The Effect of Hawkins and Barman Models on Achievement and Intuitive Thinking Among Fourth-Grade Students in Science in Biology

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Abstract:

The aim of current research is to know (the effect of Hawkins and Barman models on achievement and intuitive thinking among fourth-grade students in science in biology). Three classes were selected from a fourth scientific class in Haditha High School affiliated to the General Directorate of Anbar, and the first experimental group was studied according to (Hawkins model), and their number reached (27) students and a second experimental group studied according to Barman's model. The number of requests reached (28) and a group Third, I studied in a regular way. It reached (31) students, so the number of study subjects would be (80) students. There were equivalencies between study groups in variables: (previous knowledge, chronological age, degree of intelligence), and in order to achieve the objectives of the study, he prepared an achievement test consisting of (40) paragraphs and adopted an intuitive thinking scale, and their validity and stability were confirmed. The data were statistically treated using the Spss program. Where the results of the study showed the existence of statistically significant differences between the mean scores of students of three groups in the achievement test and intuitive thinking in favor of an experimental group.

The First Chapter

Research problem:

Intuitive thinking is considered a cognitive product that prepares to reach results in a shorter time and effort and with higher efficiency without the need for workers to search, investigate and experiment, the learner's effectiveness, especially in practicing intuitive thinking, depends to a large extent on the extent of his knowledge of information and Knowledge is essential in that area. Because his knowledge there is a kind of familiarity that prepares him for the practice of intuitive thinking even though those with good intuition may have been born possessing that ability. However, the effectiveness of this ability depends on your familiarity with the necessary information, from this it appears that the approval of teaching intuitive thinking and its inclusion in the list of study subjects is an educational necessity it cannot be dispensed with if the goal is to build a thinking generation and create a cohesive society, whose children are characterized by consciousness and awareness. The experiences that the learner acquires when practicing intuitive thinking lead to good decision-making and to adapt to new situations and learn new skills quickly and understand complex and hidden relationships, Thinking with flexibility, and thus the behavior of these learners is active and needs new teaching methods that develop and stimulate thinking, this led the researcher to believe that the traditional method of teaching was not sufficient, and because of this arose the researcher's sense of the problem of this research and represented by poor achievement in science of biology and their weakness in the conduct of thinking processes. Therefore, the researcher decided to use a new model in teaching, which is the Hawkins model from his modern models in teaching, The Barman model is also one of the modern

models that may contribute to solving any problem that they may encounter. Therefore, the researcher's view of the importance of the problem of this research was formed.

(what the effect of Hawkins and Barman models on achievement and intuitive thinking among fourth-grade students in science in biology?).

Research importance:

1. After an attempt by a new researcher, because there is no local and Arab study, It works according to (Hawkins and Barman models) in the collection and intuitive thinking of fourth-graders in sciences of biology.
2. Biology teachers may benefit from the Hawkins model and employ it in teaching biology as well as benefit from the Barman model, The researchers also benefit from the achievement test in biology and the intuitive thinking scale that the researcher will prepare.
3. It is considered as a feedback for decision-makers and officials in Pedagogical and educational systems, to know the importance of the Hawkins and Barman model in the acquisition and development of students' intuitive thinking skills.

Research Hypotheses:

1. There is no statistically significant difference at the level of significance (0.05) between the mean, The grades of students of the experimental group who studied using the Hawkins model and the average scores of the control group students who studied in the usual way in an achievement test.
2. There is no statistically significant difference at the level of significance (0.05), Between the mean scores of the experimental group students who studied using the Hawkins model, and the average scores of the control group students who studied using the usual method on the intuitive thinking scale.
3. There is no statistically significant difference at the level of significance (0.05) between the mean, The scores of the students of the experimental group who studied on the basis of the Barman model and the average scores of the students of the control group who studied in the usual way in an achievement test.
4. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who studied using the Barman model and the average scores of the control group students who studied using the usual method in the intuitive thinking scale.

Define terminology:

1. Hawkins model: A teaching model proposed by David Hawkins based on giving the learner freedom to learn and a question or what was specifically called absurdity or chaos in learning. This method passes through three stages, each of which has been given a geometric symbol: a circle, a triangle and a square. (Al-Kashef, 2009: 31).
2. Barman model:(Barman): It is a practical model that contains a set of structured steps and procedures , the logic and progressive that is followed when implementing the educational process in the classroom he serves as a guide and application guide (Barman,2004,30) .
3. Attainment:He (Najjar, 1960) defined it as: "Doing something or achieving an edge in a skill or group of information" (Al-Najjar, 1960: 15).
4. Intuitive thinking:Define Him (Woolfolk, 2006) Intuitive thinking as a kind of mental and mental response based on the conscious perceptual analysis of external sensory stimuli upon receiving them. On the other hand, it is caused by the conscious, generated and emanated internal sensations. As a manifestation of thinking and mental-perceptual activity, which is also subject to conscious analysis, in a distinct way (Woolfolk, 54: 2006).

The Second Chapter.

Theoretical Background.

The first axis: Hawkins model.

Hawkins' model is one of the modern educational models that appeared at the hands of one of the leaders of reform in America (David Hawkins), He is an educator and philosopher who developed this model after working for two years in the science education program for the elementary level, a model for science education based on what he called play or (chaos), It is considered one of the models that adopt an investigative approach - exploratory, He was considered one of the first to focus on curiosity-based learning, He is considered one of the first to focus on curiosity-based learning, indicating that young learners learn best when they follow their innate cognitive curiosity (Hawkins, 2002:15).

Stages of Hawkins' model:

- First: the circle stage: the stage of openness and (freedom): The shape of the circle indicates that there is no starting or ending point for it, meaning there are no restrictions. Learner abide by this, It represents a (absurd) stage, Thus, the learner is left free at this stage in the field of play and deals with playing tools completely freely. This stage lasts for specific minutes that do not exceed ten minutes at least.
- Second: The Triangle phase: The directed exploration phase: The triangle shape symbolizes guiding and orienting, the teacher explains to his students how to carry out an activity and its steps verbally, in writing, or as a practical procedure, The teacher also allows his students to record data and urges them to discover a concept or principle. It is a stage that takes time (from 15-20 minutes).
- Third: the square phase: a discussion phase and reaching results: It is considered a final stage. The square symbolizes the learners sitting with their teacher to discuss and dialogue in the results they reached. Thus, the teacher's role in this stage is to conduct dialogue and discussion. And the wording of the concept, and others (about ten minutes). (Abdul Amir et al. 2004: 21).

The second axis: the Barman model:

One of the important models that was characterized by the character of modernity and interest in studies and research related to the mental development of the learner, which emerged especially from a cognitive perspective of the world (Jean Piaget) and it is the model that was launched by (Charles Barman in 1990), it is based on what contemporary psychologists and educators have made for him with new conceptual insights, And mental processes that must be acquired by students in different academic stages, and for different ages, as well as based on a large number of educational development programs that are designed, prepared and implemented depending on a special perspective (Jean Piaget), and he called it (super-cognitive Course learning), In it, Barman combined metacognitive uses and models with the principles and fundamentals of Piaget's theory. This model included a number of developments until it reached the so-called (super-cognitive Course learning), so Barman revised a developed learning course and presented it in the form of his own model called (Barman model). So Barman suggested that a normal learning course does not contain a specific method for demonstrating prior knowledge. The Barman model is not different from a learning course except that teachers define learners' perceptions of clear scientific concepts before the beginning of the lesson. This modification, which was added by Barman, is an element (prediction or guesswork) until their scientific ideas become clear, and it appeared, (super-cognitive Course learning) after Barman’s Course to embody the four-stage approach to Barman with the addition of asking the learner to seriously demonstrate his thinking.

***The teaching steps are:**

1. Selection Phase or guessing: Define an educational task by asking a question, or arranging a situation on the learners or defining a problem, with the intention of creating correlations between past and present learning experiences, and this is a stage that helps them to reach a correct understanding of the educational mission. The teacher writes a list of all that can be provided from tangible experiences that are closely related to the previously identified concept, And that the learner uses his previous experience and knowledge for the purpose of prediction, The teacher stimulates predictive thinking in learners by identifying and presenting concrete experiences, (Al-Huwaidi, 2005: 20).
2. Investigation stage: This stage gives students a common base of experiences through which concepts, processes and skills are defined for their development, It creates a field for students' activities, and for their questions related to the subject of the lesson, So the teacher provides learners with the materials and tools needed for the investigation or exploration process, they are asked to do an investigation and ask questions, and the role of a teacher in this stage is the role of a guide and a guide for learners during their activities, And encourage them to continue thinking to find appropriate solutions in solving the problems at hand (Al-Afoun and Hussein, 2012: 120).
3. Dialogue Phase: An investigative experience in an earlier stage which becomes the basis for developing a scientific formulation of the concept, In basic concepts are presented and clarified through dialogue and discussion inside the classroom between the teacher and the learner, he is supposed to direct the learner to some sources to obtain answers to vague questions, his role here at this stage is to encourage students to interpret concepts, definitions and generalizations in their own language, and work on their discussion, Consequently, a concept is extracted, which thus determines the level of students' understanding, and diagnoses incorrect and alternative concepts, if any, by observing what they write or draw (Zayer, others, 2014: 292).
4. Application Phase: Learners work on applying new concepts in similar situations, ask questions, record their observations and conclusions, and here investigations lead to new investigations and new understanding, In it, learners compete to provide multiple examples of the concept, and to apply the information they obtained in earlier phrase, And a cognitive transfer to a new mission, a new educational course. A calendar takes place throughout the entire educational course. (Saidi and Suleiman, 2009: 241-242).

The importance of teaching according to the Barman model:

1. It is a learning and teaching method. As the learners themselves carry out a process of inquiry that leads to learning, and it is distinguished from other educational models by taking into account the mental capabilities of the learners.
2. It works to increase achievement, and develop intellectual cohesion in terms of reflection, and its focus on concepts and generalizations, it creates an opportunity for learners to practice mental operations to a better degree than prevailing methods based on memorization and recollection. (Saidi and Suleiman, 2009: 243).

***Previous study.**

Table (1)

A study examined the Hawkins model						
The results of the study showed that there were statistically significant differences between the mean scores of the study individuals on the scale of post-scientific curiosity due to the method of teaching in favor of the experimental group..	Appropriate statistical means	The Scientific Love Curiosity Scale	(63) student	Sixth grade of primary school	The effect of teaching science using the Hawkins method on developing scientific curiosity among elementary school students	Adaili 2019 Jordan
A study examined the Barman model						
The result of a study in favor of an experimental group, there is a difference of statistical significance attributable to the Barman model of a teaching method.	Appropriate statistical means	Reading comprehe nsion	(50) student	Fourth grade literary	The effect of Barman's model on developing reading comprehension among fourth-grade literary students in reading subject.	Jamil (2014) Iraq

The Third Chapter.

Research Methodology.

curriculum: The experimental method was used, which is based on an experimental design with three groups, one of whom is a control.

Study design: An experimental design research was taken according to the following table.

Table 2: the demographic design of the search group

Application	Experimecl	Tribal application	Groups
-Attainment -Intuitive thinking scale	Hawkins model	Intelligence- OtisLennon - Previous collection - Chronological age - Product thinking test	Experimental group 1
	Barman model		Experimental group2
	His traditional way		Control group

Research community: The research community identified fourth-grade students of science in a Haditha middle school for boys.

Research sample: The research sample was chosen intentionally, and divided into three groups: A control group that studied in a traditional way, and it numbered (31) students, And the first experimental group, which studied the application of Hawkins' model, their number is (28), And a second experimental group that studied the application of Barman's model, and they were (29) students.

Third: Procedures for controlling the parity of a sample Search: Reward three groups researcher with a number of variables as follows (previous knowledge, chronological age, and intelligence).

Table (3)

indication	Tabular	Calculated	Average of Quartiles	Df	Sum of squares	The source of the contrast	Variables
No sign	3.2	0.050	1.65	2	3.2	Between groups	Chronological age
			33.4	83	2769.5	Within groups	
No sign	3.2	0.34	17.7	2	35.5	Between groups	Intelligence
			51.7	83	4288.3	Within groups	
No sign			46.2	2	92.1	Between groups	Previous knowledge
	3.2	0.96	48.0	83	3984.03	Within groups	

Search Tool: Achievement

Test: Search Supplies:

1-Achievement test preparation: a test consisting of (40) objective items.

2-Objective of the test: The aim of the test to measure academic achievement in biology for students after they gain information that was taught during the course of his experiment.

3-Determination of the scientific subject: represented by the seasons (adaptation of an animal to the environment, a plant adapted to the environment, adapted animals and plants to the patterns of life in the environment) from the book “Biology” prescribed for the fourth grade of science / for the second course. One of the teachers was trained on the models by the researcher.

4-Behavioral objectives: The researcher relied upon drafting the items of achievement test on the behavioral objectives of (BLOOM) levels and reached (98) behavioral objectives.

5-Determining the number of test items: It has been agreed on (40) test items for a second course book, represented by three chapters considered suitable for the examination through consultation with referees and teachers.

6-Preparing a specification table: a table consisting of two dimensions, one of which represents content and the other represents levels of goals and works on linking content items, The goals to be achieved, their levels, and their fields are different.

*A researcher prepared a test map as shown in Table (4).

Table (4)

Table of achievement test specifications (specification table)

Number of paragraphs	Cognitive domain levels				The relative weight of the class	THE NUMBER OF quotas specified	Chapter title	Chapter
	analysis %12	application 27%	understanding %26	remember %35				
16	2	5	4	5	%0.39	16	Season 6	VI
16	2	4	4	6	%0.41	14	Season7	SEVNTH
8	1	2	2	3	%20	8	Season8	VIII
40	5	11	10	14	%100	38	Total	

7-Drafting test paragraphs: (objective) paragraphs were chosen as they are related to the behavioral objectives that were identified according to the levels of (Bloom) in the first four knowledge journals (remember, understand, apply, and analyze), as the number of objective questions is (40).

8- Validity of Test:

A- ValidityofOstensible: To verify the validity, test items were presented with answer instructions, and the key to correct it was presented to a group of arbitrators to judge the apparent validity of the test, and it was modified according to their opinions.

B-Validity of content: A specification table was prepared, and this was also mentioned to verify the test and to ensure the representation of the paragraphs of the content of a study material and behavioral objectives, and therefore a valid test in terms of content and from these previous procedures became an achievement test ready for application.

9-Preparing test instructions: Instructions were formulated for answering test items, which included information about students, the purpose of the test and the number of its items, and not choosing more than one answer for the paragraph.

10-First survey application: An achievement test was applied to a sample of information to ensure the clarity of the test paragraphs and instructions and to determine the necessary time that is sufficient for students to answer all test items, as the number reached (35) scientific students of the fourth grade, and the time it took students to answer for All paragraphs of the test were (48) minutes.

11-A second survey application: After the researcher applied an achievement test on his sample of information and made appropriate adjustments for the test, the test became ready to be applied again for the purpose of conducting statistical analyzes of the test items, as a test was applied on a sample of a statistical analysis of (100) students of fourth grade scientific students.

12-Test correction: intended to set a score that represents the response shown by students to a test. A correction key (0,1) was adopted for the questions of multiple

choice, then the number of correct answers for the two groups was calculated, upper and lower.

Statistical analysis of the paragraphs: After applying a test on a second probing **sample, the following was performed:-**

A. Ease and difficulty coefficient Paragraphs: A law was applied and it was found that it ranges between (0.36-0.60), then the application of the law of the difficulty coefficient of article paragraphs ranged between (0.49-0.72), so it is good, as the paragraphs that range from Its coefficient between (0,80-0,20) is acceptable as indicated by (Odeh, 1998: 297).
B. Paragraph Discrimination Coefficient: Discrimination ranges between (0.27-0.49) and article paragraphs ranging between (0.25-0.37). Whereas, paragraphs of less than (0.25) distinction is considered weak and it is recommended to delete them. (Odeh, 1998: 295).
C. Effectiveness of alternatives to the paragraphs: An equation was used for all test items, and it was found that the coefficients of the effectiveness of alternatives are false negative, since any of these dispersions of the percentage selected by the higher class students is less than the lower class students (Al-Dulaimi and Adnan, 2002: 76).

Reliability: Its value was (0.83), using the Alpha Cronbach equation, which is a good reliability coefficient for non-standardized tests, as it is considered a good test if its reliability coefficient reaches (0.67) or more.

Intuitive thinking scale:

First: Drafting the paragraphs of the Intuitive Thinking Scale: they totaled (40) paragraphs, and (0.1) was approved for correcting it, one for the correct answer and zero for the wrong answer.

Second: The validity of paragraphs: A scale was presented in its initial form with instructions to a group of arbitrators with competence to verify the ostensible truthfulness, and accordingly, paragraphs were kept.

A first exploratory experiment: an intuitive thinking scale was applied to a random sample of (45) students, and it was found through the application that the instructions are understandable and the paragraphs are clear, and the response time on the paragraphs of the scale ranges between (40-50) minutes, i.e. an average of 45 minutes.

A second exploratory experiment: It was applied on (100) students for the purpose of statistical analysis.

Statistical analysis of paragraphs:

First: The strength is discriminatory: The strength was good and it ranged between (37-46) and it indicates a good differentiating force.

Second: The relationship of the paragraph to the total degree of the scale and the field to which it belongs.

By using a t-value to signify the correlation coefficient, it was shown that all the correlation coefficients are significant.

Psychometric properties of intuitive reasoning scale:

Validity of Ostensible: The paragraphs of this scale were presented to a group of experts in the field of education and psychology to express their opinions about the validity of paragraphs, according to what they see with the deletion, addition and

modification of what they deem appropriate. In front of each paragraph there are alternatives: - (valid, Invalid, proposed amendment).

Reliability: Stability was found by applying the (Alpha Cronbach) equation for internal consistency, as the stability coefficient in this way reached (85.0).

Statistical methods: The researcher used appropriate statistical methods, using the statistical package SPSS Issue 23.

The Fourth Chapter.

Research Results.

The results of the research will be presented according to his assumptions as follows:

Results of the first hypothesis: "There are no statistically significant differences between the mean scores of the first experiment group that was studied by applying the Hawkins model and a control group that was studied in the usual way of achievement".

In order to verify the validity of a previous hypothesis, a post-achievement test was applied to an experimental study sample and its control, and the value of (t) was calculated to identify the significance of differences between his experimental group and his control in the achievement test, and the value of (t) was also calculated to identify the significance of differences between the pre and post measurement of the group Try it in an achievement test as shown in the following table:

Table (5) Analysis of variance of one-size-fits-all for research groups students in achievement test

Tabular	Computed value	Arithmetic mean	Student number	Groups
3.2	6.15	32.43	27	Experimental
		25.8	31	Control

It is evident from a previous table that there are statistically significant differences at the level of (0.05) between the mean scores of an experimental group that was studied according to the Hawkins model and its control in a telemetry to test achievement in biology in favor of a first experimental group.

The second hypothesis: There are no statistically significant differences between the mean scores of the first experiment group that was studied by applying the Hawkins model and a control group that was studied in the usual way in the intuitive thinking scale.

Table (6) T-value of the intuitive thinking test

sing	Std. Deviation		**standard deviation**	Mean	**Number**	**Group**
	Calculated	**The spreadsheet**				
Sign	2.06	16.1	6.4	90.6	27	Experimental group 1
			7.3	81.6	31	Control group

It is evident from a previous table that there are statistically significant differences at the level of (0.05) between the mean scores of an experimental group that was studied according to the Hawkins model and its control in a telemetry to test achievement in biology in favor of a first experimental group.

The third hypothesis: There are no statistically significant differences between the mean scores of a second experiment group that was studied by applying the Barman model and a control group that was studied in the usual way of achievement.

Table (7) Analysis of variance of one-size-fits-all for research groups students in achievement test

Tabular	Computed value	Arithmetic mean	Student number	Groups
3.2	6.15	32.42	28	Experimental
		25.8	31	Control

It is evident from a previous table that there are statistically significant differences at the level of (0.05) between the mean scores of the experimental group that were studied according to the Barman model and the control in the post-measurement to test achievement of biology for the benefit of the second experimental group.

Thefourth hypothesis: There are no statistically significant differences between the mean scores of a second experiment group that was studied by applying the Barman model and a control group that was studied in the usual way in the intuitive reasoning test.

Table (8) T-value of the intuitive thinking test

sing	Std. Deviation		**standard deviation**	Mean	**Number**	**Variable**
	calculated	**The spreadsheet**				
Sign	2.06	16.11	6.4	90.62	28	Experimental group 1
			7.5	81.9	31	Control group

It is evident from a previous table that there are statistically significant differences at the level of (0.05) between the mean scores of the experimental group that were studied according to the Barman model and the control in the post-measurement for testing the intuitive thinking scale of biology in favor of a second experimental group.

Interpretation of results:

Results related to the variable of achievement and intuitive thinking in biology for the fourth scientific grade:

Where results related to the intuitive thinking variable presented in previous tables showed the superiority of the experimental group that studied according to Hawkins and Barman models in testing the intuitive thinking in biology compared to the scores of the control group students who studied by the traditional method, which confirms the effectiveness of the two models in increasing their intuitive thinking among fourth grade students Scientific, and the researcher attributed that to the following reasons:

- Numerous educational research and studies confirm the positive and effective impact of new methods, strategies and models, including Hawkins and

Barman, in science education and the current study has proven their effectiveness.

- Hawkins' model facilitates the role of a teacher, and the role of the learner transformed from a mere recipient to a positive element who participates in his class, which is reflected in his activity and enthusiasm for learning, and thus acquires concepts and information and thus develop their thinking intuitively.
- Activating the Barman model of their thinking and helping them to remember previous concepts and linking them to the new concept, thus facilitating the acquisition of a new concept, and the subjects that branch out from it and include the elements. This helps in raising their achievement.

1- Conclusions:

In light of the results of the research, several conclusions were reached, including the following:

A. Both Hawkins and Barman's model are considered effective and have a clear positive effect in raising the level of intuitive thinking and achievement among students.
B. Teaching according to Hawkins and Barman's recent models helps enhance learning in biology in general and works to raise students 'achievement and think reflectively and quickly.

2- Recommendations:

In light of the results of previous research, a researcher recommends the following:

A. Applying modern models such as the Hawkins and Barman model in teaching science subjects especially for basic (intermediate) stages of education, due to their effectiveness in acquiring intuitive thinking and raising students' achievement.
B. The necessity to change educational strategies and models followed by teachers, and to adopt modern strategies and models, and global trends in teaching biology to keep pace with global educational development.

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