International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 03, 2020
ISSN: 1475-7192

The effectiveness of educational scaffolding strategy in chemical problem solving skills and motivation for achievement in the fourth grade students.

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Abstract: *This research aims to know effectiveness of the educational scaffolding strategy on the skills of solving the chemical problems and motivation issues of the achievement among the fourth grade scientific. The results of the study were divided in to two equal groups one experimental and the other control. The research tools in the test of the skills of solving the chemical problems of the type of multi - test and the questionnaire. To measure the motivation for achievement in the students and after the statistical treatment the results of the study there were statically significant differences between the experimental group and the control group In the testing of chemical problem solving skills and the motivation scale for achievement and for the benefit of the experimental group, In light of the results. The study recommended the use of the strategy of educational scaffolding as one of the effective strategies to gain the skills of solving chemical problems and motivation of achievement among students, and to guide the preparation of chemistry curricula by incorporation skills in solving chemical problems in the curriculum.*

Keywords: *educational scaffolding strategy, chemical problems, students*

I. Introduction:

We live today in the age of cognitive acceleration and technological development where our contemporary world is witnessing tremendous scientific developments that have led to drastic changes in various aspects of life, and chemistry is one of the natural sciences that have a major role in addressing the problems of the world and helps with other sciences to simplify the world in which we live To serve human beings, and since teaching skills and acquiring them from life works and daily activities and mastering them increases the student's knowledge and gives him the opportunity to better direct his thinking, effort and time to solve problems scientifically sound solution (Afaneh et al., 2007) so the educational process is a continuous need not to enrich it with all that It is new and useful that contributes to its development of strategies and methods for teaching in an effective way as it views the learner

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as an active process in which the learner exercises activity on his own when he faces a specific problem he follows a scientific method in the solution starting with not sensing the problem and identifying it and collecting data and information related to it and imposing hypotheses and developing solutions and applying the solution and testing it (Olives and Olives, 2003).

Many constructive teaching models and strategies that have proven effective in teaching science are derived from constructivism theory, emphasizing the importance of the active role of the learner in building his knowledge and the necessity of facing the learner with situations of a real problem. (Figo Tski) on social learning, in which he explained that learning takes place through participation in social experiences, as the learner does not learn independently and separately from others but rather effectively and participates with other learners who are more knowledgeable or able to influence their way of thinking and that is done through patterns and supports to make the learner Able to solve problems he faces (Vygotsky, 2004).

The educational props strategy is defined as: Providing the temporary help that the learner needs at some point during the learning process in order to acquire some skills and capabilities that enable him / her to continue learning on his own to become an independent learner, Englertet.AL. In the sense that providing assistance to students is necessary, especially when learning new information and skills or above their level in order for the student to reach the level of proficiency but that assistance is gradually reduced to transfer the responsibility of learning from the teacher to the responsibility of the student himself and then the student bears the primary responsibility for his learning then Only the teacher provides the least amount of support. Learning pillars are aids provided to the learner during the learning process to give him the ability to accomplish learning or do behavior or solve a problem that he may not be able to solve without this assistance as it may lead to his lack of help in the future (Randoll & Kali The props strategy was called this name because it focused on the temporary support of the learner and then left him to complete the rest of his learning relying on himself, it is very similar to the construction bracket (Sukbad & Hasnoh, 2010), so educational props are a process that helps the learner to cross a gap between what He knows and tries to know to solve problems and overcome them by providing help from the teacher, colleague, book, magazine or other knowledge sources available to all (Perkins, 1991), and it is also known as "a teaching method that is used The blood of the teacher is temporary, as it provides the temporary assistance that the learner needs in order to acquire some skills and capabilities that enable him and him to continue the learning process in addition to focusing on the social dimension of the learner, benefiting from the peers in the learning processes and building a bridge of communication between the teacher and students through which he can The teacher is aware of the students 'different needs and transferring his knowledge and skill experiences to them" (Al-Shehri, 2015). There are many educational pillars that are used in educating learners, among them: division of the task into small parts, and cooperative learning that promotes teamwork and dialogue between peers and giving directions Instructions and means, and teachers must also consider helping the learner in the pursuit of not accomplishing tasks by reducing the level of stress for the learner, where difficult skills or tasks can lead to frustration of the learner, and very simple tasks can cause him the same effect. ((Lips comp.et.Al, 2004.

The educational props strategy aims to reach new results that add to the learner's experience and enhance the independence and self-reliance during learning, in addition to enabling the learner to link between his previous information and the new educational situation and his training on the proper evaluation of ideas and investing his tools to deal with situations and deal with them (veresov, 2004), and it aims to increase the ability to confront complex problems and critically evaluate facts and information (Nuosu & Azih, 2011))

And that the most important characteristic of this strategy is that it emphasizes converting the assistance provided to the learner into independent and self-performance, as students get acquainted with the new information and concepts and thus reduce failure and frustration for what matters and thus give them the freedom to use their creative capabilities within a specific framework by the teacher Do and complete tasks (Doering, 2007). And that the use of the educational props strategy is not without some negatives, as it requires a long time to prepare lessons with means and support to meet the needs of each individual separately, and this represents a major challenge when the class contains a large number of students. It requires the teacher to give up some of his leadership and control within class and allow students to make some mistakes and this is not permitted by some teachers as it needs a well-trained teacher to implement the strategy and as a result he will not be able to fully implement it. These negatives can be overcome, but some are positive and not negative, such as the learner is the focus of the learning process and the role of the teacher Limited if students participate in the preparation of the pillars that suit him, this reduces the time and effort of the teacher (Hafiz, 2006).

The stages of implementing the educational props strategy have been defined as follows:

1 - The introduction phase / in this step, the teacher gives a general idea of the lesson, using hints, interesting questions, and thinking with students in the elements of the lesson.

2- The stage of group practice / here the teacher shares his students with some of the lesson ideas and raises questions for them, leaving them to answer them, and there is no place for students to work in small groups, followed by a smaller division, so that each student works together.

3- Individual learning stage / At this stage, the teacher leaves each student to learn alone and under his supervision, as the teacher engages with students in a mutual dialogue.

4- The feedback phase / in this step, the teacher gives the feedback (help) and corrects the students' mistakes and then asks each student after that to use the self-feedback (Muhammad and others, 2012).

5 - The stage of transferring responsibility to the learner / transferring all educational responsibilities from the teacher to the learner and canceling the support provided to him by the teacher, while reviewing the learner's performance periodically until he reaches the learning technology.

6- Providing an independent practice for the learner (increasing the burden on the learner) / The teacher introduces new educational situations for the student, and the student exercises his activity individually to expand and deepen the student's understanding of the subject (Katame, 2005).

This strategy has great importance in teaching science because it does not give social support to all students while teaching science and is an advanced building of scientific knowledge as it facilitates access to science and makes it available to learners and makes abstract scientific concepts tangible, as it requires tasks and challenges the capabilities used to motivate the student to accomplish meaningful tasks and encourage him on generating ideas (Davis & Linn, 2000).

The chemical issue is considered an essential element in the teaching of chemistry for high school students, and even among the most important goals of its teaching. Where chemistry education is related to the practical life of students and training them on how to transfer acquired knowledge and apply it in new situations unfamiliar to them, it is necessary for students to acquire a set of skills for that which are called skills to solve the chemical problem, and chemical issues represent highly difficult problems for students as they require possession Understanding skills, analysis, organization and dealing with them so that students can solve them, because they contain chemical problems of a mathematical nature that require the student to acquire the ability to deal with these problems in light of their ability to basic skills needed to solve them and benefit from her studies in increasing academic achievement and motivation towards studying chemistry (Sharaf, 2007) The chemical issue is defined as the ability of the student to reach a solution to the chemical problem through his ability to reformulate the issue by his own method, determine the law used for the solution, the possibility of making transfers, unification of units, compensation in the law and implementation of operations. (Abu Ajwa, 2009). and that problem solving is considered one of the most important activities through which the aims of teaching are achieved, but it does not help students in improving their analytical abilities and using them in an unlike situation, as well as in learning the facts, skills, concepts and generalizations that are required to solve the problem (students, 2007), and the teacher has a role in developing skills The solution of the problem for students is that it determines the method and strategy that suits the student's mental level and is appropriate to the skills to be developed in addition to that it helps them to demonstrate a spirit of reflection, reflection and patience and encourages them to reformulate the issue in their own language and bring information and ideas that help in solving it as it enables them to reach The most prominent relationships and theories that relate to the issue, choosing what is appropriate through hint or reference, and experimenting with more than one solution to reach the result (Ar Yafaj & Suleiman, 2010). The importance of learning problem-solving skills in helping students to apply scientific laws and develop higher mental processes among students is evident. It has a great role in building self-confidence and their self-reliance in reaching solutions to problems; it does not help students to explain many of the phenomena and thus the development of multiple intelligences (Ambosaidi and Al-Balushi, 2009). Students also face several difficulties when solving problems, including the inability to analyze the issue to its components and the failure to understand the issue and determine the data and requirements, and also they face difficulty in choosing the steps that follow in solving the issue in addition to the weak ability of the student on choosing appropriate methods, recalling information, not being able to principles, laws, calculation skills, standardizing units of measurement and making the necessary transfers (Hamdan, 2007), the reasons for these difficulties in solving problems may be due to several factors, including: the lack of understanding of the issue, and the lack of clarity in its formulation in terms of Its data, what is required of it, the procedures required to solve it, the length of the issue, the degree of its complexity, the learner’s experience of

similar issues in addition to the teacher's sufficiency in the examples presented in the textbook, which are directly resolved, which leads to the students 'inability to solve the indirect problem correctly, the inability to plan to solve it, analyze it, implement the solution processes and review The answer, and even guessing it (Rizk, 1993). These difficulties can be overcome by training students in problem-solving skills The chemical and the recruitment of chemistry teachers are appropriate teaching strategies and methods to develop students 'problem-solving skills. The chemical issue is one of the scientific issues as it shares with many physical skills and facts, but it is characterized by several advantages, including:

1-It includes chemical symbols of scientific significance as they denote materials and compounds.

2- The data of the chemical issue are often related to problems affecting human life.

3- It includes (positive or negative) signals of chemical scientific significance.

4 - Sometimes the solution to the chemical question depends on the exact writing and weight of the reaction equation, which is the basis for the solution.

5- The correlation of the substance of the chemical matter with concrete and real matters that are not abstract. (Ramadan, 2015).

Solving the problem requires the learner to possess a set of mental skills necessary for that which are the skills he uses to reach to solve the chemical problem, and it was determined by the learner's ability to define the data and what is required of the scientific question and the use of his mathematical skills to reach possible solutions (Afaneh, 2000), and was identified (George Apulia) has four main skills with which to solve the problem:

1- Understanding the issue, as the student's understanding depends on the elements of the main issue in it, which are (the data - the required - the conditions).

2- Creating a plan: where understanding the issue leads to creating a plan or strategy that leads them to solve the problem.

3- Executing the idea of the solution, and it depends on the student realizing the plan correctly and that the student does not possess despair and the inability to continue the solution.

4- Reviewing the solution: it is the confirmation and verification of the correctness of the solution and the plan it developed to solve the issue (Afana et al., 2007).

(Olive, 2002) also identified the skills of problem solving with the following:

1- Defining the variables of the problem, which include: - (reading and understanding the problem, identifying the data and what is needed in a symbolic form, drawing the issue if possible)

2- Planning to solve the issue, which includes the following: (Choosing the appropriate strategy, defining the law used)

3- Implementing the solution plan, which includes (making transfers, unifying units, compensation in the law, performing calculations)

4- Reviewing and interpreting the solution, which includes: (Reviewing the steps of the solution, interpreting the solution, designing the solution. (Olive, 2002)

With reference to many previous studies such as the Sharaf study (2007) and Abu Ajwa study (2009) and a list of problem-solving skills (by George Polya and Kamal Zeitoun) the researcher reached a set of skills that the student must possess to solve the chemical problem, which was presented to a group of Arbitrators with specialization in curricula and teaching methods were represented in the following six skills:

1- Determine the data contained in the question

2- Determine what is to be found

Determine the law used in the solution

4- Make the appropriate transfers and unify the units

5- Defining the missing and necessary data to reach the solution

6- Application in law and implementation of dissolution operations

Educational studies emphasized interest in psychological variables when analyzing educational-educational situations and problems, including motivation for achievement and its relationship to solving issues because motivation is a prerequisite for collecting information and creating various skills that are subject to factors of training and practice (Ibrahim, 2010) where many researchers addressed the issue of motivation for not accomplishment, which is " An internal state related to the individual's feelings and directs his activity towards planning for what achieves a specific level of excellence that is believed and believed in (Abu Allam, 1986). It is highly motivated to accomplish, it is the nature of these individuals to strive for high-end things and says that "the motivation of achievement is the pursuit of achieving a level of excellence and excellence and this trend represents an essential component in the motivation of achievement and is the desire for excellence and excellence, or bringing new things with a high level of characteristic Characteristic of the personality of individuals with a high level of motivation for Lajazza (Al-Fahal, 1999), as defines motivation for Lajaz: it is a group of forces and efforts that he exerts A person in order to overcome obstacles and accomplish class assignments as quickly as possible (Nashwati, 1986). Woolfolk defines them as the individual's need to perform a task efficiently, quickly or with less effort to reach a better result than he did before and the motivation for achievement reflects two basic components: the desire to succeed Or fear of failure, so the individual seeks to do his utmost to succeed and achieve the best and the superiority over others (WoolfolK, 2005), and he found that students with motivation to achieve high grades in school and also respond to failure in a different way from people with low achievement who increases them Failure is a persistence and persistence to succeed, while low achievement withdraws in the situation because they do not trust their abilities (Abdullah and Al-Khulaifi, 2001). Also, the student's ability to learn and collect is largely related to his tendency to drive to achieve success, and since this tendency is acquired mainly, it is possible to modify this

ability because Any change in the motivation to achieve success or the possibility of success leads to a modification of the student's motivation that we do not achieve success and this in turn affects the amendment of his ability to achieve (Nashwati, 2003) and there are requirements to raise the motivation to not accomplish the achievement It is diversification in teaching strategies and methods and raising questions that require thinking and linking topics to students 'lives as well as the teacher's use of educational methods and stimuli and questions, which drives the student's curiosity and helps to create an educational environment while giving the student the opportunity to express his ideas and opinions freely and ensure the effective participation of the student and away from the spacing and repulsion atmosphere Between the teacher and the student and create a healthy atmosphere of love, understanding and dialogue (Al-Ghamdi, 2009).

Therefore, the motivation for not achieving is one of the important aspects of the human motivation system, due to its importance because it is the main engine and generator of the individual's behavior and the source of its activation and awareness of the situation, as it is an essential component in the individual's pursuit of self-realization and affirmation, where the individual feels realizing himself through what he accomplishes, and what It achieves it from the goals of (Khalifa, 2000). In light of this, the motivation for achievement is the individual's pursuit of difficult tasks, while accomplishing this quickly and independently, while the individual overcomes the corresponding obstacles, his superiority over himself, his competition and the superiority of them through the resulting practice of his capabilities. And the capabilities of (Khalifa, 2006) and to achieve the desired educational goals in general, it is necessary to verify the basic condition for learning, which is the motivation to not achieve the learners, and this in turn guarantees the acquisition of skills, and this is confirmed by the results of many studies, such as the Jaber study (1989) and the Musa study (2003) and Salem study And others (2012), which praised the importance of motivation to not achieve learning, as it is among the most important reasons that control the level of academic achievement and mastery of educational skills and academic excellence, it has The student has the appropriate mental capabilities and good environmental and family conditions, yet he lacks the ability to learn well due to his lack of motivation, which increases the importance of applying active educational strategies that make learners in a state of activity and interaction so as to help them gain motivation to not be accomplished because it is a basic requirement without it will not be fulfilled The desired results in any educational system.

In light of the foregoing, it is clear that the desired learning cannot be achieved without a high level of motivation to be accomplished and reach the goal with the highest degree of excellence and the current study aims to achieve this through the use of educational props strategy in teaching chemistry for the fourth grade scientific and to know the extent of Its effect in acquiring the skills of solving the chemical and motivation issue for students 'achievement. By presenting them in the form of problem situations and in a manner that raises motivation, they will have the ability to solve them without difficulties because this strategy confirms that the learner has a fundamental role in teaching himself through carrying out many activities motivated From inside it to access information and work to understand and apply it as a high-quality educational product.

The study Problem:

The problem of low achievement and motivation towards chemistry among students is one of the problems facing education at the secondary level. The researcher has noticed from her field experience in the field of chemistry teaching in secondary schools for more than ten years, and through surveying the opinions of teachers and supervisors of chemistry for the fourth grade of science that students suffer from weakness General in the skills of understanding the verbal question and the basic mathematical skills for it. This difficulty lies in the multiplicity of data and the multiplicity of laws that go into solving them and the mathematical relationships they contain, concepts, principles and abstract laws that require careful detail and mathematical applications that many students lack the necessary foundations and this is confirmed by several studies such as the Samurai study (2005) and Ramadan (2015) study, so it has become necessary to enable students to solve chemical problem skills and this is not achieved by teachers using traditional strategies and methods that are ineffective in teaching and that encourage conservation, instruction, and routine discussion of examples in the textbook and the lack of clarification of abstract laws, which led To the coolness and lethargy of motivation for learning among students, which compels them to memorize issues, as the motivation for no Najaz is one of the most important factors that relate to students 'performance and mastery of educational experiences and skills. Therefore, an urgent need arose to use modern strategies to teach students' problem-solving skills. One of these strategies is the strategy of educational pillars, and it is one of the strategies that pay attention to the exercise of mental processes by learners in a collaborative, collective way. Therefore, the current study problem can be determined by the existence of a deficiency in the fourth scientific students in the skills of solving chemical problems and in their level of motivation to not accomplish. The study problem can be addressed by answering the following questions:

1- What is the effectiveness of the educational props strategy in the skills of chemical problem solving for fourth-grade students?

2- What is the effectiveness of the strategy of educational props in the motivation to not achieve towards chemistry among fourth-grade students?

The importance of studying:

The current study is expected to contribute to drawing the attention of officials in the Ministry of Education to develop the educational environment in secondary schools in line with the use of the educational props strategy to teach chemical problem-solving skills and to reveal the preference of the strategies that lead to female students because this strategy is based on constructive learning that requires participation and the integration of learners in building meaning rather than looking at students as recipients of knowledge. This study examined the intermediate stage, which is one of the important stages in the growth of the individual and the achievement of full maturity and the formation of students' attitudes and tendencies and preparing them to move to the university level, and that its results may help those in the educational process through Preparing workshops for chemistry teachers at the secondary level to suit the nature of the age and the development witnessed in teaching strategies and training them to use the strategy of educational props in teaching skills to solve chemical issues as it helps curriculum designers to include the strategy of educational props in the book of chemistry for the fourth grade scientific, so i

assumed the researcher said that this strategy may help in the acquisition the problem-solving and motivation skills of female students in chemistry.

Objectives of the study:

This study seeks to achieve the following goals:

- Learn about the effectiveness of the educational props strategy in the skills of chemical problem solving for fourth-grade students.

- Identify the effectiveness of the strategy of educational props in the motivation to not achieve towards chemistry among students of the fourth grade.

Study hypotheses:

1- There is no statistically significant difference at the level of significance ($\alpha = 0.05$) between the average scores of female students studying with the educational props strategy and the average scores of female students studying in the usual way on the test of skills to solve chemical problems.

2-There is no statistically significant difference at the level of $\alpha = 0.05$) between the average scores of female students studying with the educational props strategy and the average scores of female students studying in the usual way on the motivation scale for achievement.

Study limits and limitations:

The study was limited to:

1 - Fourth graders in middle schools in Baquba.

2- The first semester of the academic year (2018-2019).

3- First and second units of the fourth-grade science textbook, Chemistry, Ministry of Education, Iraq, 2017.

Study terms and definitions:

The activity was defined by:

(Shehata and Al-Najjar, 2003): The extent of the effect that experimental treatment can have as an independent variable in one of the dependent variables (Shehata and Al-Najjar, 2003).

(Majdi, 2009): The ability to influence and achieve the goals and achieve the existing results in the best possible way (Majdi, 2009)

Procedurally: The amount of the expected impact of teaching chemistry with the strategy of educational props in the skills of solving chemical and motivation issues for achievement for fourth-grade students.

The strategy of educational props known to each of.

(Afifi, 2010): The strategy that the most capable teacher or team provides the student with the types of guidance and support to develop skills that the student cannot perform alone (Afifi, 2010).

(Belgon, 2015): It is the activities undertaken by the teacher to provide temporary assistance that makes it easier for his students to overcome educational situations by their individual efforts (Belgon, 2015).

Procedurally: a set of support methods provided by the school to students in the fourth grade of science in order to help the student, not complete the learning process on her own and be presented in various forms such as pictures, hints or references at the time the student needs it.

The skill of solving problems known to each of:

(Al-Husain, 1995): The set of skills that walk in specific steps starting from collecting data, then defining the form of accountability, imposing assumptions to solve it, and verifying their validity in order to reach the conclusion of the solution (Al-Hussain, 1995).

(Afaneh, 2000): The ability of the learner to define the data required of the scientific question and use his mathematical skills to reach possible solutions (Afaneh, 2000).

Procedurally: the student's ability to use mental skills (determining data, determining what is required, identifying missing data to find what is required of the issue, unifying the units, identifying the law used for solution and applying the law and finding a solution) in that ambiguity she faces during solving the chemical question and is measured to the degree that the student gets In testing the skills of solving chemical problems prepared by the researcher for this purpose.

The chemical matter he knew:

(Abu Ajwa, 2009): A new chemical situation in which the student is confronted, in which the individual accepts the challenge, trying to recall the previous chemical experiences and concepts that he possesses and linking them together to reach the correct solution, and that requires thinking and thus achieving a goal that is to solve the issue (Abu Ajwa, 2009).

Procedurally: an uncommon educational situation that includes numerical and numerical values and descriptive chemical formulas that evoke the learner's thinking and works to link them together with each other mathematically in order to reach the solution.

- Snake's father did not succeed, who knew each of:

(Nashwati, 2003): The individual's performance of a task with great vigor and enthusiasm (Nashwati, 2003).

Procedurally: the students 'desire to learn the skills of solving chemical problems actively, as measured by the degree that the student gets when she answers the motivation scale of the achievement that the researcher prepared for this purpose.

Previous studies

After reviewing the studies and researches that dealt with the strategy of educational props, it became clear that these studies are rare at the local level and few at the international level. Here are some studies related to the subject of the study:

- Abu Dalakh (2004) study conducted in Palestine and aimed to know the effect of supporting the effect of using concept maps in educational attainment, achievement motivation, and anxiety of immediate and postponed testing for ninth grade students in chemistry in government schools in Qabatiya. The research sample consisted of (155) students. Two groups conducted two houses and two control groups, and the results showed that there were statistically significant differences between the mathematical averages of the marks of the ninth grade group students in the academic achievement test and the achievement motivation and anxiety test due to the method of education and the differences were in favor of the experimental group that was studied using the concept maps strategy.

Abu Zaid (2009) study was conducted in Egypt and aimed to know the effectiveness of using the educational scaffolding strategy in developing achievement and critical thinking in teaching science, and the researcher used the semi-experimental approach in field study and the descriptive approach in theoretical study, and she chose a random sample represented by two beams from eighth grade students in my school The prep of the middle school and Qamishtah in Fayoum, one of which represented the experimental group and the number of its students (43) students and the other represented the control group and the number of its students (40) Taliban. Criticism in favor of the experimental group.

Rice and others study (2011) aimed to know the effect of using the educational props strategy presented through the websites in developing mathematical (physical) problem-solving skills, the study was conducted in Belgium and the researcher used the semi-experimental approach, and a random sample was chosen that represented a quarter of the class of students of the class The researcher used three experimental groups and a control group. To collect the data, the researcher used two tools to analyze the content and test problem-solving skills based on the T-test and mono-variance analysis. The study results showed that there are statistically significant differences in the post application to test the problem-solving skills for the benefit of the experimental group.

A Hammouda study (2013) was conducted in Gaza and aimed to know the effect of using the educational props strategy in developing concepts and skills for solving the physical question among tenth grade students. The research sample consisted of (68) students distributed randomly to two experimental and control groups. The researcher prepared three tools that are the content analysis tool and the tool for testing the physical concepts and the tool for choosing the skills of solving the physical problem, and after ensuring the validity and reliability of the tools were applied to two research groups, and after the statistical treatment the researcher concluded that there are statistically significant differences in favor of the experimental group that studied the strategy of educational props.

The monthly study (2015) that was conducted in Saudi Arabia also aimed to reveal the effectiveness of educational props in physics teaching on developing academic achievement and used the experimental approach for two experimental and control groups and the research sample consisted of (65) students and the tool was an

achievement test and used the arithmetic mean and standard deviation and T-test As statistical means that demonstrated the superiority of the experimental group in the academic achievement test.

In a study conducted by Al-Mutawq (2016) in Gaza aimed at knowing the effect of using scaffolds in teaching concepts and skills for solving the mathematical problem and the direction towards mathematics among the tenth grade students in Gaza, the research sample consisted of (80) students distributed into two control and experimental groups, and the researcher prepared three tools It is the choice of mathematical concepts, and a measure of the direction towards mathematics, and the validity and reliability of the tools have been verified by appropriate statistical methods. After statistical processing of the data, the researcher concluded that there are statistically significant differences in favor of the experimental group that was studied with educational scaffolding.

The Saidia (2018) study was conducted in the Sultanate of Oman, and aimed to know the impact of the use of educational props in modifying alternative perceptions of electrical concepts among students of the ninth grade class in the Sultanate of Oman, the study sample consisted of (62) students distributed to two control and experimental groups, the researcher prepared a test to diagnose perceptions Alternative as a research tool and the results showed that there were statistically significant differences in favor of the experimental group, which was studied by the strategy of educational props.

It is clear from the review of previous studies that most studies aimed to know the effect of educational props on academic achievement and different thinking patterns among students, such as the Abu Zaid study (2009) and the monthly study (2015). Other studies also focused on developing concepts and skills to solve problems in physics and mathematics as a commendable study (2013) and Al-Mutooq study (2016) and Rice and others study (2011). The Saidia study (2018) dealt with modifying alternative perceptions of concepts, and despite the multiple studies that used the educational props strategy from different angles, the current study has distinguished from it in that it is considered the first study within the limits of science the researcher was interested in dealing with the effectiveness of the educational props in the skills of resolving chemical and motivation issues for achievement in the secondary stage, and this is what distinguishes the current study from others, so the researcher decided to try it out, but not the skills of resolving the chemical and motivation issue to not be accomplished among students of the fourth scientific grade, and the researcher benefited from previous studies In preparing the skills test for solving chemical problems and the motivation scale for achievement, and assisting them in choosing the appropriate statistical methods Research methodology and its samples.

II. Method and procedures:

Experimental design

The researcher followed the experimental design with a partial control with the post test to test the skills of chemical problem solving and the motivation measure for achievement in two groups, one is experimental and the other is controlled as shown in the following chart:

Planner (1)

Dependent variable	Independent variable	the group
- Chemical problem solving skills -A measure of motivation for achievement	Educational props strategy	Experimental
	The usual way	Control

Study population and sample

The study population consisted of fourth-grade students in secondary schools affiliated to the city of Baquba for the academic year (2018-2019). As for the study sample, it was chosen from the Juwairiyyah Preparatory School for Girls in Baquba as a sample for schools and intentionally and in the school there are two divisions for the fourth grade of scientific, research bodies choose one The two divisions are random to form the experimental group, so the (A) section and the number of female students (28), the (B) control group, and the number of female students (27), after excluding the students who had failed in (A) three female students and (B) two students, the number in each division (25) Student

Equivalence of the two groups

The researcher was keen to verify the equivalence of the two study groups in the previous academic achievement in the subject matter of chemistry and the chronological age of the students, as in table (1)

Table (1) represents the equivalence of the two study groups in the previous achievement and the life time

Statistical significance	Computed t value	standard deviation	SMA	Groups	Variables
Not significant	0.33	10.7	66	Experimental N = 25	Previous achievement in chemistry
		10.2	65	Control N = 25	
Not significant	0.9	11.8	201	Experimental N = 25	Chronological age

		11.6	198	Control N = 25	

The value of the tabular t at freedom degree 48 and the significance level 0.05 equals 2.009

Study procedures

1 - Defining the scientific subject: The scientific subject was defined in the first and second units of the Chemistry textbook for the fourth scientific grade

2- Formulating behavioral purposes

(54) a behavioral purpose has been formulated distributed on the levels of Bloom (knowledge - assimilation - application - analysis) and these behavioral purposes have been presented with the content of the educational material on a group of experts Appendix (1) to verify its coverage of the level and accuracy of the formulation and after some amendments were adopted all The targets did not obtain 0.79 approval or more from expert opinions

3- Preparing study plans

In light of the content of the first and second units of the fourth-grade science textbook and reliance on the behavioral purposes that were prepared, the researcher prepared (15) teaching plans for the experimental group and (15) teaching plans for the control group and was presented to a group of arbitrators with specialists, an appendix (1) Based on their proposals, the plans in their final form have become an appendix (2)

Study tools

A- Test chemical problem solving skills:

The researcher has prepared a list of skills for solving the chemical issue by referring to educational literature and previous studies, including a list of skills (Abu Ajwa) and (Kamal Zaitoun) to solve the problem and George Polya, and the problem-solving skills were prepared and presented to a group of arbitrators with expertise in curricula and methods Teaching and chemistry After modification and deletion, the researcher came up with a list that contains (6) basic skills to solve the chemical problem, namely:

1 - Determine the data in the matter

2- Defining the required matter

3- Determining the missing data does not find the required matter

4- Make transfers and unify the units

5- Defining the law

6 - Mathematical application of law and solution

Based on the previous skills, the researcher built the test, which consists of (20) multiple-choice questions with the four alternatives, and this type is one of the most common questions, because it is used in many fields for ease and accuracy of correction and its avoidance of bias. To ensure the validity of the test paragraphs were presented A group of arbitrators with specialization in teaching methods and chemistry about the validity of the tool in measuring chemical problem-solving skills Annex (3) has obtained an agreement rate of more than 0.75

- To calculate the stability of the test, the researcher used the re-test method, where the test was applied to an exploratory sample consisting of (30) students from the bamboo prep for girls without the study sample, and the test was applied again to the same sample after a two-week time period and the correlation coefficient was found between the two applications and found The stability coefficient is (0.78), and tests are good if the coefficient of stability reaches more than (0.6 (Gronlund, 1965)).

The final image of the test:

After confirming the validity of the test, and calculating its stability, the test in its final form became composed of (20) questions of the multiple choice type with four alternatives.

B- A measure of motivation for non-achievement:

After reviewing previous studies that focused on motivation, the researcher reached the dimensions of the motivation measure of achievement, namely:

1- The pursuit of excellence

2- Performing the duties

3- Overcoming difficulties

4- Perseverance.

Scale paragraphs were formulated according to the Likert method and in the form of a triple scale (yes - sometimes - no). During the drafting of the scale paragraphs, it was taken into account to be clear and to express behaviors that students may practice while studying chemistry or in their daily lives.

- To ensure the accuracy of the scale was presented in its initial form to a group of arbitrators with specialists who did not express their opinions and suggestions about the appropriateness of the scale paragraphs for each dimension of the scale and the extent of formulation of statements and their suitability to the level of fourth-grade students in scientific, and after making adjustments to some paragraphs and deleted some of them became the scale It consists of (20) items.

- The motivity measure was applied to the same previous exploratory group. The stability of the scale was calculated using the Alpha Cronbach equation and it was found to be (0,83), which is a good degree of stability.

Conduct the experiment:

After completing the preparation of the study tools and verifying their sincerity and reliability, the experiment was applied as follows

1- The experiment started on 14/10/2018 until 19/11/2018

2-The two research groups were taught by the Chemistry School in Juwairiya High School for Girls after the researcher explained the teaching steps according to the strategy of educational pillars of the subject school and provided them with study plans and follow-up measures taken in implementation

3- The number of study classes reached (15) lessons, with an average of 3 classes per group during the week

4- At the end of the experiment, the chemical problem solving skills test and the achievement motivation scale were applied

5- The answers were corrected and the data were arranged for the purpose of statistical treatment

Statistical treatments:

In this study, the researcher used the SPSS statistical program in conducting statistical analyzes represented in the following statistical methods

1- The mean and the standard deviation

2- Pearson correlation coefficient for calculating test stability

3- T-test for two independent samples to identify the equivalence of the two study groups and to test the hypotheses (Melhem, 2000)

III. The results of the study and its discussion:

This chapter includes a presentation of the results that were reached through the application of the study tools in addition to the interpretation and discussion of the results reached by answering the questions of the study and checking its hypotheses as follows:

First: Results related to the first question: What is the effectiveness of the educational props strategy in the skills of chemical problem solving for fourth-grade students?

And 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 scores of female students studying the educational props strategy and the average scores of female students who study in the usual way on the test of chemical problem-solving skills.

The mean, standard deviation and T value for two independent samples were calculated as shown in Table (2).

Table (2) arithmetic mean, standard deviation, and calculated and tabulated T value for post test scores.

For the chemical problem solving skills of the experimental and control groups.

Statistical significance	The value of the tabular t	Computed t value	standard deviation	SMA	Groups	Skills
Sign Statistical	2.009	5.45	0.83	2.8	Experimental N = 25	Determination of data in the matter
			0.7	1.6	Control N = 25	
Sign Statistical		4.44	0.66	2.6	Experimental N = 25	Determine what is required of the issue
			0.61	1.8	Control N = 25	
Sign Statistical		5.26	0.62	2.4	Experimental N = 25	Identification of missing data
			0.72	1.4	Control N = 25	
Sign Statistical		6.5	0.72	2.7	Experimental N = 25	Unification of units
			0.69	1.4	Control N = 25	
Sign Statistical		4.66	0,99	3.6	Experimental N = 25	Determine the law

			1.13	2.3	Control N = 25	
Sign Statistical		4.44	0.88	3.4	Experimental N = 25	Law enforcement and solution making
			1.02	2.2	Control N = 25	

It is clear from the results presented above that the calculated value of T is greater than the tabular T value in all skills at the level of significance $\alpha = 0.05$ this indicates the presence of statistically significant differences between the mean scores of the experimental group and the average score of the control group in testing the skills of chemical problem solving and in favor of the experimental group and thus We reject the null hypothesis and accept the alternative hypothesis, that is, there are statistically significant differences on the mean scores of the two groups and in favor of the experimental group and the researcher attributes this to several reasons, including that the educational props strategy works to reduce the gap between the teacher and the student, because the educational props are based on the principle of providing how much assistance from the teacher or any of the available sources of knowledge to achieve the educational goal and ensure that the assistance provided to the learner turns to independent and self-directed performance. The strategy also gives clear instructions and directives to ensure that students are directed to successive steps in the task and thus they ensure their continuity and thus reduce the frustrations that hinder female students In reaching the specified goals in addition to directing the path of thinking of the student It is to remove them from unnecessary information or mistakes to solve the recurring issue when solving it, as it increases its ability to accurately diagnose the learning situation and to choose the problem-solving skills that work to address the learning problem at hand and this result is consistent with the results of the Hammouda Study (2013) and Al-Mutwak Study (2016)) That has proven the effectiveness of the educational props strategy in physical and mathematical problem-solving skills.

Second: The results related to the second question: What is the effectiveness of the strategy of educational props in the motivation to not achieve towards chemistry among students of the fourth grade science?

For the answer to 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 scores of female students studying the educational props strategy and the average scores of female students studying in the usual way on the motivation scale for achievement.

The mean, standard deviation and T value for two independent samples were calculated as shown in Table (3).

Table (3) arithmetic mean, standard deviation, calculated and tabulated T value

Scale for motivation scale of achievement for the experimental and control groups

Statistical significance	The value of the tabular t	Computed t value	standard deviation	SMA	No.	the group
Sign Statistical	2.009	5.79	4.08	50	25	Experimental
			5.57	42	25	Control

It is clear from the results presented above that the calculated t value is greater than the tabular t value in the motivation scale of achievement at the level of $\alpha = 0.05$ This indicates that there are statistically significant differences between the mean scores of the experimental group and the mean scores of the control group in the motivation scale and in favor of the experimental group and thus we reject The null hypothesis and we accept the alternative hypothesis, that is, there are statistically significant differences on the mean scores of the two groups and for the benefit of the experimental group. From their motivation we do not accomplish the tasks, as it adds a degree of suspense and freedom of expression to the student without the bullying of the teacher and reduces boredom and routine, it does not increase the student's ability to communicate with her colleagues in order to solve the problem that is presented to them in the form of tasks, it is a strategy based on social interactions among female students and the teacher, and between female students and their more experienced peers, through cooperative activities aimed at establishing the female student Awareness of what the teacher does and what he says, and in doing so they were born motivated, not accomplished and successful in the task.

IV. Recommendations

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

1 - Attention to the use of educational props at all academic levels as one of the effective strategies in acquiring chemical problem-solving skills as one of the goals of teaching chemistry.

2- Holding training courses for teachers who are trained to use educational props.

3- Directing the attention of those involved in preparing chemistry curricula to the importance of chemical problem-solving skills for inclusion in the school curriculum.

4- The necessity of paying attention to the professional preparation of chemistry teachers and providing them with modern directions in teaching and how to use modern strategies in classroom teaching.

5- Conducting more studies to identify obstacles to using modern strategies in teaching chemistry.

V. The proposals

1 - Conducting similar studies to know the effect of the educational props strategy on educational materials and other academic stages.

2 - Conducting other studies to find out the effect of the educational props strategy on other variables (such as inclination, direction, multiple intelligences, and acquiring different thinking skills, etc.)

3- Conducting a comparative study between the educational props strategy and one of the other modern strategies to determine which is most effective.

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