

## **The Effect of Jigsaw strategy on Academic Achievement and Engagement in Learning among the 3rd male graders students in Chemistry**

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### **Abstract:**

The research aims to identify the effect of jigsaw strategy in learning achievement and engaging for the third grade intermediate students in chemistry. The research sample consisted of (61) students distributed in two experimental and control groups. The research tools consisted in the achievement test and the measure of engaging learning. The results showed that there are statistically significant differences at the level of ( $\alpha = 0.05$ ) between the experimental group and the control group in both the achievement test and the measure of learning involvement for the benefit of the experimental group. In this light, the researcher recommended the use of jigsaw strategy for teaching the subject matter. Lamia because of its impact in raising the level of academic achievement and engaging learning chemistry.

**Keywords:** jigsaw strategy, engaging in learning

### **Research problem:**

The third grade is considered one of the important stages in the life of students because it prepares them for several study options depending on the final rate obtained in the ministerial exam. This causes anxiety and tension for students and thus leads to a decrease in their academic achievement in general and chemistry in particular, the researcher noted this Through the complain of teachers and parents of the decline in students' achievement in chemistry and found this by looking at the results of the previous years of chemistry, and due to other reasons, including the presentation of chemistry in traditional ways that do not broadcast suspense and vitality For these subjects, making them dry and complex material, as these methods focus on memorization and pouring information in the student as a bowl and the student only save them for exams and then leak and evaporate the information, and this is confirmed by many studies such as the study Taie (2016), as follow this traditional pattern In teaching leads to poor student involvement in learning, which is an important element of education, and a basic goal based on the attitudes of learning to achieve and an indicator of the motivation of the learner to engage in learning tasks in and outside the classroom (Baily & Alfonso, 2005, P-3).

The learner's preoccupation with non-academic duties and low motivation to engage in school assignments as well as drop-out and lack of commitment to attend classes and poor ability to communicate with teachers within the classroom leads to a low level of involvement in learning and thus make them do not engage in materials and do not make an effort, which leads to low scientific level, The students lose their focus in the lesson for reasons related to non-diversified educational activities that lack the minimum of excitement and go at the same pace all the time, as well as poor suitability to the level of students and developmental stages all this will Increase the level of concentration and mental harmony and enjoy what they learn in the class because they feel bored, which leads students to choose activities outside the framework of learning such as looking outside the window and watch what is happening there or look at the clock or write on the book, because they find it more interesting than engaging in educational activities Dull and insipid (Zayed, 1998, 283).

This is confirmed by the results of several studies such as Warbartion (2001) and Fredrick (2004), which indicated that the low sense of efficiency and the desire to exert effort during the educational process and poor organization and self-planning of learning activities reflected negatively on the level of academic achievement, and that the lack of interest and seriousness of students in activities Learning is a major challenge for the educational system. Engaging in learning is key to student success (Fredrick et.al, 2004, p69).

To make the learning environment suitable for students and to help them learn in an environment of cooperation and consistency and fun, away from the tension and fear of chemistry in the middle third students, which increases the involvement of learning and achievement, this required the experimentation of modern strategies that arouse the thrill and help to collaborative work and make the student The focus of the educational process, such as the Jigsaw strategy, which may contribute to the improvement of achievement and involvement in learning, in the light of the above can summarize the problem of the current research in the presence of weakness in the achievement and the involvement of learning in the third grade students in chemistry, which created a need to use The Jigsaw strategy for cooperative learning has increased the learning achievement and the involvement of chemistry in the third grade students. Therefore, the current research attempts to answer the following question: Is the use of Jigsaw strategy to increase the academic achievement and the involvement of learning in the third grade students in chemistry?

research importance :

The end of the twentieth century witnessed the development of knowledge and technology not seen before in the modern world in various areas of life, led to an increase in the volume of knowledge and information, which made interested and those who develop the educational system, accelerate the time to search for new strategies in learning to communicate information to the learner and make it the center

of the educational process Since the modernization process in the field of science teaching strategies is no longer a subject of debate or debate, it has become a very important and urgent requirement for the balance between the fast life in the era of globalization, teaching science in general and chemistry in particular reflects the scientific values of It is a social activity that includes human values. Objectivity, perseverance, thoughtfulness, judgments must be explored, and others are essential in science (Al-Khalili, 2005, 22). The task of a successful chemistry teacher is to choose a teaching strategy that focuses On the positive students and develop their scientific and social skills and enhance the spirit of participation and cooperation among them leading to increase their academic achievement in chemistry (Balawi, 2007, 1), and these strategies are cooperative learning advocated by the contemporary educational movement where research and studies have proven their impact It is considered as a modern strategy that focuses on the quality of learning among students and allows them to interact between them and their colleagues, which leads to positive active participation on his part, thus transforming from an ineffective element to an active and participatory element. In cooperative learning groups (Shehata and El-Naggar, 2003, 66), cooperative learning has many strategies, including a developed strategy called the Jigsaw Strategy. This strategy has proved effective in building positive attitudes towards school, teacher and subject at the same time (2008). Kilic), in his study K. Many studies have pointed to the effectiveness of the Jigsaw Strategy in Education, such as Al-Matouq (2013) and Aziz (2010). The importance of this strategy is that each student in the group depends on others and this encourages them to perform their roles effectively. Most teachers find that Jigsaw's strategy is easy for students and the student enjoys applying it, thus reducing student dropout from school. The concept of engaging learning is a relatively modern concept that emerged at the beginning of the century. The One and the World Renn, who leads the individual to the highest degree of employment of his cognitive and psychological energies, which is usually accompanied by a state of conviction and self-satisfaction with the postponement of the individual's desires, which leads to the full involvement of the activity or task performed by being a motivated state associated with preoccupation and involvement and concentration of attention (Pham, Arent P-2, 2009, is one of the important objectives of educational institutions, where the teacher works through the full integration of students with educational activities, leading to the achievement of positive results that the teacher seeks to achieve, and contributes to improve the climate and environment As the middle stage is adolescence, this type of education derives its importance in that it corresponds to a certain psychological stage experienced by the individual during his development, so the work of the teacher is very much focused on internal payment. The difficulty of understanding the motivation in guiding the student may lead to the problem of students feeling tired and bored, and improper learning and the feeling that the school does not matter. (Khalifa, 200, 255), as Many studies, such as AkeL, 2009, confirmed that learning is of great importance for students 'achievement. Learning is concerned with students' desire and willingness to spend and spend their efforts for a long period of time to understand the subject in depth and master difficult skills (Sedaghat, el, al, 2011,

p240) It is found that there is a relationship between learning engagement and achievement goals. The goals of achievement are divided into two types: Goals for approaching performance indicate that individuals are preoccupied with the task until successful in order to prove their abilities as they continue to face difficulties through the use of effective strategies. In teaching and have high ambitions Continue to succeed, either individuals who have the goals of improved performance, they are associated with the loss of desire and the will to discuss and seek help from others when faced with difficulties and be weak motivation for success (Debacker, Crowson, 2006, p537).

The importance of the current research in:

- Addressing the Jigsaw strategy based on the assumptions of the constructivist theory as the most common theories adopted by modern reform movements in this era through cooperative groups suitable for teaching chemistry.
- It is hoped that it will contribute to improve the achievement and the involvement of learning in the third grade students when teaching chemistry
- Curriculum developers have been constrained in formulating chemistry curricula and incorporating modules using Jigsaw strategic steps
- Adding a building block of Arab and local scientific knowledge to the lack of studies that addressed this strategy as well as its impact on the involvement of learning.
- The present study may contribute to finding solutions to the problem of low level of achievement of third grade students in chemistry through the presentation of the material strategy Jigsaw.
- The present study provides objective, honest and consistent tools to measure study variables (achievement, involvement in learning at a critical age, adolescence)
- The results of the study provide an information base on the study variables in the conditions of the educational process in our schools, which establishes the proper planning and development of appropriate educational programs in improving the educational environment
- The results of the study may add important information to the field of knowledge in the field of teaching chemistry and thus provoke new ideas for researchers to conduct new studies of value and usefulness.

research goals:

Current research aims to identify:

- The impact of Jigsaw strategy in the achievement of third grade students in chemistry

- The impact of Jigsaw's strategy in engaging in learning for third graders in chemistry

#### Research hypotheses

- There is no statistically significant difference at the level of significance ( $\alpha = 0.05$ ) between the average scores of the experimental group studying chemistry according to the Jigsaw strategy and the average scores of the control group students studying the material according to the usual method of achievement test.
- There is no statistically significant difference at the level of significance ( $\alpha = 0.05$ ) between the average scores of the experimental group studying chemistry according to the Jigsaw strategy and the average scores of the control group students who study chemistry according to the usual method on the scale of engaging learning.

Search Limits: The current search was limited to:

- Third grade students in middle schools in Baquba / Diyala province.
- The first semester of the academic year (2017-2018)
- (Chapter I and II) of the book of Chemistry for the third grade intermediate, 2018.

#### Define terms:

- Strategy Jigsaw: Known both
- Shahin (2010) is a type of collaborative learning that requires learners to communicate with each other in order to fill in the missing information and integrate it with other information and participate actively and reliably (p23, Shahin, 2010).
- Ali and Taie (2011)

An educational strategy based on dividing the learning task into parts by the number of students in each group, and each member becomes an expert in these parts, then teams of experts work together, in order to find the best way to help others learn, and then teach other members of the group (Ali and Taie, 2011.73)

- Aronson (2000): A strategy based on collaborative learning through which students are organized in a way that relies on each other, to achieve the objectives of the lesson, in which students are divided into groups of experts, each mastered a specific part of the lesson, and study this part later to team members P87), Aronson, 2000

Procedurally: It is a cooperative learning strategy based on the division of the third grade students while teaching chemistry into small groups (5-6) and gives each student a special task important, which makes him an expert on his own part of the material and after receiving the tasks return the members in their original group and then return to groups And rotate to teach each other to transfer their expertise to their members.

-Achievement knew all of

Abogado (2008): The outcome of what the student learns after a specified period of time, and can be measured by the degree obtained in the achievement test to see how well the strategy developed and planned by the teacher to achieve his goals and the student's knowledge translated into grades. (Abu Jadu, 2008, 425)

-Bani Khalid (2012): Specific level of achievement and performance in school education which is measured by the teacher or through monthly or final tests. (Bani Khalid, 2012, 27)

Procedurally: the amount of information acquired by the students of the research sample as measured by the degree obtained in the achievement test prepared for this purpose.

- Engage in learning and knew each of:

- Karen and Kuuklin (2006): Persistence and student participation in class activities to increase student learning capacity and achieve academic success (Carini, Kuh & Ktlien, 2006.p.5)

Al-Zu'bi (2013): The student is engaged in an activity directly related to the learning process in the classroom through attention, participation, effort and commitment to the teacher's instructions (Al-Zu'bi, 2013, 25).

Procedurally: The degree obtained by the student for the paragraphs of the scale of the involvement of learning prepared by the researcher for this purpose

Theoretical framework:

-Jigsaw strategy

The use of cooperative learning strategies of all kinds is widespread in educational institutions that adopt the modern curricula in education. This strategy was developed by Arenson and his colleagues at the University of Texas and was first designed by Arenson in 1978 (Shehata, 2009, 143), which gives students the opportunity to act as a teacher and manager of the learning process, and to partner with each other to achieve their goals. The whole strategy is to divide the students into groups consisting of (4-6) students, and then divided the lesson material into sub-tasks commensurate with the size of the group, so that each student takes part of the material and then the students gather in specialization groups to discuss the task entrusted to each. Each student then returns from the specialization group to the parent group in which he already exists and in the specialization group to the parent group where he is already present. In the parent group, each student specializing in a particular task tries to convey his or her group the information reached by the specialization group that discussed the task. Itself and in this stage is called stage up. One student represents the role of the teacher and teaches his group the subject in which he specializes (Zeitoun,

2007, 56) Jigsaw Strategy can be defined as a cooperative strategy that divided students into groups ranging from (4-6) and divided the material into parts and distributed to the totals. Each of them is tasked with completing their task within the group and assigns a student in charge of the group to monitor the work. Each of them is an expert in his part to explain to his group which facilitates the learning process (Kashash, 2015, 264). They are evaluated by discussion among students in the molecular group and are corrected Here after getting feedback by the classroom teacher (descriptive, 1998, 22),

The word Jigsaw: (synthesis groups) is a method distinguished in its focus on the activity of the student where students cooperate among themselves by forming a group of experts consisting of (4-6) students, where each one in the group gives educational material does not give to anyone else in the group After each assignment, students reorganize themselves into expert groups to study the subject and prepare to teach it to the students members of their original groups and then return to these groups and rotate to teach each other what they have learned and expected to learn All students Slavin worked on developing a modified Jigsaw method, the original in 1990 called Jigsaw II, which is characterized by an assessment of the group as well as an individual assessment in and out of ordinary Jigsaw. The individual's score is influenced by the average score of his group so that it can fit groups and therefore the group writes grades to be added to its credit (Slavin, 2011). To become an expert in it and also contribute to the process Hussein scored the individual student scores in raising the overall team score, while the rest of the modified Jigsaw 2 procedures are the same as in the regular Jigsaw.

Jigsaw's strategy aims to make the learner an expert, take responsibility in leadership and has his own personality, listen to others, give them lectures and draw conclusions. For understanding and learning (Afaneh, 2008, 272)

#### Jigsaw Strategy Features

- 1 - Develop to support students depend on each other in a very positive way in the sources and tasks of learning and the goal of the lesson, because it is based on the distribution of tasks and duties among members of the group
2. The strategy makes every member of the group contribute, as well as obliges each member to listen to the rest of the group, and increase their attention to them because they need them to get the work done.
3. Develop a love of direction towards both teamwork and fellow students (Yusuf, 2011, 202)
- 4 - make the educational material exciting to learn and interesting and characterized by suspense and attraction
- 5-Alleviate the introvert and isolate students and develop a spirit of love among students (Al Matouk, 2013, 27)

The role of the teacher is to organize and categorize the groups of learners according to their abilities and identify the topic studied by students in the educational session, and then break it into parts based on the number of members of the same group (Afanah and the Army, 2008, 272), and help provide materials and tools for learning and works to follow the groups Interviews with experts in content components, clarification, interpretation and teaching, and then develops appropriate tests to measure content learning outcomes

#### Jigsaw Strategy Steps

Alon Arenson outlined Jigsaw's strategic steps as follows:

- Divide the class into groups, each group of (4-6) students taking into account their homogeneity.
- Divide the topics of the lesson into parts depending on the numbers of members of each group.
- Identify a leader for each group, so that it is the most effective and mature among them.
- Distribute the parts of the lesson to the members of the group so that each student takes one part, and be responsible for it
- Students have a good time to read the required part of them and the expert groups are formed by grouping students from the back of the learning groups according to the lesson molecule responsible, so that students from the group of experts to which they belong. His original collection within a specific time.
- Students return to their original groups
- Each student explains his molecule to members of his group, and is discussed with them
- The teacher walks between groups, monitors the workflow and guides them

Finally, each student is given a test and covers the objectives of the lesson to ensure that they are achieved (Aronson, 2000,23).

#### Engaging in learning:

The emergence of the concept of preoccupation between the twentieth and twenty-first century is important in the growing scientific interest in positive psychological conditions and that the first use of the term involvement of learning is (Corno and Ndnash in 1983), which was concerned with the so-called (student participation) followed by the so-called learner experience Engagement in learning is one of the concepts that followed these actions and aims to promote learning and teaching (Trovler & vicK, 2010, p.2).

Learning engagement is defined as a concept related to the interaction between time, effort and other relevant resources that are invested by students, school and other social institutions to expand the learner's experience and enhance learning outcomes, as well as to develop learner performance and attain a prominent place in the educational field. Individuals engaged in learning have been defined as those who are focused on their work and motivated enthusiastically and that they are deeply attentive and engaging in it. Engagement in learning is not observed and cannot be seen, because the individual is in a neurological condition while performing the tasks involved. Hard and hard and not noticeable by others (Morris, Lummis, Lock, 2017, p. 496)

Indications of learning involvement:

The learners engaged in learning exhibit behavioral use of their learning in educational activities accompanied by positive emotion and they choose tasks that fit and efficiency, and spend a clear effort in the implementation of learning tasks and show positive emotions during those tasks such as (perseverance, curiosity, pleasure and optimism) (Skinner, 1993, p. 572). Several studies have identified five indicators for students 'involvement in learning. These indicators fall within the level of academic challenge, effective collaborative learning, and students' ability to interact and enrich learning experiences. The learner who is not engaged in learning does not do his homework hard, suffers from boredom, gloom and grumbling and is often anxious and angry if he is asked to participate in the classroom and is rebellious to his teachers and colleagues (Skinner, 1993, p. 572), the concept of learning to engage in ambiguous concepts, because it is a complex concepts that revolve around good classroom behavior or persistence and the extent of interaction within the classroom has been assumed Frederick framework for work in the field of learning engaging distinguished through three types of involvement are cognitive and emotional Effectiveness and behavioral Occupy (Frdrick, 2004, p.2)

Involvement methods:

There are several ways to engage students, including:

- Style of strong or strong involvement: They are students who are very attached to their studies and tend to exchange talk with the teaching staff and view the educational environment as supportive.
- Independent Inclusion: Students who are a group of people involved in the supportive learning community and see the faculty as supportive but less inclined to work collaboratively with other students within or outside the classroom environment
- The method of cooperative engagement: It is the type in which students tend to social aspects and oppose the individual forms of interaction and that the higher levels of general cooperative engagement reflects the sincere feelings of students within the

school community, especially during participation in broad activities and when they interact with the teaching staff and students

Negative Involvement: This type of student rarely participates in public activities.

The goal is to improve student learning, improve student retention and productivity, achieve equal social opportunity and develop curricula (trovler & vick, 2010, p12-25).

The involvement of learning has positive effects, including: -

- Improve public capacity and critical thinking
- Improving practical efficiency, developing skills and the possibility of transferring them from one position to another
- Improve and develop the perseverance of learners and feel good about their performance

Engagement in learning takes place through stages

- Recall the previous knowledge experiences of the individual
- See and communicate with the experiences associated with the task from different sources
- Organize expertise in order to accurately accommodate the task
- Formulate a hypothesis in the light of what has been reached where it includes (mental preoccupation, freeing the mind of ideas away from the problem, feeling and interaction with the problem, identify a set of solutions to it)
- Reaching the new idea and formulating it accurately (Reza and Azaab, 2010,58)

previous studies

- Studies on Jigsaw strategy
- The Resourceful Study (2007)

The study aimed to investigate the impact of cooperative learning based on expert groups (Jigsaw) in the direct and deferred achievement of students of faculties of educational sciences compared to normal cooperative learning, the sample of the study consisted of (62) students, and the researcher followed the experimental method, has prepared a test achievement as a tool of study composed of 100 The study found that there were statistically significant differences at the level of ( $\alpha = 0.05$ ) in the direct and deferred achievement between students of the two study groups attributed to the teaching method and for the benefit of the experimental group.

#### Study (2010) Koseolgu

The study aimed to test the differences between cooperative learning represented by the strategy of GIXO and learning based on direct teaching in terms of attainment and attitudes of students and their competence in the course of biology in Turkey, and then to identify their views on the strategy of GIXO, and the sample consisted of (46) students from the third year students in the biology course. The results showed that there are statistically significant differences in achievement attributable to GISCO strategy and there are no statistically significant differences in self-efficacy and attitudes towards biology attributed to the teaching method.

#### - Study of the Ring (2013)

The study aims to find out the effect of using the Jigsaw strategy in developing critical thinking and attitudes towards science among the eighth grade students in Gaza. The sample of the study consisted of 58 students. The study tools were determined in the critical thinking test and the measure of the trend towards science. The results of the study showed that there are statistically significant differences at the level of ( $\alpha = 0.05$ ) between the experimental group studied by the Jigsaw strategy and the control group which is studied in the usual way in the test of critical thinking and the measure of direction and in favor of the experimental group.

#### - Study of Angel (2014)

The study aimed to reveal the impact of cooperative learning strategy Jixo on the achievement of sixth grade students in science in Jordan, and the sample of the study consisted of (70) students were distributed to two control and experimental groups and used an achievement test and the results showed the superiority of students who studied according to Jixo strategy in educational achievement.

#### Study of Sultan and Bulgur (2018)

The study aimed to find out the effect of using JIXO strategy for cooperative learning in the academic achievement of fifth grade students in science. The study was conducted in Syria. The research sample consisted of (80) fifth grade students in Lattakia city. The results of the study and the impact of the strategy of Jixo in the development of academic achievement and for the benefit of the experimental group.

Through the review of previous studies there was a diversity in the objectives, tools and sample of the study where the trick study (2007) aimed to know the impact of cooperative learning based on expert groups (Jigsaw) in the direct and deferred achievement and the sample were students of faculties of educational sciences, the study tool was an achievement test, either. The study of the culmination aimed at knowing the impact of Jigsaw strategy in developing critical thinking and measuring the trend towards science. The study of Sultan and Bulgur aimed to know the effect of Jixo strategy in the academic achievement in science. The sample of the study was the fifth grade students. This study and the study of the resourcefulness in dealing with

the achievement test as an independent variable as well as the preparation of an achievement test. A measure of learning involvement as tools of study.

- Studies dealing with learning

The Zu'bi Study (2012)

The study was conducted in Jordan. The research sample consisted of (303) students from the first year of secondary school and prepared a scale for the engagement and another to know the nature of the English language. The results of the study showed that the students had moderate grades and did not show any significant differences in the level of gender involvement with positive trends towards learning English.

Study (Sani, 2017)

The study aimed to identify the relationship between learning strategies and cognitive involvement of international Islamic students in English. The study was conducted in Malaysia. The research sample consisted of (375) students from international Islamic secondary schools in Malaysia. (Leung, Biggs, Kember)

The study showed a positive relationship between social and metacognitive strategies and cognitive involvement.

Through a review of previous studies that dealt with the involvement of learning we noticed that the study of Zu'bi aimed to reveal the relationship between the behavior of students engaged in learning English with both their relationship with English teachers and their attitudes towards learning, the sample of the study was the first year secondary students, and prepared three tools of study is the measure of involvement The student relationship with teachers and the measure of direction, while the study (Sani, 2017), aimed to know the relationship between learning strategies and cognitive involvement of students of Islamic schools, and adopted the scale of cognitive involvement.

The current study has differed from the previous studies in that it used the strategy (Jigsaw) in the knowledge of its impact on academic achievement and the involvement of learning for third grade students in chemistry, and the researcher did not find any previous study dealt with the impact of Jigsaw strategy by engaging in learning in chemistry has prepared the researcher Measuring tools for research variables (achievement test, learning engagement)

- From the previous studies show that the studies touched on the use of the strategy (Jigsaw) in the teaching of science, mathematics and biology, but there was no study at the local level, about the impact of the strategy of Jigsaw in the teaching of chemistry (within the limits of researcher science), and not all studies have been exposed to study The effect of Jigsaw's strategy on engaging students in learning, so this study takes some kind of excellence for using Jigsaw's strategy in teaching chemistry.

- The extent to which the current study benefit from the previous studies:

The previous studies were used to cover the various aspects of the strategy (definition, steps, and importance), in the theoretical framework and to identify the references that enrich the study as well as in the presentation and interpretation of the results and link them to the results of the current study, as well as in the preparation of study plans and procedures and building tools.

Search procedures

- Experimental design: The experimental design with molecular control was selected with two control groups and experimental with dimensional test as shown in the following diagram:

Dependent variable	Independent variable	Equivalence	Group
Achievement -test Engagment in Learning	: Jigsaw strategy	Prior achievement in science Intelligence	Experimental
	Ordinary method	Time age month	Control

- Research community and sample: The research community includes the middle day schools for boys in the city of Baquba, Diyala Governorate, for the academic year (2017-2018). Four divisions for the third average and after the exclusion of the repetitive students reached (61) students distributed in two experimental and control groups equally.

- Equal search groups

The researcher was keen on the two research groups statistically in some variables, including (chronological age in months, and the previous achievement in science and intelligence) and as shown in table (1)

Table (1) Equivalence of research groups in chronological age, intelligence and previous achievement of science

Statistical significance	T-tabular	T-calculated	Standard deviation	Average account	Group	Variables
Is statistically significant	2,01	1,89	2,73	174,6	Experimental	Time age month
			2,4	173,3	Control	
Is statistically significant	2,01	0,9	5,36	66,6	Experimental	Prior achievement in science
			7,57	68,1	Control	
Is statistically significant	2,01	1,19	4,18	28,96	Experimental	Intelligence
			5,4	27,6	Control	

- Search Requirements

- Determination of scientific material: The scientific material is specified in the first and second semesters of chemistry for the third intermediate grade for the academic year (2017-2018)

Behavioral Purposes: A number of behavioral objectives were formulated based on Bloom's classification of the cognitive domain of the three levels (remember, accommodate, apply). The behavioral objectives were presented to a group of experts (1) to indicate their views on their suitability, and in the light of their observations. The reformulation of some goals and amendment and thus became the number of approved goals (95) behavioral goal.

- Teaching Plans: The teaching plans of the experimental group were prepared according to the strategy of Jigsaw and the other according to the usual method of the control group and were presented to a group of experts.

-search tools

- Preparation of the achievement test: -

- Achievement test has been prepared, where the objective of the test was determined, and analyzed the content of the material, and the table of specifications has been prepared and consists of (30) paragraphs of the type of multiple choice as shown in

Table (2) has been drafted test paragraphs, and gives the student one score for the correct answer about Each paragraph of the test, zero for the wrong answer or left.

The authenticity of the test has been confirmed by:

A - virtual honesty: The paragraphs of achievement test and behavioral purposes were presented to experts in the specialty of chemistry, curriculum and methods of teaching chemistry, has been the proposals and opinions of experts and make adjustments to some paragraphs, and thus achieve virtual honesty

B - Content Validation: The specification table prepared by the researcher is an indicator of content validity, which indicates the number of paragraphs in each cell as well as the objectives and content to be covered through these paragraphs and thus verifies the content validity

Table (2) Specification Table

Total 100%	Percentage of behavioral goal level			Academic content			Chapters
	Application 15,79%	Comprehension 33,68%	Knowledge 50,53%	The relative importance of content	Number of Pages	Chapter title	
20	3	7	10	65,62%	21	Atomic structure for Matter	Chapter one
10	2	3	5	34,38%	11	Groups IA and IIA	Chapter two
30	5	10	15	% 100	32		Total

- Statistical analysis of the test items

The survey was applied to a sample of (50) non-research students. After correcting the students' answers and descending order, a statistical analysis of the test items was conducted, where the difficulty coefficient for each test paragraph ranged between (0.69-037). - 66, 0) It is accepted that the effectiveness of the wrong alternatives showed that the alternatives attracted more students from the lower group compared to the students of the upper group, and thus decided to keep them unchanged.

- Test stability: -

The stability of the test was found in a re-test method where the test was applied to a sample of (40) students. The tool was re-applied with a time interval of (15) days. Consisting of (30) Annexes (3)

- Scale of learning-engaging

The researcher constructed the Learning Engagement Scale after reviewing the studies that dealt with learning engaging and the paragraphs of the scale consisted of (26) paragraphs and the alternatives of five-step answer in front of each paragraph (strongly agree) (agree) (not sure) (disagree) Strongly agree) and scores are calculated (1,2,3,4,5) in front of each selection

- The validity of the virtual scale was verified after it was presented in its initial form to a group of arbitrators to indicate the validity of its paragraphs in measuring the variable and was adopted by accepting the paragraph which has the approval rate (80% and above). Paragraphs

- The stability of the scale was calculated in alpha-Kronbach method and the coefficient of stability reached (75, 0).

- The teaching groups were started by the chemistry teacher after providing him with the teaching plans for both groups and clarifying the objective of the research and follow-up continuously to see the application of the experiment.

It started on (7/10/2017) until (2/12/2017). Achievement test and a measure of learning participation have been applied after the completion of the application of the experiment (4/12/2017) on the research sample. search

- Statistical means: The researcher used the statistical program (SPSS) and represented in

1. Pearson correlation coefficient

2. Arithmetic mean and standard deviation

3-test (t-test) for two independent samples to identify the equivalence of the research groups and test hypotheses

- View and interpret results

First: Results related to the first question: What is the effect of Jigsaw strategy on academic achievement for third grade students in chemistry

To answer the question: The researcher examined the following zero hypothesis: There is no statistically significant difference at the level of significance ( $\alpha = 0.05$ ) between the average grades of students studying Jigsaw strategy and the average grades of students who study in the usual way on the achievement test:

The mean, standard deviation and the value of two independent samples were calculated as shown in Table (4).

Table (4) shows the arithmetic mean, standard deviation and the calculated and tabulated T value of the post-test scores for the achievement test of the experimental and control groups.

Significance at level (0.05)	t- tabular	t-calculated	Standard deviation	Average account	Group
Statistically function	2,01	5,69	5,8	40,07	Experimental
			5,63	31,07	Control

The above table shows that the calculated T value (5.69) is greater than the tabular T value (2.01) at the level of  $\alpha = 0.05$  and a critical score (59), thus rejecting the first zero hypothesis which states (there is no statistically significant difference at the level of significance). ( $A = 0.05$ ) between the mean scores of the experimental group studied using the Jigsaw strategy and the average score of the control group students, which was studied in the usual way in the achievement test. This indicates the superiority of the experimental group over the control group in the achievement test, the researcher attributes this to several reasons, including: - Hey.

- Jigsaw strategy has increased interaction between the members of the experimental group and the active discussions about the educational task and the guidance of the teacher impact on their understanding of the teaching material, this understanding may be transferred to their original groups, which led to increased achievement, and also helped to exchange experiences between students and take into account individual differences Among them being heterogeneous groups and they have made the student is the focus of the educational process so that they work and learn from each other and bear a common responsibility in their learning, and thus the success of the group members linked to the success of the expert who explains the task and this leads the expert to make a greater effort To communicate the information well to all students of the group as it urges the student to research to reach knowledge, and works to reduce the level of anxiety and fear of failure in the students and provide reassurance and self-reliance and increase self-confidence in addition to the tests at the end of each lesson by the teacher to evaluate students all that This result is consistent with the results of the Kubaisi study (2016) and the Sultan and Bulgur study (2018) which proved the effectiveness of Jigsaw's strategy in student achievement.

Second: - Results related to the second question: What is the impact of Jigsaw strategy on the involvement of learning towards chemistry in the third grade students?

In order to answer the question, the researcher examined the following zero hypothesis: There is no statistically significant difference at the level of significance ( $\alpha = 0.05$ ) between the average grades of students studying Jigsaw strategy and the average grades of students who study in the usual way on the scale of learning involvement)

The mean, standard deviation and the value of two independent samples were calculated as shown in Table (5).

Table (5) Arithmetic mean, standard deviation, T and calculated and tabulated grades of learning engaging scale for experimental and control groups

Significance at level (0.05)	t- tabular	t- calculated	Standard deviation	Average account	Group
Statistically function	2,01	13,2	10,6	105,07	Experimental
			6,32	75,6	Control

It is clear from the above results that the calculated T value is greater than the tabular values in the learning-engaging scale at the significance level ( $\alpha = 0.05$ ). Thus, reject the zero hypothesis and accept the alternative hypothesis that there are statistically significant differences on the mean scores of the two groups and for the benefit of the experimental group attributed to the researcher for several reasons, including that the use of cooperative learning strategy Jigsaw led to the students engaged in teaching chemistry Students who have a self-motivation to engage in assignments when they are experiencing difficulties seek help from friends and teachers. This is due to Jigsaw's collaborative strategy that promotes teamwork and thus enables students to deal effectively with problems and overcome problems. The difficulties and obstacles facing them, students who are motivated to engage in learning are a plan to study and communicate with group discussions and the search for information to improve and increase their understanding and academic achievement and the element of thrill is the most important characteristic of these A strategy that plays an active role in which the student feels acceptance of himself. Through this strategy, the student focuses his work on a specific task that makes him feel responsible, which increases his involvement in learning.

Recommendations:

In the light of the research results, the researcher recommended the following:

- 1 - Use Jigsaw strategy in all stages of study for its effectiveness in increasing academic achievement and engaging in learning
- 2- Using Jigsaw's teaching strategy to achieve great intimacy and communication among students and eliminate individual competition among students in class.
- 3 - Holding workshops for teachers to train them on how to plan lessons in various subjects using the Jigsaw strategy

Proposals:

1- Conducting other research to know the impact of Jigsaw strategy on other variables such as thinking skills and motivation for achievement.

2 - conduct similar research to find out the impact of Jigsaw strategy in educational materials and other stages of study.

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