The Effect of the Lorsbach Model on Developing Sensory Thinking for First-Grade Female Students in Science

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Abstract

Experimental design with two equal groups, and the research sample consisted of Governorate, for the academic year (2023-2024). The researchers adopted an limited to first-grade female students in the city of Mosul, the center of Nineveh of the research, the researchers formulated the null hypothesis. The research was formal achievement of first-grade female students in science. To achieve the goal The current research seeks to find out (the effect of the Lorsbach model on the Steps for using it in the classroom environment teachers on the important of the Lorsbach model and its effectiveness. And and introductory seminars for male and female first-grade primary school General Directorate of Nineveh Education to hold workshops, training courses, including: directing the training and professional development divisions in the researchers presented a number of recommendations to executive agencies, according to the Lorsbach model, and in light of the results and conclusions, the experimental group with The highest arithmetic mean, which was studied between the two groups in the mock achievement test, in favor of the research results showed: the presence of a statistically significant difference reached (74, 0). After processing the data and using the statistical package, the using the equation (Couder - Redchadson - 20), where the reliability coefficient The reliability of the test was confirmed. test in science, consisting of (20) items To measure the dependent variable, The researchers prepared an achievement variables: (the female students' chronological age in months, intelligence level). conducted equivalence between the two research groups with the following control group who will study according to the usual method. The researchers will study according to the Lorsbach model and (34) female students for the (66) female students, with (32) female students for the experimental group who.

Keywords: Lorsbach Model-Formal Collection, Developing Sensory Thinking, Students in Science

INTRODUCTION

Society of the twenty-first century faces many challenges and transformations, including the challenges of rapid changes, accelerating transformations in various areas of life, and the technological revolution (cognitive, information, computer, democracy, environment, energy, engineering, etc.). The current research aims to find out the effect of the Lorsbach model on the formal achievement of first-grade female students in science.

First: Problem of the Research

In light of this, the usual traditional methods, means and tools are no longer able to keep pace with these challenges, developments and transformations, nor contribute to development in its various forms in an effective manner (Zaytoun,2007: 19), and began teaching science, like other subjects, relying on memorizing and retrieving information, and thus The extent to which students develop sensory thinking depends on the extent to which they memorize and retrieve information for the purpose of the exam only, and then forget it so that it is of no use later. In addition, the specialization of teachers in the primary stage is general, so the teacher is not proficient in the scientific subject in a good way that qualifies him to teach such a subject. task in a way More serious and effective, and lack of attention to the practical application of information does not help the teacher develop scientific skills (Al-Huwaidi,2008: 19), and based on the aforementioned dimensions of the problem and the researcher's feeling about it, the researcher decided to use A model that is compatible with the educational reality in our schools on the one hand, and the educational needs of students in science on the other hand. Accordingly, the researcher chose the Lorsbach model, which may contribute to achieving more effective learning of science and alleviating students’ learning difficulties by transforming them from a passive state to active movement. Through their practice of activities and thinking processes, their acquisition of
experiences in an effective manner, and the formation of their personality in an integrated manner. According to this, the problem of the current study was represented in answering the following question:

(What is the impact of the Lorsbach model on developing sensory thinking for first-year primary school students in science?)

Second: The Importance of Research Value of Research

The twentieth century witnessed a massive, unprecedented scientific and cognitive revolution that included various fields of human, natural, and applied sciences. It witnessed the birth of new scientific fields that were not known before. Education was not immune to this development, but rather it was one of the most affected and influential fields, as many fields appeared. Among the educational theories and trends that sought to comprehend the enormous volume of science, and to preserve this human heritage by transmitting it to successive generations, to develop it on the one hand, and to put it into practice on the other hand, and to achieve this, it worked to benefit from all the theories and applications that science had produced. (Frigat, 2014: 17: 18). Education plays an important role in providing more flexibility in the educational process and emphasis on the self-scientific growth of individuals to continue raising the scientific level, keep pace with the requirements of the modern era, and work to prepare the specialized learner familiar with all developments in life. (Salem, 2007: 38). Learning is a set of knowledge and skills presented to the learner, and the learner makes an effort to learn or gain them. Her gain is determined by the difference between the starting state in the situation and the finishing state. If this difference in performance increases, this guarantees learning to improve or increase performance. The intent of the learning process is to bring about a change in performance and apparent response, and learning usually takes place under the influence of experience, practice, and training, and has the characteristic of relative permanence (Al-Saadi, 2020: 13). A teacher must have the mental ability to enable him to help his students develop mentally. The way to do this is for the teacher to have an abundance of scientific material, that is, to know what he is teaching to the fullest extent, to have the best understanding of the subject of his specialization, to be fully capable of understanding the material that was overlooked for him, and to have a strong desire to expand and update his knowledge, and be flexible. Thinking involves studying and researching the branches of knowledge that he teaches, and is familiar with modern methods of education. The teacher also needs to know the methods and means of education, and this knowledge includes theoretical information related to planning education, motivating students and exciting them for learning, and how to deliver content. The academic program uses effective methods and specific means that facilitate student learning, as well as knowledge of classroom management, evaluating students’ learning, and directing them to further learning. (Al-Asadi et al., 2016: 17). And that teaching models are given

We have the opportunity to be more clear and more precise about the implicit learning that students receive from education as a whole. It enables us to expand the ways of construction (constructing experience), and thus expand the students’ mental experience in school. The teaching model was not designed to achieve a degree of quality in achieving knowledge in the minds of students, but rather was designed to teach students how to think and learn in various ways. (olive, 2003: 238). Teaching science at any academic level is... It paves the way for study at a later stage. This means preparing specialized cadres in science who contribute to designing plans for the country’s development, employing scientific information to solve the individual’s daily and future problems, creating positive feelings towards science, accustoming new youth to scientific thinking in facing life, and imparting and developing scientific trends such as objectivity, accuracy, scientific honesty, and so on. Students’ skills grow and crystallize through teaching them science, accustoming them to scientific thinking such as deduction, analysis, and hypothesis, and acquiring skills in holding dissecting tools, connecting laboratory equipment, measuring masses, and recording weights and temperatures. (Samurai, 20013: 48). The importance of collection lies

Academic achievement in the educational process because it is treated as a standard for measuring the efficiency of the educational process and the extent of its efficiency in developing the various talents and abilities available in society. Academic achievement is when it reaches its level of achievement, as it instills confidence in oneself. (Rabeh and Laour, 2014: 22). The Lorsbach model is one of the constructivist learning models that Prepared by
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the British scientist (It consists of five educational stages (the attention-getting stage and the Anthony Lorsbach stage).

The investigation stage, the explanation stage, the concept expansion stage, and the evaluation stage). (Zayer et al., 2014: 392).

From the above, the importance of the current research is evident in the following points:

The necessity of using modern educational models that emphasize that the student is the focus of the teaching and learning process

The importance and novelty of the topic, as there is no study that has dealt with the Lorsbach model in formal acquisition

the state of Iraq, according to the researcher's knowledge.

The results of the current study may provide evidence of the effectiveness of the Lorsbach model and its impact on formal achievement, including:

It reflects positively on students’ attitudes towards science.

Directing the attention of planners of teacher preparation and training programs in general, and science teachers in particular in the State of Iraq to

Teaching models in general, and the Lorsbach model in particular to benefit from in this.

Third: The research goal and hypothesis Aim and Hypothesis of the Research

1 - Research objective:-

The current research aims to find out the effect of the Lorsbach model on the formal achievement of first-grade female students in science.

2 - Research hypothesis:

To verify the research objective, the researcher formulated the following null hypothesis:

There is no statistically significant difference at the significance level (0.05) between the average grades of the group’s students

The experimental group, which was studied according to the Lorsbach model, and the average grades of the students of the control group, which was studied according to the usual method of developing sensory thinking.

Fourth: Limits of Research Limitation of the Research

The current research is determined by the following:

Human limits The research is limited to first-grade primary school students in government schools affiliated with the directorate Nineveh education.

Temporal boundaries: The first semester of the academic year (2023 - 2024).

Spatial boundaries: Government primary schools affiliated with the Nineveh Education Directorate.

Scientific frontiers Units one, two, and three of the science textbook issued for first-year primary school students from the Iraqi Ministry of Education, seventh edition of the year (2020).

Fifth: Defining Terminology Determination of Terms

The effect is known by Al-Hariri (2011): A set of methods and procedures used by the teacher to empower students

Of planned and specific educational experiences, and the achievement of educational goals, in a comprehensive and integrated manner to achieve specific goals. (Hariri, 2011: 291)
The researcher defines it practically: It is the result obtained by the students of the experimental group after being exposed to the variable. The independent Lorsbach model is measured by the grades that female students obtain in the science test.

2 - Lorsbach model defined by Zayer (2014): An educational model prepared by the British scientist Anthony Lorsbach in 1997, 2002 from the University of (In the United States of America, he presented a chart explaining the learning cycle consisting of (Illinois).

Five interconnected stages that are not distinct from each other: A. Attention arousal stage b. Investigation phase c. Concept explanation stage d. Expansion stage in explanation. Evaluation stage. (Zaire et al., 2014: 392).

The researcher defines it practically: It consists of steps followed by the teacher in a precise plan to draw successive steps and manage them. The educational process within the classroom when teaching the experimental group to determine the effect of the model on formal achievement among first-grade female students in science subject, consists of interconnected steps that begin (with the stage of arousing attention, then the stage of investigation, then the stage of explaining the concept, then the stage of expanding the explanation, and then the final stage of evaluation). In order to increase the ability to collect images for the longest possible period.

3 - Sensory thinking knew everything that came

Al-Atoum-1 (2007)

“It is one of the simplest forms of thinking, as the individual deals with only what he can see or hear, that is, stimuli. Sensory must accompany the thinking process. This style of thinking depends on sensory-motor synergy towards... Stimuli and situations, giving synergy control over an individual's thinking.”

(Al-Atoum, 2007: p.) 28


“It is the mental process that is used for the purposes of identifying and perceiving the surrounding world based on various sensory stimuli, meaning that the mind depends on the five senses to know things, that is, it is the process of receiving information, interpreting it, selecting it, and then organizing the sensory information.”

(Al-Hayari, 2017: Retrieved from Google) -

4 - Science subject

A set of knowledge and experiences included in the science textbook for the first grade of primary school, approved by the Iraqi Ministry of Education for the academic year 2021.

5 - First grade of primary school:

The researcher defined it procedurally: It is the first grade of primary school in which the researcher applied the experiment to her students to determine the effect of the Lorsbach model and the regular method on formal achievement and to compare the results of the two groups (experimental and control).

RESEARCH METHODOLOGY AND PROCEDURES

First: Research Methodology Research Methodology

The researchers relied on the experimental research methodology because it suits the nature of the research and its objectives.

The experimental research method is considered one of the most accurate research methods in the educational and psychological sciences, as it includes conducting (independent variables) and how they affect the dependent factors (dependent variables) in light of precise control of the variables. (yolk, 2022: 59)
Second: Experimental design

The researchers adopted the experimental design of two equal groups (experimental group and control group) with partial control and post-test, because it is compatible with their research that includes one independent variable (Loersbach model) and one dependent variable (formal achievement), as shown in the diagram below:

<table>
<thead>
<tr>
<th>T</th>
<th>The group</th>
<th>Independent variable</th>
<th>Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Experiment group</td>
<td>Loersbach model</td>
<td>Sensory thinking before and after</td>
</tr>
<tr>
<td>2</td>
<td>Control group</td>
<td>Normal method</td>
<td></td>
</tr>
</tbody>
</table>

Third: The research community and its sample

The current research population is defined as all first-grade female students continuing to study in government primary schools affiliated with the General Directorate of Nineveh Education (Mosul - Center) for the academic year (2023-2024)

As for the research sample, the researchers intentionally chose Zahrat Al-Huda Primary School for Girls and Al-Abed Primary School for Girls located on the left side of the city of Mosul. Division (B) was chosen randomly to be the experimental group in Zahrat Al-Huda Primary School for Girls, and Division (A) to be the control group in the school. Al-Abed Primary School for Girls, as the number of students in the experimental group reached (36) female students, and the number of female students in the control group was (39) female students, and after statistically excluding the female students who failed, the number of female students in the experimental group became (32) and the number in the control group (34).

The students in the control group (34). As shown in Table 1.

Table 1. It indicates the number of individuals in the research sample.

<table>
<thead>
<tr>
<th>Group</th>
<th>Class</th>
<th>Number of female students before exclusion</th>
<th>Number of excluded female students</th>
<th>Number of female students after exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>B</td>
<td>36</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td>Control</td>
<td>A</td>
<td>39</td>
<td>5</td>
<td>34</td>
</tr>
<tr>
<td>Total</td>
<td>B + A</td>
<td>75</td>
<td>9</td>
<td>66</td>
</tr>
</tbody>
</table>

Fourth: Equivalence of the two research groups

Equivalent of Study

The researchers conducted equivalence between the two research groups in a number of variables that may affect the dependent variable, as they equalized the two research groups in variables (chronological age of the female students calculated in months, intelligence test). These are undoubtedly variables that affect the results of the experiment. As shown in Table 2.

Table 2. It shows the results of the t-test for the two research groups on a number of variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>The Group</th>
<th>No.</th>
<th>Arithmetic mean</th>
<th>Standard deviation</th>
<th>T.Test In table</th>
<th>Calculated T</th>
<th>significant difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ test</td>
<td>Experiment</td>
<td>32</td>
<td>17.750</td>
<td>3.262</td>
<td>267.0</td>
<td>200, 2</td>
<td>There is no significant difference</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>34</td>
<td>18.558</td>
<td>5.444</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of students in months</td>
<td>Experiment</td>
<td>32</td>
<td>76.812</td>
<td>5.567</td>
<td>070.3</td>
<td>200, 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>34</td>
<td>77.352</td>
<td>6.266</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of the t-test for two independent samples showed that there were no statistically significant differences at the significance level (05, 0) between the two research groups (experimental and control) and thus they are equivalent in all variables.

Fifth: Requirements for implementing the experiment

Among the requirements for implementing the experiment are the following:

Determine the scientific material
The researchers determined the subject that would be taught to the experimental and control groups:
Formulating behavioral objectives: Behavioral objectives are defined as statements that accurately describe desired educational outcomes. It expresses specific behavioral changes that we expect the student will acquire after completing a unit of study or a specific daily lesson. It is characterized by accuracy and clarity in its meanings and implications, is easy for teachers to measure, and can be achieved within a relatively short period. (Al-Hasnawi, 2019: 87), and in light of the general goals of teaching science and the content of the subject.

For the scientific topics that were identified from the science book for the first grade of primary school, the researchers formulated the behavioral objectives on three levels according to Bloom’s classification, which are (remember, understand, apply). Then the list of behavioral objectives was presented to a group of expert professors in the field of educational and psychological sciences to know their opinions on the validity of formulating behavioral objectives and to verify the validity of the cognitive level for each behavioral objective and the extent of its connection to the scientific subject. It was adopted.

The two researchers established an agreement rate of (80%) or higher as a criterion for accepting the purpose or not, and all of them obtained this percentage and more, in addition to modifying some of them.

Preparing study plans:

What is meant by academic planning is a prior visualization of the school situation with its various procedures that the teacher must plan and implement in a specific period of time to ensure his success in what he plans. It is setting broad outlines and a vision of what he will do. It is also developing the necessary plans to link the means used to achieve the targeted goals. It is also a deliberate attempt. To exploit specific and available resources and capabilities to achieve specific goals and within a specific period of time. Planning processes link goals, capabilities, time, and the means used. (Al-Saadi, 2020: 61)

Since teaching plans are one of the requirements for successful education, the researcher prepared (20) A teaching plan for each group. The plans prepared for the experimental group (a teaching plan according to the Lorsbach model) for teaching general science for the first grade of primary school in light of the content of the prescribed book and behavioral objectives, and plans according to the method followed (usual) for the control group, and the researcher presented a model of each of the plans to a group of experts. And specialists to express their opinions and comments about improving the formulation of plans to ensure the success of the experiment. Some modifications were made to the plan models to make them valid for application to the two research groups (experimental and control).

Sixth: Search Tool

Sensory thinking test:

This test represents the second tool for measuring the second dependent variable of the current research, and after the researcher reviewed a number of previous studies and models for such a test, she did not find one of those tests that was appropriate for her research, whether related to the scientific subject of the science subject or the age level of first-grade primary school students.

Define the purpose of the test:

The aim of the sensory thinking test is to measure the sensory thinking of female students in the research sample in science.

Formulating the test items:
The Effect of the Lorsbach Model on Developing Sensory Thinking for First-Grade Female Students in Science

The researcher formulated a test consisting of (15) objective items, of the multiple-choice type with three alternatives and pairing, distributed among the senses included in sensory thinking, taking into account in the wording of these items that they be. Linguistically sound, appropriate to the students' level, clear and free of ambiguity.

Instructions for Answering the Test

The researcher prepared instructions for answering the Sensory Thinking test items so that they would appear understandable, clear, appropriate, and easy. The instructions included the number of test items, asking each student to read the test items before answering them, choosing the alternative that she deems correct, and writing the name, grade, and branch in the place assigned to them and answer all questions.

Correcting the Test

The researcher developed model answers for all items in the Sensory Reasoning test (Appendix 13). A full score was given for the correct answer for each item in the test, and zero for an answer that was not correct, was left out, or contained an indication of more than one alternative in the item. Thus, the score ranges between (0 - 15). The grades are listed in Appendix (6).

Validity of the test:

For the purpose of verifying the validity of the test and measuring it for the purpose for which it was used, the researcher relied on the apparent honesty. The researcher developed model answers for all the sensory thinking test items (Appendix 13). A full score of one was given for the correct answer for each test item and zero for the incorrect, left out, or non-containing answer. More than one alternative was indicated in the paragraph, so the score ranged between (0 - 15) and the scores in the appendix were (15). This is in order to ensure the clarity of the paragraphs and uncover ambiguous or unclear paragraphs. The researcher presented the test to a committee of arbitrators who are specialists and experts in the field of (teaching methods and educational and psychological sciences) (Appendix 2), for the purpose of verifying the integrity of the paragraphs and their suitability for measuring thinking. Al-Hasay, and Qad, the researcher relied on an agreement rate of (80%) and above of their opinions, and all the experts agreed on all items of the test, and thus the researcher verified the apparent validity of the test.

Exploratory experience

The researcher applied the test to the same survey sample, to test mock achievement, for the purpose of verifying the psychometric properties of the items in the sensory thinking test (difficulty of the items and discriminative power), and to demonstrate the clarity of the test items and instructions, and to calculate the time taken to answer, as the test was administered on Tuesday, corresponding to (11/7). / 2023, and after application, all the test items were clear and easy to answer by the students. The time taken to answer the test items was calculated by determining the finishing time of the first (5) students to answer the test, which was (30) minutes and the last (5) students. It was (50) minutes, and after calculating the average time for the test, it was found to be (40) minutes.

Statistical analysis of test items:

After the researcher applied the test to the survey sample consisting of (100) female students, the answers were corrected and arranged in descending order from highest to lowest, then the upper percentage (27%) was taken and the lower percentage was (27%). Thus, the number of female students in each category reached (27) female students. This is to extract the difficulty of the paragraph and the discriminating power, and it is presented as follows:

Paragraph Difficulty Factor

Determining the level of difficulty of the paragraph is necessary because it shows how the learner performs in the task that the paragraph measures, as well as the general level of learners' performance in each paragraph of the test. It also helps in identifying the paragraphs that are extremely difficult or easy. (Allam, 2006: 11 3)
Therefore, the researcher extracted the difficulty factor using the equation for the difficulty factor, as the difficulty level of the paragraphs ranged between (0.40 - 0.68) and these values are good and acceptable in difficulty based on the spoken percentages (0.20 - 0.80). (Abu Aqeel, 2017: 229) (Appendix 11).

The Discriminatory Power of the Test Items:

The researcher used the discriminatory power equation for the items in the sensory thinking test in order to keep the items with high discrimination and delete the items with low discrimination. It was found that the discriminatory power of the items ranged between (47.0 - 75.0), which is greater than (25, 0) which are considered distinct and acceptable ratios (Al-Nabhan, 2004: 188), as shown in (Appendix 15).

The Reliability of the Sensory Thinking Test:

The stability of the test means the accuracy and consistency of its items in measuring the characteristic to be measured, as it is re-applied to the same individuals and in the same circumstances. (Al-Gharib, 1985: 65).

To calculate the reliability of the sensory thinking test, the researcher applied the test to a second exploratory sample consisting of (25) female students who were selected from members of the original community from (Al-Taqwa Primary Girls) School on Thursday, corresponding to (11/9/2023), using the (Couder- Richardson-20) equation. The reliability coefficient reached (0.78) and is considered a coefficient of good stability, as tests are considered good if their reliability reaches (0.76) or higher (Al-Nabhan, 2004: 24). Thus, all test items were kept, and the test became ready to be applied in its final form to the research sample.

Seventh: Application of the Experiment:

After completing the procedures for the research requirements, the experiment was implemented. It began on Sunday (11/12/2023) and ended on Sunday (1/14/2024). The experiment continued over a period of (8) weeks, and the mock achievement test was applied. The post-test on the experimental and control groups on Tuesday (1/16/2024).

Eighth: Statistical methods: In their study, the researchers used the following statistical methods:

1 - T-test for two independent, unequal samples (t-test).

2 - T-test for two correlated samples.

3 - Paragraph difficulty factor.

4 - Paragraph recognition equation in the mock achievement test.

5 - Equation (Couder-Richardson-20) to calculate stability.

(Lind & others, 2001:385)

(Attiya, 2009: 307)

(Abu Aqeel, 2017: 227)

(Al-Shujairi and Al-Zuhairi, 2022: 273)

(Al-Nabhan, 2004: 262)

Chi-square test.

Eta square equation. Effect size (η)2

(Van Marte & Gilbreath, 1980: 313)

(Abu Aqeel, 2017: 356)
PRESENTATION AND DISCUSSION OF RESULTS

First: Show Results:

The results related to the research hypothesis, which stipulate the following: (There is no statistically significant difference at level connotation (0.05) between the average scores of the students in the experimental group who studied according to the Lorsbach model,

And the average grades of the students in the control group who studied in the usual way in dimensional sensory thinking in the science subject.

To verify the validity of this hypothesis, the researcher used the t-test (For two independent samples, the t-test indicated

The results showed that there was a difference between the average grades of the students in the experimental group, which was (687.14) and average grades The students in the control group, who reached (588.11), the calculated T-value reached (00.9) greater than

The tabulated value amounted to (00. 2) At a significance level of (0.05) and a degree of freedom (3).

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>Arithmetic mean</th>
<th>Standard deviation</th>
<th>T.test</th>
<th>Degree of freedom</th>
<th>significant difference 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment group</td>
<td>32</td>
<td>876.14</td>
<td>0.820</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control group</td>
<td>34</td>
<td>865.11</td>
<td>1.777</td>
<td>9</td>
<td>2,00</td>
<td>There is no significant difference</td>
</tr>
</tbody>
</table>

Which indicates that the students of the experimental group were superior to the control group who studied the subject in accordance with the usual method, and therefore the second null hypothesis is rejected, and Table (3) shows this.

The researcher attributes this result to the following reasons:

The Lorsbach model provided some comfort and reassurance for the stubbornness of the students and gave them the opportunity to express their feelings. Ideas.

Helping the Lorsbach model attract students' attention, motivate them towards science, and enhance the learning process They have it through the students' effective and active participation and integration in the lesson compared to the usual method, as it does not allow the students to interact and build their knowledge on their own.

Teaching using the Lorsbach model gave the students an opportunity to express everything that was going on in their minds and what They have previous information about the lesson and are encouraged to participate in the lesson and the continuous interaction between them and the researcher shows them how to implement the steps of the model, and this helped raise their level of sensory thinking.

Measuring the Size of the Effect

Using the Eta square equation, it was found that the value of the effect size was (0.55), which is an appropriate value to explain the size of the ether and the (large) amount that the independent variable (Lorsabash model) caused in the dependent variable (sensory thinking) and for the benefit of the experimental group, and Table (4) shows this.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>value of effect 2 $\eta^2$</th>
<th>The amount of effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorsbach model</td>
<td>Sensory thinking</td>
<td>0.55</td>
<td>big</td>
</tr>
</tbody>
</table>
CONCLUSIONS, RECOMMENDATIONS, AND PROPOSALS

First: Conclusions: In light of the research results, the researchers reached the following conclusions: 1 - The Lorsbach model has a significant impact on the achievement of first-grade female students in science. 2 - The Lorsbach model made the science lesson full of activity, vitality, and excitement, far from boredom and stagnation, which led to the students' acceptance and understanding of the material.

Second: Recommendations: In light of the research results, the researchers recommended the following:

- Directing the training and professional development divisions in the General Directorate of Nineveh Education to hold workshops, training courses, and introductory seminars for first-grade primary school teachers on the importance of the Lorsbach model, its effectiveness, and the steps for using it in the classroom environment.

- Adopting the Lorsbach educational model in teaching science at the primary level.

Third: Suggestions: To complement the current study, the researchers suggest conducting the following future studies:

- The effect of the Lorsbach model on the acquisition of scientific concepts by fifth-grade female students and the development of their deductive thinking skills.

- The effectiveness of the Lorsbach model in the achievement of female first-year intermediate students and the development of their deductive thinking.

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The Effect of the Lorschbach Model on Developing Sensory Thinking for First-Grade Female Students in Science


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