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Effect of Hot Chair Strategy on the Acquisition of Second-Grade Middle Class Students

Efecto de la estrategia de silla caliente en la adquisición de conceptos en estudiantes de clase media de segundo grado

Jehan Faris Yousif
gehan_faris@yahoo.com
University of Baghdad, Iraq

Read Idrees Mahmood
raad_eru@yahoo.com
Tikrit University, Iraq

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ABSTRACT

The purpose of the research was to identify the impact of the hot chair strategy on the acquisition of second grade intermediate students of the concepts and the development of the chemical survey and their higher thinking skills. The researchers adopted the experimental design of the two equal groups. The research community determines the average second grade students in the secondary schools in Tikrit for the academic year 2018 -2019, a high school was chosen for girls as a sample. Of a total of 69 students, 34 of the experimental group studied in accordance with the hot chair strategy and 35 students in control group studied the usual way. The researchers compared the two groups in the variables: grades of chemistry for the past year, age calculated by months, academic achievement of the parents of the students, degree of the chemical survey and higher thinking skills. The results showed that there was a superior difference between the students of the experimental group who studied according to the hot chair strategy on the female students of the control group, which studied according to the usual method.

Keywords: Hot chair, acquisition, concepts, students, second grade.

RESUMEN

El propósito de la investigación fue identificar el impacto de la estrategia de la silla caliente en la adquisición de los estudiantes de segundo grado de los conceptos intermedios y el desarrollo de la encuesta química y sus habilidades de pensamiento superior. Los investigadores adoptaron el diseño experimental de dos grupos iguales. La comunidad investigadora determina el promedio de estudiantes de segundo grado en las escuelas secundarias de Tikrit para el año académico 2018-2019, se eligió una escuela secundaria para niñas como muestra para la investigación. De un total de 69 estudiantes, 34 del grupo experimental estudiaron de acuerdo con la estrategia de la silla caliente y 35 de ellos formaron el grupo de control que estudiaron de la manera habitual. Los investigadores compararon los dos grupos en las variables: grado de química del año pasado, edad calculada por meses, rendimiento académico de los padres de los estudiantes, grado de la encuesta química y habilidades de pensamiento superior. Los resultados mostraron que hubo una diferencia superior entre las estudiantes del grupo experimental que estudiaron de acuerdo con la estrategia de la silla caliente con respecto a las estudiantes del grupo de control, que estudiaron de acuerdo con el método habitual.

Palabras clave: Silla caliente, adquisición de conceptos, estudiantes, segundo grado

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INTRODUCTION

The breadth of concepts, ideas, and theories as an inevitable result of the information explosion that occurred in different countries has led to a weak ability of learners to absorb, learn, or distinguish concepts and terminology from each other, as well as it has made it difficult to benefit from their use in school, and therefore it has been forgotten easily, this works to create negative attitudes towards the subject matter for the students, among other reasons that works as a decliner in the level of achievement.

Many studies have shown that there are deficiencies among learners in acquiring concepts related to chemistry, especially in the intermediate school stage, because of the critical age that they are in.

It is recognized that most individuals, when faced with a specific problem or situation that affects their ability to achieve success, due to the fact that they adopt a kind of cognitive preferences or a specific pattern in the process of learning and thinking with regard to dealing with this as a reflection, are aware of this as a continuation of what is to be understood as a relationship processing information and how to keep it individual, in other words neglecting the balance of the teacher's method with the individual's way and learning style.

From the foregoing lies the current research problem, which is how to make the learner the main focus in the educational process, in order to raise his ability to learn and gain concepts in general and in chemistry in particular, and when reviewing previous studies and literature, we find that they have focused on using my use It is the most effective solution to the problem of weakness in the acquisition of concepts, as it focuses on putting greater effort and activity on the learner and his conscious and purposeful effectiveness. [Abdul Bari, 2010: p. 162]

The researchers concluded that the chemistry subject suffers from difficulty in terms of teaching it, through the visits made to a number of middle schools and the meetings with teachers of chemistry, it was found a weakness in the learning process and in mastering chemical concepts. The reason for this phenomenon is the common use of traditional teaching methods, which made the researchers experiment almost a new approach in teaching, by using the hot chair strategy in a serious of attempts to reveal the extent of its use and raised the ability of female students to acquire basic concepts in chemistry.

The problem can be determined by answering the following question: What is the effect of the hot chair strategy on the acquisition of chemical concepts and the development of a qualitative research in middle school students?

Research importance

The hot chair strategy is a cooperative learning method and a contemporary teaching strategy; it aims to provide students with concepts and ideas provoking their motivation and development in their preparation. It's suitable for students of all ages and for teachers applying the cooperative method for the first time. [Ahmed, 2006: 55]

This strategy relies on dividing the subject into mini tasks and assigning each task to a student, who has to learn, understand, and master them, as well as teaching them to his colleagues in the group that they belong to. This strategy has positive reviews in the education field, as it aims to develop social relations among learners, it also works to reduce the tension that can occur among them, as it contributes to build good and positive links between groups of students, helping to develop their academic achievements, as it works by raising their motivation and creating positive attitudes towards the teacher, the subject and the educational institution. [Atef, 2004: 127]

The process of developing the ability to think has touched one of the highest goals of chemistry education, and that is because the curriculum of chemistry has a great impact on the importance of stimulating the minds of learners, and stimulating their cognitive abilities, and what can be done with technology is called higher thinking skills. Researchers in this field counted two levels of thinking, basic thinking level and higher thinking level, which means higher thinking skills. [Jarwan, 2010: 36].

The higher-order of thinking skills are one of the patterns of thinking, and it requires a lot of mental effort, which includes an analysis of difficult information, and a self-organized, process of thinking. [Al-Otoum and others, 2013: 202-203].

"There has been a great interest in directing efforts on the development in thinking skills and strategies as a major and important tool for scientific knowledge in all its forms. The goal of the educational process is not confined only in the acquisition of knowledge, but also in knowing how to deal with many accelerated concepts and information that emerge hour after hour. Is an essential thing that cannot be escaped from its introduction and commitment if we want to build a successful generation of coherent, aware and serious students with a commitment in the implementation of their performance. [Hussein 2006: 35]. "

Research objective

The current research aims to identify: The effect of hot seat strategy (Independent variable) in the acquisition of chemical concepts among middle-grade students and the development of their chemical reconnaissance and higher-thinking skills. (The two dependent variables)

Research hypotheses

The following hypothesis has been formulated:

1. There are no statistically significant differences between the average scores gain in the experimental group of female students who are studying chemistry according to the hot chair strategy and the average grades gain in the control group who are studying chemistry according to the traditional method of chemical concepts.
2. There are no differences with statistical significance between the average grades of students of the experimental group who study chemistry on the basis of the strategy [hot threshold of knowledge]
3. There are no differences with statistical significance between the main levels of pre and post-test scores of the chemical survey for the experimental group that are studying using their psychological studies.
4. There are no differences with statistical significance between the average scores of the students of the experimental group that are studying chemistry on the basis of the hot chair strategy
5. There are no differences with statistical significance between the average levels of pre and post-test for higher thinking skills of the experimental group who are studying using the hot chair strategy.

LITERATURE REVIEW

The hot chair strategy is “A educational strategy based on a questionnaire between students, who sits on (the hot chair) and on teachers who play different topics. This strategy is use to develop various mental and cognitive skills, including: Reading, building questions, exchanging ideas, and deepen in values, personalities and their souls” [Zayer et al., 2014: 242]

Procedural definition of the researcher: It is one of the active learning strategies that includes a set of steps to perform the roles among the students of the experimental group, where the student sits on the chair to answer the questions that the other students ask. This strategy develops social ties between female students, as well as developing interpersonal skills, creativity and thinking, leading to create an atmosphere of discussion and cooperation. And interaction in the course by answering the asked questions.

Acquisition: “One of the first steps in learning and through which the individual is represented in the new behavior to become part of the total behavioral outcome” [Abu Jadu, 2003, p. 424]

Procedural definition of acquisition: It is the ability of a student of the experimental group to define, distinguish and apply the chemical concepts contained in the first four semesters taught from science writers for the second intermediate grade and to measure and calculate the acquisition.

Concept: “Is a word or a group of words that possesses distinctive features or characteristics and can be generalized to countless things” [Maree and Al-Hailah, 2011: 211].

Procedural definition of the concept: "It is a group of words, names, symbols or elements that are mentioned in the chapters of science textbooks related to chemistry and scheduled for students of the second intermediate grade who collect similar characteristics so that each name has its meaning."

Chemical survey: "The learner's desire to reveal the unknown, deal with opinions and ideas to know what is expected to happen" [Qandil, 2006, p. 123].

Procedural definition of the chemical survey: “The tendency of the students of the experimental and controlling group is to disclose information about events or phenomena, as it expresses the degree that the students of both groups obtain in the scale of the chemical survey prepared.”

Higher thinking skills: "A set of skills that require an analysis of complex and multiple situations that depends on the widespread use of mental and cognitive processes, as they represent the skills of analyzing, formatting, modeling and installing information. " [Al-Qarni, 2015: 15]

Procedural of higher-thinking skills: “A group of sophisticated mental skills that the second intermediate class students applies in the experimental and control group, when exposed to a special position in chemistry, which requires a broad mental process.” It is measured by the degree to which the experimental or control group students gives in the test.

Hot chair strategy

The hot chair is a learning strategy that calls for the trend of the learner as an active participant in the learning process bringing positive activities, which came as a response of the traditional method, which brought negativity to the learners instead. It gives a distinctive role because it enables him to lead the learning process in some situations enhancing its confidence, his ability to lead the discussion, ask questions, give answers, as well as having a role in the development of discussion skills, conversation and defense of opinion and access to other ideas. [Attia 0.2016: 388].

It is an easy and interesting strategy that can be relied upon all topics, its benefit is that it develops many skills, including: Good reading, formulation of questions, and the exchange of opinions and ideas, as preferred by the teacher, with the help of Mina Muhammedi.

The idea of this strategy is based on the seat of the teacher, the student, or the expert on the hot seat among a group of students as they ask questions on it, considering that the questions are open and not closed. [Young, 2008: 3].

This strategy is considered one of the effective strategies that focuses on the role of the learner, and through it, the teacher can develop skills, establish values, build questions and exchange ideas. Then students directly ask questions to the volunteer who is sitting on the chair, and this student answers the questions addressed to him, if he doesn’t know the answer then the question is passed to another student or to the teacher. [Afattla 0.2016: 339].

This strategy is based on discussion and questions and answers, so the seating order is arranged for students in one or several groups to manage the topic of discussion. This chair is available for all the students to implement the plan of the teacher, so the teacher himself may sit on this chair and respond the questions of the students around it. [Attia, 2016: 389]

Sarah Young [2008] stated that this strategy is an interactive strategy in which students practice skills and activities, including speaking and listening, and it is called a hot chair. Each student has a role in this. The teacher monitors students and guides them on how to formulate questions through which students can create or dedicate many different topics, and the teacher corrects the grammar and language [2: 2008, Young].

As Wilhelm notes, this strategy is considered one of the “effective strategies that helps students to exchange ideas, understand the situations and problems that they face, learn about the meanings, and understand the views on the topics and the ideas” and inferential by experimenting and discovering knowledge

from themselves, as well as conducting interviews, debating, and addressing a kind of discussion, as well as giving the opportunity to all students to sit and perform their roles [83: 2002 Wilhelm,].

Teaching with a hot-seat strategy

In this strategy, teaching takes one of the following forms:

-Sitting in one seat and the student in a other one: Seating seats are arranged in this situation, in one episode, the student sits on the hot chair, and the teacher must explain to the students the procedures and steps of this strategy.

The subject of the lesson, which is divided into paragraphs, so each student is concerned with a specific paragraph.

-The chair is placed in the center and surrounded by a group of chairs on which the participating students are entrusted, which is determined by one of the topics of the lesson or a specific issue. In this episode, the students ask their questions to the volunteer student who was chosen to sit on the chair, with the need that the questions have a degree of difficulty and their answers require reasoning. By discussing the answer, respecting different points, urging his colleagues to ask questions related to the subject of the lesson. The teacher will ultimately carry out the evaluation process for the students accommodation, and he will give his notes on the topic, and the students should take notes on the subject lesson.

-Place the seats in more than one circle run by students: The distribution of seats among multiple groups allows the opportunity for all students to sit on the hot chair and to performed the role and complete the task entrusted in him in the educational situation, and this is done during the following: The subject of the lesson is divided into tasks that are given to each group, the teacher randomly distributes students into groups, each group distributes its students to the seating chairs in a circular shape being the hot chair in the middle, each group names the volunteer student who sits on the chair. The teacher explains the role to the volunteer student, the roles of students sitting around him and encourages them to ask questions with open answers. The teacher asks the students, who sit on the hot chairs to receive the questions related to each episode, answer them, clarify and explain them, and respect other people's opinions and not disdain them. The teacher will ultimately carry out the evaluation process by presenting his notes about the volunteer students sitting on the hot chairs, as well as his notes to the participating students that asked questions and their importance in enriching the lesson. Through the previous two situations, the role of the teacher is the role of the facilitator for students because he chooses a student to facilitate and succeed the discussion, and his role is also guided and directed, and the student assigned to him does not replace the mission except when necessary.

-Placement of the single episode and the teacher's hot seat: Seating seats are arranged for the students in one episode, which is mediated by the hot chair on which the teacher sits, which is the center of dialogue, discussion and answer to the questions asked.

- Determination on the topic or task whose importance is indicated: The teacher motivates the students to ask questions that they would like to have answers to especially those that enrich the lesson and value their efforts. The teacher must listen to the student's opinions and answer all their questions [Attia, 2016: 3903939].

Concepts

Concepts are the basic building blocks of science and scientific knowledge, and they are the outcome of human knowledge that has accumulated as a result of intelligence and human experience in thinking, research and investigation, and the organization of knowledge on the basis of objective criteria and the contents of the truth. [Khawaldeh, 2003: 298].

The concepts are easier to remember, more stable and survival than the facts that are forgotten faster. Learning concepts helps organizing the experience and facilitates the transition of the effect of learning, which leads to the use of the visual approach. Educational and psychological aspects are both the components of concept and consider by Olian [2010] that consists of:

1- Concept Name: It meaning, a term or a symbol.

2- Meaning of the concept: It is intended to define the concept.

3- Examples of the concept: It includes positive examples that contain all the characteristics of the concept, and negative examples that contain some of the characteristics of the concept. [Olayan, 2010: 110].

Gain and learn the concepts

The learning of concepts is the most prominent educational step by seeking education to them, Olney was emphasized by educators at different levels of learning, through which the development of teaching materials and methods were the appropriate one to teach, because learning concepts facilitates the learner's process to study in a clear and smooth way. Kmaanha is considered a successful way of mental development processes, the process of forming concepts among learners makes it easier for them to study, memorize, remember and keep current facts. [Al-Qaisi, 2008: 241].

Ozil [1972] determined that learning concepts at school is done through two phases, the first phase: Known as the [concept] where the learner can discover the distinctive features of the associated stimuli, and that is what they have in mind. In this stage, the relationship between the name of the concept and the mental image of it is how the learner knows that the name indicates the characteristics of the concept. [Al-Khawaldeh et al., 1996: 127].

Scientific curiosity

The curiosity of a person is important and necessary in education, as well as the home environment which have an effect no less than the school environment, and in order for this motive to be used in the achievement of learning, it must be provided a supported, safe and free environment in school by accepting students questions, ideas, and opinions freely, without boredom. Scientists have indicated that the owner of the scientific investigation is characterized by a lot questions and inquiries about events and phenomena, and that curiosity is the basis of learning and creativity, and how to use this poll to achieve learning through selecting topics and teaching methods that stimulate the scientific survey among students. [Salama 2002: 59]

Higher thinking skills

The development of higher thinking skills among students is a major goal of those in charge of the educational process to achieve academic levels. At the same time, it is considered as way to raise the level of the individual and the society, it is noticeable that in recent times, interest has increased over the development and improvement of higher thinking skills among students and at various stages. This has led to the emergence of three directions for the development of higher thinking skills among students in general and not as a specific course of study.

First direction: The proponents of this trend believe that this development process is carried out by special programs in developing thinking skills, provided that these programs are independent in the content that students are studying, and among those who support this trend - the institution. [Edward De Bono].

Second direction: The owners of this trend see that the possibility of developing thinking skills is in the context of daily quotas for academic subjects, especially in scientific subjects such as chemistry, mathematics, and others; this is done through the implementation of certain teaching practices during teaching, using its process and methods [Lauren Resnick].

Third direction: The owners of this trend believe that the ability to develop skills is through the integration of those skills in the content of daily classes at the same time during, and that this requires the teacher to use the content of a daily lessons [Robert Eanis]. [Olive and Kamal, 2003: 101-103].

PREVIOUS STUDIES

Karat Lucy/2017/Iraq

The impact of the ring registration strategies and the hot chair in the academic achievement of second-grade middle school students in biology and positive thinking. 1st experimental group of 30, 2nd experimental group of 230, 30 achievement test officers. Positive thinking test. There is a statistically significant difference in favor of the two experimental groups.

Al-Hamdani/2010/Iraq

After using forms (vee) in the absorption of students in the fourth grade, science branch / institute for the preparation of information for scientific concepts and the development of scientific survey.

Experimental group of 20, 20 concepts for understanding. The scale of the scientific survey is that there is a statistically significant difference in favor of the pilot.

Al-Qarni/2015/Saudi Arabia

Learn about the impact of using a brain-based learning strategy in science education in developing higher-order skills and some habits of mind when Talal is in the second intermediate grade with different brain-damaging mental patterns.

35 female officers with higher thinking skills test. The scale of mind habits outweighed the experimental group studied according to the brain-based learning strategy in developing higher-order thinking skills.

METHODOLOGY

The researcher used the experimental approach, which is one of the most used, accurate and efficient methods of scientific research.

Experimental design

The researchers deliberately designed an experimental design with partial control appropriate to the circumstances of the current research.

The design came as [1]:

Telemetry	Independent variable	**Tribal measurement**	The group
Gain the concepts of chemical exploration	Hot seat strategy	Chemical survey Higher thinking skills	Experimental
	The usual way		Control

Figure [1] experimental design of the research

Results	Research tools	Number of respondents	The aim of the study	The name of the researcher Year / location	s
The presence of a statistically significant difference for the benefit of the two experimental groups	Achievement test Positive thinking test	1experimental 30 Experimental 230 30exact	The effect of the hot registration and hot seat strategies on the academic achievement of second-graders of the second intermediate grade of biology and their positive thinking	Al qara Lucy 2017 Iraq	1
The presence of a statistically significant difference in favor of experimental.	Understanding concepts The scale of the scientific survey	20 experimental 20 exact	The effect of using forms (vee) in the absorption of students in the fourth grade, science branch / Institute for the preparation of teachers for scientific concepts and the development of their scientific survey	Al-Hamdani 2010 Iraq	2
The experimental group that was studied according to the brain-based learning strategy in developing higher thinking skills exceeded some mind habits.	Top thinking skills test Scale Habits of Mind	35 experimental 35 exact	Learn about the effect of using a brain-based learning strategy in teaching science on developing higher-order skills and some habits of mind when Talal in the second grade of middle school with different types of mental dominance patterns	Al-cornea 2015 Saudi Arabia	3

Research community

The research community is composed of second-grade middle school students from secondary schools of girls for the day-to-day study of the General Directorate of Education Salah al-Din Governorate / Tikrit District Education Center / Tikrit District Center for the academic year of the year 2018 - 2019 [11]. Total number of female students in school: 1216 students

Research sample

The current research sample consisted of 69 students selected by the researchers criteria. It was chosen a doctrine high school for girls in Salah Governorate in Tikrit district, as a deliberate choice to apply their experience in for the following reasons: 1. The school administration has expressed the desire to cooperate with researchers in conducting an experiment. 2. Providing the required conditions in terms of research due to the existence of two divisions for the second intermediate class.

After the school determine where to apply the experiment, the researchers visited Mstsahban school with a book to facilitate the task, the school has two divisions of second grade, the first one is average, chosen by the researchers randomly to represent the experimental group that will be consider as the students of following the hot chair strategy in chemistry counting with 34 female students; the second one will represent the control group, those students will study chemistry in the usual way, counting with 35 female students. Hence the research sample includes 69 students.

Female students life calculated in months: The researchers obtained data from the school card and processed the results with the T-test for two independent samples of the two research groups, as shown in Table [1]

Table [1]. Results of the final life-time test for the two research group students, calculated in months

Significance at level 0,05	Value t		Degree of free	Standard deviation	SMA	Sample size	The group
	Table	calculate					
Not function	2,00	0,86	67	4,44	162,88	34	Experimental
				4,06	162,00	35	control

It appears from Table [1] that the average age of female students of the experimental group [162,88] months and the average age of female students of the control group [162,00] months, when using T-test for two independent samples to know the significance of the statistic level of [0,05], as the calculated T value [0,86] is smaller than the cyclic T value [2,00], with a degree of freedom [67], this indicates that the two groups are equivalent.

Chemical Survey

The chemical survey scale was applied in its final form to the students of the two groups of the research sample before starting the experiment after which the answers were corrected, and the grades were given to the total of students. The arithmetic number of the control group [65.77], and to know the significance of the differences between the two groups of the sample, the researcher used a [t-test], and found that the difference was not statistically significant. The calculated value of the t-test [0.36] is smaller than the tabular value [2,00], and this indicates that the two groups are equivalent in the scale and in the scientific survey , table No. 2 shows that.

Table [2]. T-test value calculated and tabulated in the chemical survey scale of the two sample groups

Significance at level 0,05	Value t		Degree of free	Standard deviation	SMA	Sample size	The group
	table	calculate					
Not function	2,00	0.36	67	6.33	65.18	34	Experimental
				7,44	65.77	35	control

Higher thinking skills

The researcher applied the final thinking skills test to the students of the sample before starting the experiment for the equivalence of the two groups of the research, afterwards the researcher corrected the answers, and gave the scores for all students. For the experimental group [18.18] was the arithmetic number. For the control group [17,40], to know the significance of the differences between the two groups of the research sample, the researcher used the t-test, and found that the difference was not statistically significant. The significance level is [0,05], because the calculated t-test value [0,54] is smaller than the tabular value [2,00], and this indicates that the two groups are equivalent in the higher thinking skills test and table No. 3 shows that.

Table [3]. Calculated and tabulated [t-test, value] in the higher skill test of the two research sample groups

Significance at level 0,05	Value t		Degree of free	Standard deviation	SMA	Sample size	The group
	table	calculate					
Function	2,00	0,54	67	5,74	18,18	34	Experimental
				5,51	17,40	35	control

Female students degrees in chemistry for the previous academic year: The researchers obtained the final grades of the students of the two groups in the chemistry course for the previous academic year. The results were as follows:

Table [4]. Results of the final test for female students grades for the previous academic year 2017-2018 in chemistry

Significance at level 0,05	Value t		Degree of free	Standard deviation	SMA	Sample size	The group
	table	calculate					
Not function	2,00	0,86	67	10,69	68,24	34	Experimental
				15,85	67,89	35	control

It is clear from Table [4] that the average score for female students of the experimental group is [68,24], and the average score for female students of the control group is [67,89], when using the T-test for two independently defined samples. Statistical significance at the level of [0,05], as the calculated T value [0,86] is smaller than the T-index value [2,00] and with a free degree [67].

Academic achievement of fathers and mothers

The information related to the academic achievement of Fathers and Mothers was obtained through the school card, and after the calculation of repetitions for each level of education, the level of the subject is clear. As with any statistical method, it was found that there is no statistically significant difference between the two research groups in the educational achievement variable for fathers and mothers, as the calculated value of a square reached as any [1,5] is less than the tabular value of a square, such as any of [6,7] at the significance level [0,05] and with a free degree [3]. This result indicates the equivalence of the two research groups in this variable and table No. [5] illustrates this.

Table [5] Square results, such as in the achievement variable of the fathers of the two research groups

Significance level at 0.05	The Kay value		Degree of free	Academic achievement of the father				No.	Group
	Table	calculate		Institute and Bachelor	Prep	Medium	Read, write and primary		
Not function	7,81473	2,15	3	8	13	7	6	34	Experimental
				8	10	10	7	35	control
Not function	7,81473	2,73	3	7	14	6	7	34	Experimental
				8	10	7	10	35	control

Control of exotic variables

Controlling exotic variables is one of the important actions in experimental research to provide a degree of internal validity for experimental design. Here is a presentation of these variables and how to control them:

1. Maturity operations: The duration of the experiment was equal for the two research groups, so this factor did not have any effect on the results of the experiment.
2. Experimental extinction: In the current research, there was no interruption or transfer of any student, except for the regular absence cases, which were almost equal between the two groups.
3. Accompanying accidents: It refers to the natural or non-natural accidents that can occur during the period of the experiment that hinder the course of the experiment and have an effect on the dependent variable [the acquisition of chemical concepts] in addition to the effect of the independent variable, no accident affecting the experiment occurred.
4. Measurement tool: The researchers used a standardized measuring instrument to measure the acquisition of the two students groups, as they prepared a summary test for the purposes of the current

research, the test was applied to both the experimental and control group, and a scale for the quantitative aspect of the survey.

5. The effect of the experimental procedures:

5.1 Confidentiality of research: Researchers are keen on confidentiality in agreement with the school administration to not inform students of the nature of the research and its purpose, so that it does not affect the students activity or deal with the experience that affects the integrity of the results.

5.2 The distribution of lessons: The weekly schedule was organized in agreement with the school administration through an equal distribution of lessons between the experimental and control groups.

5.3 Duration of the experiment: The trial period was uniform and equal for the students of the two research groups, as it started on 3/10/2018 and ended on 27/12/2018.

5.4 School: Studied by itself through two research groups giving results of the experiment as degrees of accuracy and objectivity, because the individuals of a school for each group make one of the two groups more difficult than others; personality among other factors.

5.5 Determining the academic subject: The course material was specific to the experiment and standardized for the two research groups. It is the subject of chemistry with science textbooks for the second intermediate grade, to be taught by the Ministry of Education for the academic year 2018-2019.

5.6 Teaching room: The experiment was implemented in one school, and in two adjacent classes similar in terms of space, ventilation and lighting.

Specification of scientific subject

The scientific course outlines the topics included in the first four chapters of the science textbook for chemistry to be taught for the second intermediate grade of the academic year [2018-2019]

Formulating behavioral goals

The researchers formulated the behavioral goals that reached [122] behavioral and intentional purpose according to Bloom's classification of knowledge domain and in the first three levels [definition, discrimination, application] because they are compatible with the physical and mental development of the sample, as well as the perception of this sample. It was presented to arbitrators and specialists with expertise and competence and in the light of their observations and proposals, some of the objectives were reformulated. The behavioral goals obtained the approval of all the opinions of the arbitrators and specialists, which numbered [111].

Teaching plans

A teaching plan was prepared for each group of subjects related to chemistry, which will be studied during the experiment, and two models were presented, the first of which is based on the strategy of the hot chair and the second according to the traditional method.

Research tools

1. Concept acquisition test

1.1 Formulation of test items: This test was designed from multiple choices because it aims to cover the study of comprehensive materials, its objectives and credibility when extracting honesty and consistency, its status is not affected by self-correction, and the paragraphs were formulated with a number of 30 paragraphs. The methodological book contains information for acquiring concepts in light of mental levels [definition, discrimination, and application].

1.2 Validity of the test: The test was presented to a group of experts and arbitrators for the purpose of verifying the validity of the test, and after taking the opinions of experts and arbitrators, some amendments were made to it, and no paragraph was deleted from it.

2. Correction Instructions

For each paragraph, there is a degree, the paragraph whose answer is correct which has a degree, and the paragraph that has a wrong answer which is zero, and the paragraph left or the paragraph that has more than one answer is treated as a wrong one.

3. The exploratory sample for the test

The test was applied to a sample of the second intermediate class students, and the researchers selected Abdul Rahman Al-Dakhel School as a prospective sample and they numbered [50] students to know the time spent in answering the test paragraphs, as well as to know that the extent of the poverty has been clear. Clear to the students, and with a simple clarification of the questions asked by the students during the test about some paragraphs, and after that time taken for answering was calculated, reaching [26,50] minutes.

4. Statistical analysis of the test items

Statistical analysis of the test items aims to verify their validity for application through the responses of the students on each paragraph, to know the coefficient of difficulty, the strength of the discrimination and the effectiveness of the alternatives for each of the paragraphs of the test; in the light of that, the alternative or change is not followed. The test was applied to an exploratory sample that included 100 female students from the second medium grade, and after correcting the responses of the students, they were combined descending from the highest to the lowest degree and a percentage of 27% was taken as a group of Lea and 27% as a lower group, where the higher group consisted of 27 students and the lower group of 27 students as well, where the total number of the two groups were 54 students and accordingly, statistical analyzes were conducted according to the following steps:

4.1 Paragraph difficulty factor

The difficulty factor for each of the test items was calculated, the ratio ranged between [0.28 - 0.52]. Bloom et al. saw that the test paragraph was considered acceptable if the difficulty ranges between [0,20-0,80] [Bloom & et al, 1971: 66].

4.2 Paragraph discrimination factor

The discriminatory force equation was used to maintain the high-discrimination items and delete the low-discrimination items, and it was found that the discriminatory strength of the paragraphs ranged between [0,30-0,81] for all of the test items, and this ratio is good. The paragraph is considered good if its discriminatory ability is higher than 30%. [Ebel, 1972: 399].

4.3 Effectiveness of wrong alternatives

Through conducting the statistical operations, and after calculating the effectiveness of the alternatives, it was found that these alternatives attracted a number of female students, and accordingly it was decided to keep them without changing or removing them.

5. Stability of the test

The Alpha Cronbach equation was used to calculate the stability of the objective test paragraphs from a multiple choice type, as it is the most common way to extract the internal consistency of the test paragraphs whose paragraphs are corrected by giving a zero for the correct answer.

Building a chemical survey scale

After reviewing the literature and many previous studies and researches that dealt with the scientific survey [which includes all sciences], only chemistry was specified, so the scale was built on this basis, so the researcher has prepared a number of 30 questions. By answering it, the students were informed that it is not a study test, but a measurement, a chemical survey, in order for their answers to be honest and accurate. To prepare the scale, the following steps were taken:

1.Determine the objective of the scale

The researchers designed a scale that aims to measure the chemical exploration of second-graders from the second intermediate class.

2. Preparing the paragraphs of the scale

Prepared paragraphs measuring the chemical survey of students in both experimental and control research groups, as the paragraphs of the scale reached were 30 paragraphs, with ten questions, and each paragraph had three alternatives.

3. Exploratory sample for the chemical survey scale

The scale was applied to a sample of the second intermediate class students, and the researcher chose Abd al-Rahman school inside as an exploratory sample of 50 to know the time spent in answering the test items, as well as to know the extent of the clarity of the paragraphs during the scholar period. The scale was applied on 4/10/2018, after which the time taken for answering was calculated, being the average response 32,50 minutes.

4. Outstanding honesty of the content

This scale was presented to a group of experts and arbitrators in the fields of teaching methods, sciences and chemistry, and for the purpose of taking their opinions and observations about the paragraphs of the scale - and its clarity in order to improve the standard.

5. Instructions for correcting the scale

The scale correction instructions were prepared, setting three paragraphs for each question in which each paragraph had three options, clarifing how the grades were going to be distributed to the scale paragraphs as follows: Always 3 degrees, sometimes 2 degrees, rarely 1 degree.

6. Scaling factor of the paragraphs

The purpose of knowing the differential parameter for the paragraphs of the chemical survey scale, and by calculating the number of correct answers for both the upper and lower groups, and after using the statistical analysis of the paragraphs, it was found that the value of the paragraph differentiation factor ranges between [2,976-8,2].

7. Stability of scale

The internal consistency method [Alpha Kronbach] was used for the purpose of knowing the stability of the scale - and after applying the scale - on a sample consisting of 50 students. The answers were corrected by using the coefficient of the Alpha Kronbach equation giving the value of stability [0,81].

Top thinking skills test

One of the requirements of the study is testing the higher thinking skills among the members of the research sample, and by examining the researchers with a number of studies and tests that relate to these skills among students; whether in terms of the subject matter, the target age group, or the level of the second intermediate class students; after the researchers polled the opinions of some experts and specialists in this field Dad's higher-order thinking test has to be that the test sections are interesting and exciting for students and include various questions so that students feel a kind of challenge to their mental abilities and knowledge capabilities. The test was prepared according to the following steps:

1. Reviewing the literature and previous studies

The literature and previous studies that dealt with higher thinking skills tests that were referred to in the second chapter of the previous studies were reviewed.

2. Determination of higher thinking skills

The skill classes were combined with their definitions that the original references came from those studies that were prepared as they were without any change in the form of separate lists from each other according to their workbook and their contents of the skills presented to them by the psychologists. Before them and

judging their validity, choosing and adding the skills that they find appropriate with the age group of the students of the research sample, the nature of the educational level [the second intermediate] and the science [chemistry], and after familiarizing them with the skills that have been approved which are: analysis, generation, production, consumption, characteristics of induction, identification of relationships and patterns, inference, prediction, expansion, access to facts from given information, interpretation of a problematic situation, access to generalization through partial situations and setting assumptions through observation, as seen in figure [2]

Figure No. [2]

Basic sup	Basic skills	
A- Determination of properties and components B- Determining relationships and patterns	Analysis	1
A- Inference A- Prediction C- Expansion	Obstetrics	2
A- Accessing the facts from the given information B- Interpretation of a problem	Conclusion	3
A- Reaching generalization through partial positions Assignments are made through available observations B-	Induction	4

3. Formulating test items

The paragraphs were formulated in a way that corresponds to the level of the second intermediate class students and their level of mental abilities; the test consisted of 32 items distributed over four basic skills.

4. Validity of the test

In order to verify the apparent sincerity of the test, its paragraphs were presented to a group of experts and specialists in chemistry, and their teaching methods, to express their views in the validity of the test items, and a percentage of 80% agree that the criteria were adopted by accepting the failing paragraphs.

Statistical analysis of test items:

4.1 The discriminative strength of paragraphs

The differential coefficient was calculated for each of the paragraphs using the T-test for two independent samples as they ranged between [9,349 - 3,349], and it was found that the calculated T values are greater than the T-values of the table, which is of good result

4.2 Persistence

The Kronbach alpha equation was used to calculate the stability of the objective test paragraphs of multiple choices, because it is the most common way to extract the internal consistency of the test paragraphs whose paragraphs are corrected by giving a zero for the correct answer.

Application of experience

It was followed this steps in the application of the experiment:

1. The two research groups were taught in the light of the teaching plans by using the traditional method in the control group, and the hot chair strategy in the teac experimental group, as follows:

Female students were divided into five groups, four groups that included 7 female students and one group that included 6 female students, as each female student was given a portion of the subject within her original group. After that, the female students of the original groups were divided into groups called “The Group”. After having a discussion among them, female experts return to their original groups and each student teaches the members of her group, because the hot chair strategy requires the freedom of movement of students from the original groups to expert groups and then return to the original groups.

2. The acquisition test was applied after the completion of the experiment to the two research groups, as the researchers supervised the application of the test in the school itself, corrected the answers in the light of the criterion that was set and the response given was the correct score scale, the scientific survey and testing of higher thinking on students of the two groups.

Statistical methods

The following statistical methods were used: T-test for two independent samples, [Ca] 2 sq. Test, ie, difficulty factor, differentiation strength equation, efficacy of error alternatives, Sperman-Brown equation.

RESULTS

There is no significant difference between the average acquisition of students of the experimental group studying chemistry according the hot chair strategy and the average gain control group who are studying chemistry according the traditional method, to verify this hypothesis it was used the T-test for two independent samples.

The results showed that there is a statistically significant difference at the level of 0,05 and with a free degree of 67, as the calculated T value [3.95] was greater than the T value. The spreadsheet 2,00 and table [6] clarify this, thereby rejecting the zero hypothesis, this means that the experimental group is superior to the control group.

Table [6] Results of the final test scores for students of the two research groups in the acquisition of concepts

Significance at level 0,05	Value t		Degree of free	Standard deviation	SMA	Sample size	The group
	table	calculate					
function	2,00	3,95	67	2,84	21,03	34	Experimental
				2,43	18,51	35	Control

There is no statistically significant difference at the level of 0,05 between the average chemist poll, from the students of the experimental group study using the hot chair strategy and the control group who study using the traditional method. To check this hypothesis it was used the Altaia to Aienten independent test, that showed the following results: the presence of a statistically significant difference at the level of 0,05 and with a free degree of 67, since the calculated T value 3,16 was greater than the T-table value 2,00 and table [7] illustrates that, which rejects the null hypothesis, meaning the superiority of the experimental group to the control group.

Table [7)]. Results of the final test scores for female students in two groups in the chemical survey

Significance at level 0,05	Value t		Degree of free	Standard deviation	SMA	Sample size	The group
	table	calculate					
function	2,00	3,16	67	5,48	70,71	34	Experimental
				7,39	65,74	35	control

There is no statistically significance difference between the mean scores of pre-test and post chemical survey of students in the experimental group who are studying using the hot chair strategy, to verify this hypothesis the researcher used the Altaia-Aienten interrelated test; results showed a statistically significant difference at the level of 0,05 and a degree of freedom of 33, since the calculated T value 8,52 was greater

than the T-index value 2,05 and table [8] illustrates this, thereby rejecting the zero hypothesis, meaning that the experimental group was average.

Table [8]. Results of the T-test for two interrelated samples for the students of the experimental group in the pre- and post-test.

Significance at level 0,05	Value t		Standard deviation of differences	Average differences	Standard deviation	SMA	The group
	Table	calculate					
Function	2,05	8,25	3,91	5,53	6,33	65,18	Tribal
					5,48	70,71	after

Results of higher thinking skills

To verify the second zero hypothesis, which states that: There is no statistically significant difference at the level of 0.05, between the average grades of students of the experimental group who are studying according to the hot-seat strategies and the average of the students of the controlled group.

To verify the validity of this hypothesis, it was calculate the arithmetic and T value by using [T.test] of the two independent samples for comparison between the mean of the average of the female students of the experimental group and the mean of the students of the control group.

Table [9]. Results of the [T.test] scores for students of the two research groups in the test of higher skills

Significance at level0 ,05	Value t		Degree of free	Standard deviation	SMA	No.	The group
	table	calculate					
function	2,00	3,16	67	5,48	70,71	34	Experimental
				7,39	65,74	35	control

There is no statistically significant difference at the level of 0,05, between the mean scores of pre-test and post chemical survey of students in the experimental group who are studying using the hot chair strategy, to verify this hypothesis the researcher used Altaia-Aienten interrelated test, results showed a statistically significant difference at the level of 0,05 and to a degree of freedom 33, since the calculated T value 8,52 was greater than the T-index value 2,05 and table [10] illustrates this, thereby rejecting the zero hypothesis, meaning that the experimental group is superior.

Table [10]. Results of the T-test for two interrelated samples for the students of the experimental group in the pre- and post-test.

Significance at level 0,05	Value t		Standard deviation of differences	Average differences	Standard deviation	SMA	group
	Table	calculate					
Function	2,05	8,25	3,91	5,53	6,33	65,18	**after**
					5,48	70,71	**before**

It is clear that the meaning for the scores of female students of the experimental group is equal to 20.77, with a standard deviation of 3.11, while the meaning of female students of the experimental group is equal to 17.45, with a deviation of 2.2.4]. The spreadsheet amount is 2 with a freedom degree of 59 and a significance level of 0.05. This indicates the presence of a statistically significant difference between the average grades of female students of the experimental group and the average grades of female students of the control group; for the benefit of the control group higher-level thinking skills test and thus rejects the second hypothesis of

zero and accept alternative hypothesis, this results shows the superiority of students in the experimental group who studied according Skambr strategy on the control group students who studied in accordance with the ordinary method to test higher-level thinking skills. This can be seen in table [11]

Table [11]. Scores of female students

Significance at level 0,05 Calculate	Value t		Degree of free	Standard deviation	SMA	No.	The group
	Table	Calculate					
Function	2	4.78	59	3.11	20.77	30	Experimental
				2.25	17.45	31	Control

The results of higher thinking skills before and after the experiment

There is no statistically significant difference between the average grades of female students of the experimental group who are studying using a scamper strategy and the average of the scores of female students in the control group.

To verify the validity of this hypothesis, the arithmetic account is calculated using [T.test] for two independent samples, comparing the scores of the students average grades in the experimental group previous the test.

Table [12] Results of the [T.test] scores for students of the research group in examining higher thinking skills before and after the experiment

Significance at level	Value t		Standard deviation of differences	Average differences	Standard deviation	SMA	Group
	table	calculate					
0.05	8.03	29	3.00	4.40	3.40	16.37	after
					3.11	20.77	before

Interpretation of the results

The results obtained by the current research can be explained as follows:

The result of rejecting the zero hypothesis showed above, meaning superiority in the acquisition of the experimental group students that were studied according to the hot chair strategy on the students of the control group, the same has been studied by:

1. The use of the hot-seat strategy increased the attention of the students making them more willing to receive information as it provided them with the opportunity to learn by themselves, organize their experiences, symbolize them, distribute them, and turn them into memory. Their mental routine reduces the ranks that prevail in the classes taught in the traditional way.

2. The reasons for the experimental group students who studied according to the hot seat strategy may be due to being one of the modern strategies that are not familiar to students in the teaching of chemistry, and this could not be successful.

3. The hot chair strategy makes students to focus of the main educational process, and also makes students able to implement activities in a scientific manner, which makes the learning process more enjoyable.

4. The hot chair strategy encourages discussion and interaction on the occurrence of conflicts and challenges between members, ideas and opinions, but what happens is that these conflicts go away and turn into a stimulus that works on the excitement of the students towards learning leading to an increase in positive trends towards the study of the educational subject.

5. The hot chair strategy works to increase the level of participation among female students and cooperate with them to achieve educational goals, and this leads to increasing the absorption of female students in the form of schooling in a chained or unstable form, without correction or worry.

6. The cooperative educational atmosphere in which groups operate in a hot chair strategy elevates the level of female student acquisition and develops individual responsibility.

The hot seat strategy was concerned with the learner [students] and did not cancel their role, as did the teaching method, and the curriculum elements in general, which led to achieving good educational learning outcomes.

The learning process of students in accordance with the hot chair strategy is meaningfully better than the normal way, because the learning process and trends of different levels of thinking make the students more understanding of hypertext science while dealing with the future, investing in Mmatjal students ability to deal problem-solving is good, and this stimulates higher thinking skills.

The students of the experimental group possess the ability to perceive, distinguish, analyze and synthesize knowledge, and in a better way to compare it with the students of the experimental group who studied in the usual way.

The presentation of the educational material in the hot chair strategy is a progressive and sequential manner that with simple help of the traditional method the way students think is stimulated in the experimental group.

CONCLUSION

In light of the result obtained by the current research, it is possible to conclude that the use of the hot chair strategy may contribute to increase the effectiveness of female students superiority and the activities that makes them the focus of the educational process.

The students feel in the cooperative groups that they perform their class duties to achieve the educational goals, making them more receptive and motivated to the learning process.

The hot chair strategy is based on the female students activity, and the student's success in carrying out the activities of the whole group.

The validity of most of the literature that focuses on making students a central axis in the educational process, emphasizing the student's participation in the learning process, is confirmed by cooperative learning.

The necessity of the Ministry of Education's institutions to take interest in generalizing the use of cooperative learning strategies, including the hot chair strategy, and training teachers and schools on how to use it.

The necessity of informing chemistry teachers, educational supervisors and specialization on the use of the hot chair strategy in teaching chemistry.

Teachers of chemistry should be trained in using the hot chair strategy, and not be limited to teaching methods that are based on memorization and preservation.

Work to prepare the classrooms, and teaching aids necessary to help teachers to teach in accordance with the hot chair strategy.

Introduce students of educational colleges with the hot chair strategy and train them to apply them in their working lives.

Conducting similar studies for the current study on universities and middle schools.

Conducting similar studies to know the effectiveness of using the hot seat strategy in other variables such as the development of thinking and achievement, its retention, the development of trends, and others.

Conducting a study to identify the obstacles that prevent the application of the hot chair strategy and work to solve it.

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BIODATA

Jehan Faris Yousif: Ministry of Higher Education and Scientific Research. Instructor Doctor of the Faculty of Education of Pure Science /Ibn Al-Haitham, Department of Biology. University of Baghdad Iraq. gehan_faris@yahoo.com

Raed Idrees Mahmood :Ministry of Higher Education and Scientific Research. Professor of the Faculty of Education for Human Sciences, Department of Educational and Psychological Sciences. University of Tikrit. Iraq. raad_eru@yahoo.com