teaching, which creates a spirit of positive mutual dependence among students, while each of them maintains his position and self-esteem, each student becomes an expert in a field through in-depth study on a specific topic with a group of experts. When each student returns to his group, he teaches what he has studied to his colleagues, and at the end of the lesson each student undergoes evaluation in the various areas of the lesson.

(Skon, & others, 2020)

The Jigsaw strategy was chosen as a model for cooperative learning intervention based on the assumption, as it provides a climate rich in feedback. It was developed by Snapp, Stephen Sikes (Snap 1978), and & Blaney Sikes, Stephan (1978). It was described by Slavin (1986) and called Jigsaw. It included a structured learning cycle of activities that included reading, expert group explanation, group reporting, testing, and finally the group. This previous cycle provides a set of useful opportunities. (Skon, others, 2020)

One of the contemporary methods of cooperative learning that has gained great emphasis in language and science classrooms. Coelho (2012) demonstrates that the Jigsaw method offers us an outstanding learning environment for stimulating the development of academic skills through thoughtfully planned reading and writing assignments and investigating relevant content from Through the active use of meaningful dialogues in the classroom, Millis & Cottell (2020,) the Jigsaw method fits into educational courses requiring for problem-solving abilities. The fundamental components of cooperative learning are supported by the Jigsaw method, as these two researchers have confirmed. For example, since students are tested individually, all the information must be present, not just their portion, and they must teach each other until they have a complete picture. This requires positive agreement and individual responsibility. (Millis & Cottell, (2020)

A group structure that can be applied to all areas of the curriculum is the Jigsaw method. The primary group of students begins with the task of teaching a portion of the teacher-imposed assignment. Subsequently, the instructor splits the class up into Jigsaw groups. One person from each main group is assigned to a new group in order to accomplish this. Students share information and finish projects or products in Jigsaw groups. Berg (2003) used the jigsaw method to provide a large amount of material quickly and to provide students with different perspectives on the topic, as well as to create interest, and also use it as a research strategy. Berg, Ellen (2003)

Berg believes that the most important addition to the jigsaw activity in learning is that students create their own meaning and demonstrate seriously and realistically that they have learned the subject. (Aronson, E., Blaney & others, 2021)

Practical benefits of applying the jigsaw strategy:

 Among the benefits of applying the Jigsaw strategy are the following: (Webb, N.M., 2019)

1- Solving the problem of bullying students.

2- Dealing with the problem of weak students.

3- Dealing with the problem of outstanding students who may become bored as a result of not exploiting and satisfying their talents.

4- Satisfying students who are accustomed only to competition and not cooperation.

Steps of the jigsaw strategy:

Coelho, E, has specified the steps for jigsaw by providing several tips for the teacher to work with this strategy, which are: (Coelho, E., 2012)

1- Divide the students into groups of five or six students.

2- Appoint a group leader.

3- Divide the lesson into five or six parts.

4- Each student was assigned to study part of the lesson.

5- Give students the opportunity to read their section at least twice to understand it well

6- Gather groups of experts from each group where they study their part in depth and prepare to present it to the rest of their original groups.

7- Let the students return to the complex groups again.

8- Ask a student to present his part to the rest of the group, and at the same time encourage the students to ask questions.

9- Move between groups to observe the progress of work among students and participate in the discussion if necessary.

10- At the end of the lesson, students take a small test on the topic of the lesson.

Studies examining the jigsaw group strategy's effectiveness in teaching:

1- Gallo, Lee, C. (2023) study:

The aim of the study was to test the effectiveness of using the Jigsaw method in teaching biology on students' achievement and scientific thinking. The study group was of (171) students. The students were divided into two arms: the first included (104) students and used the Jigsaw method, and the second included (67) students and used the traditional method of learning. A pre-post achievement test was applied to measure achievement in biology for first year secondary school students, and a scale in scientific thinking was applied. The study results showed the following:

- The arm that used the Jigsaw method in learning outperformed the arm that used the usual method in achievement in biology.

- There are statistically significant differences between the two arms in the scientific thinking scale in favor of the experimental arm. (Gallo, P., & Lee, C., 2023)

2- Jesse Palmer and Johnson (2023) study:

the study investigated the effectiveness of the Jigsaw strategy in the learning of the subject of energy by first-year College of Education students, to examine its impact on the students' achievement compared to their colleagues who did not use this method in education. The study group included (76) students who were administered an achievement test. The findings of this study showed no statistical significance between the scores of students who learned with the Jigsaw method and their peers who did not learn with it in the post-achievement test. (Palmer, Jesse, Johnson S.T, 2023)

3- "Qin, John" (2022) Study:

It aimed to determine the impact of studying chemistry using the jigsaw method. The study group consisted of (63) students for the experimental arm and the same for the

control arm. The Jigsaw method was used by the experimental arm students, while the traditional method was used by the control arm students. The experimental arm students outperformed the control arm students in terms of achievement and acquisition of scientific knowledge. (Qin, Z., John. T., 2022)

4- Van Sickle's (2022) study

Which aimed to identify the effect of using the Jigsaw group method in teaching the subject of human embryonic development. The study's sample size of (120) high school students: 65 students were in the experimental arm, 55 students were in the control arm. The subject of human embryonic development was studied to the students of the experimental arm. Using the Jigsaw group method, while the same subject was taught to the control arm in the normal way followed in secondary schools, the study results showed differences that are statistically significant between the average achievement scores of the two arms at a significance level (0.01) in favor of the experimental arm, and that there are statistically significant differences The average education retention scores for the two arm were shown at a significance level of (0.03) in favor of the experimental arm. (Van Sickle, R.L., 2022)

5- "Ellen Berg" (2022) Study

In this study the Jigsaw method was used to test its effectiveness on achievement and scientific thinking among sixth-grade primary school students, through teaching some fictional stories in the science subject, to acquire some scientific concepts. The sample included (96) students, of whom (55) were in the experimental group that studied using the Jigsaw method, and (41) the control group studied these stories in the usual traditional way. The results showed a clear superiority of the experimental group students compared to the control group students in both achievement and scientific thinking. (Berg Ellen, 2022)

6- Theodora De Paz, (2021) Study

This scientific paper examined the effectiveness of using two teaching methods, the traditional method and the Jigsaw method on achievement and attitude toward science by studying the Organs of Living Organisms unit in the biology curriculum for the second year of secondary school. The sample included about (96) students, and the study tools included an achievement test and a measure of attitude toward the science subject. The findings showed that the Jigsaw method group was superior to the traditional method group in achievement, while no statistical differences were recorded in the attitude towards the science subject between the two groups. (De-paz, Theodora, 2021)

7- Jean Dori (2020) Study

This scientific paper studied the effect of two methods of teaching biology on students' achievement and their acquisition of laboratory skills through studying the unit "cell" in biology. The sample included (80) high school students. The study group was divided into two arms, the first studied using the Jigsaw method and the second using the regular method. The study used an achievement test, an observation form, and a scale towards the Jigsaw method, the results showed the superiority of the experimental arm that was taught using the Jigsaw method in achievement, as well as their positive attitudes towards the Jigsaw method and the increase in cooperative learning activities. (Dori, Jean, 2020)

Comment:

By investigating a number of previous studies that examined the effects of the Jigsaw method as an active learning strategies in the classroom, and discussing the areas of agreement and differences between them, it becomes clear that:

Areas of agreement:

- These previous studies agree in their goal, as they aim to identify the effectiveness of the Jigsaw method on achievement compared to the traditional method.

The differences:

- Some studies were concerned with measuring the effect of the Jigsaw method on some educational outcomes other than achievement, such as: the study of "Theodora De Paz", which was concerned with measuring this effect on the attitude towards science subjects, and the study of "Jean Dore", "Ken, and John" on some laboratory skills, the attitude towards the Jigsaw method, and the study of Allen Berg, "Gallo, Lee" on scientific thinking.

- Most previous studies focused on using the Jigsaw method in advanced educational stages, such as the secondary and university levels, because this method requires training for students on how to work with it, with the exception of the "Berg" study, which was conducted on sixth-grade primary school students.

Looking at the results of the previous group of studies, it is clear that:

Areas of agreement:

- Most of the results of previous studies in this area agreed on the effectiveness of the Jigsaw method on achievement.

The differences:

- The "Jesse Palmer and Johnson" study was distinguished in its results, as it indicated that in academic achievement there were no statistically significant differences between the experimental arm that studied using the Jigsaw method, and the control arm that studied using the usual method.

The current study agrees with these studies in its interest in examining the impact of the jigsaw method on achievement, in addition to examining its impact on developing the attitude towards using peer teaching in education.

Search procedures:

This part presents the study tools, which are the teacher's guide and the student's book for the jigsaw strategy in teaching the learning skills unit in the learning and research skills course. It also deals with the evaluation tools represented by an achievement test, and a measure of the attitude towards using peer teaching in teaching. It also presents how to choose the research group and its variables.

First: Search tools:

Whereas this study aims to determine the jigsaw strategy's effectiveness on cognitive achievement, and the attitude towards using peer tutoring in teaching; Therefore, the researchers prepared some of the tools required for the research experiment, which are as follows:

A- Student book:

Teaching the "Learning Skills" unit required reformulating the unit so that it is consistent with the jigsaw strategy, that the researchers initially formulated the unit in the form of educational situations, so that each student book in the unit includes activities based on the philosophy of the jigsaw strategy. The "Learning Skills" unit was presented in the Learning and Research Skills course for the preparatory year students at University of Imam Abdul Rahman bin Faisal, it was presented to a group of arbitrators, including professors from colleges of education and workers in the educational field, to express an opinion on the following points:

- The extent to which activities are appropriate for the student's level.

- The extent to which activities are appropriate for the learning strategy.

- The suitability of educational objectives to the content of the subject.

The unit's exploratory experience:

This was done for the purpose of determining whether the unit prepared using the Jigsaw strategy achieves the goals for which it was developed when used by the students for whom it was prepared. Therefore, the researchers tested the unit on a group of (30) students in the preparatory year at University of Imam Abdul Rahman bin Faisal, to verify the extent to which the suitability of the tools, the clarity of their objectives and content, the extent of the students' response to the instructions contained therein, and determining if there is ambiguity or difficulties that these students see. The experiment has shown some results, including: the difficulty of some activities. These activities have been simplified to suit the level of the students.

- The final formulation of the student book:

Some modifications were made according to the results of the arbitrators' responses, the exploratory experience of the unit, and in light of the objectives of teaching the unit and adherence to the strategic controls. In the end, the validity of the unit in its final form was confirmed for application to the experimental group.

B- Preparing the teacher's guide.

The main items of the guide can be presented in the following points:

1- Introduction.

2- The importance of teaching the unit.

3- The educational objectives of the unit.

4- Guidance for the teacher regarding teaching the unit.

5- Presentation of educational situations.

- Special educational goals.

- Learning resources.

- Teaching strategy.

- Assessment.

6- Final evaluation.

Second: Evaluation tools:

C- Preparing the achievement test:

The achievement test was prepared in light of the first three levels of the cognitive aspect. The number of test items was determined at (34) divided into three levels (remembering - understanding - application), the number was in the order (21-4-9). The following table shows the distribution of test items at the three levels.

Table No. (1) Table of specifications for the learning skills unit in the learning and research skills course

	Topics	Remembering level	Understanding level	Application level	Total number of test items
1	Teaching strategies	6	2	1	9
2	Mind maps	5	1	3	9

3	Reading & writing skill	9	1	2	12
4	Summarizing skill	1	-	3	4
	Total N# of test items	21	4	9	34

After completing the preparation of all items of the test, the initial form of the test was written and presented to a group of arbitrators to determine its suitability for application. The researchers used the method of personal interviews with each of the arbitrators in order to facilitate their work, some of the test items were modified as indicated by the arbitrators.

- Exploratory testing experience:

After preparing the test and presenting it to the arbitrators, it was applied to a group of students on the humanitarian track in the first year. The aim of the application was:

A- Calculating the test reliability coefficient.

B- Calculating the test's validity coefficient.

C- Calculating the time required to perform the test.

- Test reliability:

It means "the possibility that the test will give the same results if it is re-applied to the same sample consecutive times and under the same conditions." In calculating the test's reliability coefficient, the researchers used the test re-application method, where the test was re-applied two weeks after the first application. The reliability of the test is of high degree; the reliability coefficient value was (0.80).

- Test Validity:

The validity of the test is intended to "measure what it was designed to measure." The logical validity of the test was calculated: The logical validity is intended for the test to represent the field or area that it measures, and after presenting the test to the arbitrators, the test items have become largely representative of the field of measurement.

D - Preparing a measure of the attitude towards using the peer teaching strategy in teaching:

1 - The goal of the scale:

The scale aims to identify the attitude of first year students towards using peer teaching strategies in learning.

2- Formulating the attitude scale items:

Through the theoretical background and review of some trend measures, it was possible to write a number of items amounting to (50) items.

3- Attitude scale instructions:

The student was asked to express his opinion by agreeing or disagreeing with each item of the scale, according to the Likert method, with the students putting a mark (✓) below the response that expresses his opinion.

4- Presenting the Attitude scale to the arbitrators:

After preparing the initial form of the scale, it was presented to a group of arbitrators. The arbitrators made some comments and amendments that were taken into account after rewriting the scale. Thus, the final form of the scale became acceptable and consists of (50) items in which the positive and negative items are balanced.

5 - Method of correcting the attitude scale:

The scale included a key explaining how to correct it, so that the answer to each item of the scale ranges between: (strongly agree, agree, not sure, disagree, strongly disagree), and grades are given (5, 4, 3, 2, 1) respectively. Corresponding to the previous five answers if the item is positive on the scale, and grades (1,2,3,4,5) respectively if the item is negative on the scale. The total score of the scale ranges between (50-250), where the score (250) represents the maximum answer score for all items of the scale, while the score (50) represents the minimum score.

6- The exploratory experience of the attitude scale:

After completing the preparation of the attitude scale, it was applied to a group of first year students in the scientific track, numbering (30) students, then it was re-applied again to the same group two weeks after the first application, in order to calculate the scale's stability and validity, the coefficient of discrimination for its items, and the time for performing the scale, and this will be explained. Below:

A- Scale reliability:

The scale's reliability coefficient was calculated by re-applying it to the same group of students two weeks after the first application. The reliability coefficient was calculated using the general equation for the correlation coefficient, where it was equal to (0.91), which indicates a high degree of reliability of the scale that makes it suitable for application to a group. search.

Third: Choosing study groups:

The two study groups (140) students were randomly selected from the students of the humanitarian track in the first year, for each of: the experimental arm and the control arm, as follows: four groups, each of which has (35) students per group, the experimental arm (70) students, and the control arm (70) students.

Research results, their interpretation, recommendations, and proposed research

First: The research results and their interpretation:

In this part, the statistical treatments for the post-application scores for both the achievement test and the measure of the attitude toward using peer tutoring in teaching are presented and interpreted, to answer this research question:

• What is the effectiveness of using the Jigsaw strategy in teaching on cognitive achievement, and the attitude towards using peer teaching?

1 – The first hypothesis:

The mean, standard deviation, and "T" value were calculated to indicate the difference between the average scores of the two arms. The findings are shown in the following table:

Table (2) The significance of the difference between the average scores of participants in the two arms (experimental and control) in the post-application of the achievement test

Arm	Students N#	Total mark	Mean	Standard Deviation	T-value	Significance level
Experimental	70	34	29	2.8	10.75	Significant at the 0.01 level
Control	70	34	23	3.9		

There is a statistically significant difference at the level of (0.01) between the average scores of the students of the experimental arm who are taught using the Jigsaw strategy, and the control arm who is taught in the traditional method, in the post-achievement test in favor of the experimental arm participants, which confirms that using the Jigsaw strategy has a significant impact on improving the quality of education for the students of the experimental arm for this unit compared to the traditional method of teaching used by the control arm (table2).

From these results, the following implications can be drawn: -

Using the jigsaw strategy in teaching the learning skills unit in the learning and research skills course contributes to increasing the achievement of the students in the experimental arm over the control arm students who studied the same unit but taught using the traditional method.

The researchers attribute the superiority of the experimental arm students who were taught using the jigsaw strategy over the control arm students who were taught using the traditional method in achievement to:

• The effectiveness of this strategy. The jigsaw strategy is one of the active learning strategies, where the student has an active role in the process of learning, and his role is not limited to passive listening as it is in the lecture; Therefore, the information has a greater impact on the student's mind.

• The jigsaw strategy is based on several foundations and steps that include the student's mastery of the concepts included in the lesson, discussing it with his colleagues, and exchanging experiences with his peers in the group. The strategy also allows the outstanding student to help the weak student within the same group.

• Peer teaching develops different levels of thinking as it activates memory and develops: (remembering - understanding - application).

• An atmosphere of social relations and social cohesion prevails among the students of one group, which makes the high-achieving student encourage the rest of the group to do what is difficult for them. Which increases the achievement of the group.

• Continuous feedback from the teacher to students, as well as evaluation after the end of each lesson individually (individual accountability), which increases academic achievement.

Therefore, the findings of this study are similar to the findings of the study of: "Ellen Berg, Theodora De-Paz, Gallo & Lee, Qin & John, Van Sickle," "Jean Dori"   (Dori, Jean). It was previously mentioned in previous studies.

While it does not agree with the results of the study of: "Palmer, Jesse & Johnson."

Considering the previous results, the first hypothesis is accepted, which states: "in the post-application of the achievement test, there is a statistically significant difference at the level (0.01) between the average scores of the participants in the experimental arm, who were taught using the Jigsaw strategy, and the control arm, who were taught in the traditional method, in favor of the experimental arm."

2 - Regarding the second hypothesis:

To test the validity of this hypothesis, which is stating that: "There is a statistically significant difference at the level (0.01) between the average scores of the participants in the experimental arm and the control arm on the scale of attitudes towards using peer tutoring in teaching in the post-application, and the difference is in favor of the participants in the experimental arm," the mean was calculated. The standard deviation and its "T" value indicate the difference between the average scores of the two arms' students in the post-application of the attitude scale. The following table shows these results:

Table (3) The significance of the difference between the average scores of participants in the two arms (experimental and control) in the post-application of the attitude scale towards using peer tutoring in teaching.

Arm	Students N#	Total mark	Mean	Standard Deviation	T-value	Significance level
Experimental	70	250	245	24.7	13.3	Significant at the 0.01 level
Control	70	250	185	24.7		

There is a statistically significant difference at the level of (0.01) between the average scores of participants in the two arms (experimental - control), in the post-measurement of the attitude scale towards using peer tutoring in teaching in favor of the Jigsaw strategy (experimental arm) participants, which indicates that the use of this strategy contributed to improving the attitudes of the participants in the experimental arm towards using peer tutoring in teaching (table3). This growth may be attributed to the extent to which the experimental arm participants positively accepted the use of peer teaching in teaching, which adds an atmosphere of pleasure within the classroom. The researchers attribute the lack of improvement in the responses of the control arm members to their lack of knowledge of how to implement peer teaching in a practical manner inside the classroom, and their lack of the process of interaction that occurs between groups during the learning process, which results in modifying students' attitudes and giving them positive attitudes toward using peer teaching in education. This was confirmed by "Fawzi Al-Habashi" and "Badriya Kamal", that functional skills and personal attitude work in tandem, and any change in one lead to a change in the other. (Hussein, Abdel Moneim, and Mohamed Hussein, 1996)

These findings of the study are similar with the results of the studies of: "Zakaria Yahya, Lotfy Al-Khatib, "Topp," Abdullah Al-Farra, Kamal Aziz Club, "Boone & Gable." (Al-Habashi, Fawzi, 1995)

Considering the previous results, the second hypothesis is accepted, which is stating that: "There is a statistically significant difference at the level (0.01) between the average scores of the study arms (experimental – control) participants on the scale of attitudes toward using peer tutoring in teaching in the post-application, and the difference is in favor of the participants in the experimental arm."

3 - Regarding the third hypothesis:

A significant positive correlation between the scores of the achievement test and the scale of attitudes toward using the peer teaching strategy in education for the experimental arm in the post-measurement."

The correlation coefficient was calculated between the scores of the achievement test and the attitude scale for members of the experimental group in the post-measurement to determine the type of correlation between them and verify the validity of this hypothesis. The value of the correlation coefficient was equal to (0.32), which is a significant positive value in the experimental arm indicating the presence of a significant positive correlation between the scores in both the achievement test and the attitude scale towards using the peer teaching strategy in teaching for the post-measurement. This is because using the peer teaching strategy to teach the unit helped provide the learner with educational environments and experiences, provide immediate feedback, and gives him a greater opportunity to share information, and increase his motivation towards using the peer teaching strategy in learning, to achieve learning goals and motivate him to learn more.

There is no doubt that whenever the peer teaching strategy helps the student understand abstract concepts that he did not know, or that were difficult for him to understand before, his attitudes towards this strategy increase, he feels how important it is in learning. The interaction between the student and his colleagues also creates a kind of familiarity, thus

the student's motivation to learn increases, from here the interrelation appears between the student's acquisition of information and concepts using the peer teaching strategy and his attitudes toward it and its educational uses.

The above proves the validity of the hypothesis of the existence of a significant positive correlation between the scores of the attitude scale and the achievement test using the peer teaching strategy in education in the post-application of the experimental arm. The findings of this study are similar to the findings of the following studies: "Qin & John, Roger, Barbara, & Hansell, Mike," Patrick McCarthy and Leon Anderson. Considering the previous results, the third hypothesis is accepted, which affirm: "A significant positive correlation between the scores of the achievement test and the scale of attitudes toward using peer tutoring in teaching for the experimental arm in the post-measurement."

Results Summary:

using The Jigsaw strategy in teaching the learning skills unit for first year students, which was taught to members of the experimental group, has led to:

1 - Increasing their acquisition of the experiences included in the unit, thus the effectiveness of the Jigsaw strategy was verified in bringing about a positive, statistically significant change in increasing the learning of the experimental arm students, revealed from the achievement test results.

2 - Increased growth in students' attitude towards using the peer teaching strategy in teaching.

Research recommendations:

(1) Working to include modern teaching strategies in academic development programs for faculty members in Arab universities.

(2) Evaluating the performance of faculty members according to their ability to use modern strategies in teaching

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