

## Article

# The Impact of the D.U.I.T Model on the achievement of Elementary Fifth Grade Pupils in their Science and Future Thinking

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**Abstract:** The research aims to identify the effect of the D.U.I.T model on the achievement of fifth-grade primary school students in science and their future thinking. The research sample included two groups, one of which was the experimental group, with (33) students, and the other was the control group, with (31) students. Using the random drawing method, the researcher chose a school from the research community. The researcher adopted the experimental research method as a method for conducting his research, which includes an independent variable (the D.U.I.T model) and two dependent variables (academic achievement, future thinking). The researcher chose the experimental design to control the research variables. Before starting to apply the experiment, the researcher equalized the two research groups in order to obtain accurate results with the following variables: (chronological age calculated in months, previous achievement of students, and the Daniels Intelligence Test, Future Thinking Test). After conducting the equivalence between the two research groups, the researcher prepared the application requirements of plans, goals, and tests for the two research groups. After completing the application of the experiment, the researcher applied his research tools. On the two research groups, as the researcher obtained data for the two research groups, as this data was processed statistically using the SPSS program; as the results showed the superiority of the students of the experimental group over the students of the control group according to the D.U.I.T model in academic achievement and future thinking.

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## 1. Introduction

### Research Problem

Primary is an essential and important stage in pupils' lives, and that its implications may affect the end result of learning, including educational achievement. The low levels of pupils in science for the fifth grade have been observed in recent years. Primary schoolchildren have poor attainment of science. The researcher noted this by familiarizing himself with a number of studies on the curricula and methods of teaching science in general and at the primary level in a particular way. This problem has preoccupied educators and educators as it cannot be overlooked.

Many recent Iraqi studies and research have indicated a decrease in students' attainment of science at the primary level, including the study (Wes and Ahmed, 2020)

and the study (Al-Jabouri, 2023). They emphasized that the usual teaching method used to teach science was characterized by throwing, leading and controlling the teacher, receiving, negativity and submission by the pupil.

Above, the researcher found that there was a decrease in the attainment level of elementary fifth graders in science as well as a weakness in future thinking confirmed by (Al-Khafaji, 2019) study . Furthermore, their teaching strategies do not foster future thinking, so the researcher thought about applying the D.U.I.T. model to science education in order to help students improve both their future thinking and scientific educational attainment. This created a challenge for the researcher to respond to the following question: The impact of the D.U.I.T model on the achievement of elementary fifth grade pupils in the subject of science and future thinking?)

#### **The importance of the researcher:**

The age in which we live is the age of progress and advancement and the development of nations in the field of technology and science. Our time is characterized by rapid and dramatic changes and developments in scientific knowledge and its applications. Science and its applications are accompanied by contemporary society and are incorporated in all different sectors of social, industrial, economic, educational and health life. By applying its principles, theories and laws in modern technical discoveries and inventories for the sake of human happiness and well-being (Yemen, 2022:45).

Modern education is not limited to the transfer of scientific knowledge and information to pupils but aims to develop and integrate all aspects of their personalities. The main objective of the educational process is to prepare the pupil so that he or she can interact with his or her environment and society in order to drive progress (El Bawie, 2022:47).

The nature of teaching science is different from that of teaching other subjects. Science depends on involving pupils in scientific activities. They practise a range of science processes such as prediction, conclusion, observation, etc. All these and other matters require the science teacher to use multiple and varied teaching methods and methods (Al-Jabouri, 2022:58).

The D.U.I.T model is a model that develops motivation and excitement among students in new learning by researching their past experiences to discover the relationships between them and new experience And that seems obvious when we address a phenomenon to compare it to another familiar phenomenon, It brings together familiar and new concepts to become aware of students through the connection they have found between them and the similar process would be to link two concepts with the same level of difficulty and clarify the elements common to them, The first concept is familiar and the second is uncommon, and includes a model (D.U.I.T) six steps, namely (introduction of the target concept, mention of the underlying concept of the pupil's knowledge inventory, identification of similar features in the underlying and targeted concepts, matching similar and different features between the corresponding areas, reference to similar deficiencies) (Mesoudi and Huda, 2023:123).

The importance of research also comes from the importance of educational achievement because educational achievement is one of the most important educational products. Education is one of the aims of teaching because of its importance in the pupil's life. In the field of education, achievement is an important criterion whereby students progress in study and transfer them from one class to another, as well as their distribution in different education disciplines or admission to their colleges or universities of higher education, as well as achievement for most educational decisions. (Methodology and management) in education and contributes to increasing the ability to retain information because it makes the study more effective (Croissant, 2020:158).

Future thinking or so-called forward-looking thinking is based on the processes of mental openness and acceptance, and therefore it welcomes the many views and alternatives when confronting problems that require solutions and decision-making,

making a great effort, relying more on intuition than on mathematical mental reasoning, and having a tendency to trust others, and not on open grounds (Alhafi, 2020:59).

Based on the foregoing, the importance of research can be summarized in the following points:

1. The importance of education as the first factor in the world's scientific and technical development.
2. The importance of science as an important subject of study, as it contains many abstract scientific concepts.
3. The importance of a model strategy (D.U.I.T) as it helps the pupil raise their awareness and hold vision and reflection when thinking.
4. The importance of achievement as the criterion by which pupils' progress in schooling is measured.
5. The importance of future thinking as it may help 5th grade primary pupils solve future problems facing them in future life situations.

**The researcher's objective and hypotheses:**

The objective of this investigation is to determine the influence of the D.U.I.T. model on the academic performance of fifth-grade students in the areas of science and future thinking. In order to accomplish the researcher's objective, the researcher developed the subsequent two zero hypotheses:

1. No statistically significant difference exists at the indicative level (0.05) between the average scores of pupils in the experimental group studying science via the D.U.I.T model and those in the control group studying the same subject through the conventional method, as assessed by the achievement test designed for this research.
2. No statistically significant difference exists at the indicative level (0.05) between the average grades of pupils in the experimental group studying science via the D.U.I.T model and those in the control group studying the same subject through the conventional method, as measured by the future thinking assessment designed for this research.

**Fourth: The limits of the researcher: The present researcher is defined by:**

1. Spatial boundaries: General Directorate of Qadisiyah Education.
2. Time limits: First semester of the school year (2024-2025).
3. Human boundaries: pupils in the fifth grade.
4. Cognitive Limits: Science Subject for Grade 5 Primary.

**Definition of terms:**

1. The D.U.I.T model is known as:
  - a) (Fatlawi, 2022): "A modern method of teaching helps the pupil to move from sensory knowledge to imaginary knowledge and also broadens the individual's mindset" (Fatlawi, 2022:14).
  - b) Procedural definition: A model followed by the researcher to teach the students of the experimental group in science and know its impact on their attainment by identifying similar features and identifying differences and future thinking.
2. Academic achievement:
  - a) (Yusuf, 2020): "The skill set and experience obtained by the pupil and developed during the course of study subjects, which is usually evidenced by test scores or grades allocated by teachers or both" (Yusuf, 2020:32).
  - b) Procedural definition: The amount of information obtained by the fifth grade primary students in the subjects of science as measured by the grades obtained in the researcher's examination for this purpose.

### 3. Future Thinking He Knew:

- a) (Ibrahim and Others, 2021): "A set of skills that enable the learner to look ahead through appropriate planning, forecasting and decision-making processes" (Ibrahim and others, 2021:47).
- b) Procedural definition: A mental activity practised by the fifth grade primary pupils (research sample) through a set of skills (prediction, forecasting, visualization and solving future problems) measured by the overall degree of the pupils in the future thinking scale, which the researcher prepared for this purpose.

## 2. Materials and Methods

### Theoretical framework and previous studies

#### **Constructive Theory:**

Many modern philosophies have emerged, each of which is the basis for teaching methods adopted in the educational process. A "constructive philosophy" that enables students to retain the fundamentals of knowledge in their memory, thereby establishing a solid scientific foundation. This knowledge is then applied to the comprehension of the surrounding phenomena and the resolution of life's challenges. The educational-learning process is centered around the students, who are the focal point of their own knowledge structure, as a result of thought-provoking educational attitudes. Thus, it looks at students as building mental images of the world around them and these mental images in turn benefit in the light of their adaptation of experiences. Learning is therefore a process of adaptation in which the pupil's conceptual structure is constantly rebuilt as it retains a wide range of ideas and experiences, It is based on the premise that students are not white pages on which the teacher says what he wants, but they have preconceived ideas and knowledge to which the new knowledge relates. pupils ", which may be compatible with and incorporate into pupils' cognitive structure and may differ from them, need to modify or add linking previous learning to subsequent learning (Al-Samuel, 2022:157).

#### **Model (D.U.I.T):**

DIOT cited the "TWA" model developed on the basis of theoretical considerations and empirical results on analogue education and analytical studies on the use of analogies in physics books and includes a range of mental processes, providing both pupils and teachers with a general structure of the steps to be followed in adopting this educational model and how these steps are taken and perceived in the main phenomenon and the model actively develops students' cognitive schemes if analogue education is realistically used, The model enables students to understand the similar provided to them as in their teachers' mind The model also enables the teacher to ensure that students' perception of the true similarities is his or her own. (Especially, 2023:147) It is clear from the foregoing that the analogue D.U.I.T model replaces pupils' familiar ideas with unfamiliar ones, so it is an effective means of education because it provides sensory perception of abstract information and simultaneously builds new and easily assimilated information (George, 2022:14).

Thus, it breaks the routine of the traditional educational process, which depends on the teacher as a vector of information and the centrepiece of the educational process, and makes the pupil only a recipient and neglect without his role, also has no ability to form his personality and develop his mental, skilled and emotional abilities, as well as make the classroom environment boring that does not contain excitement and suspense, which are important to attract students' attention and increase their acceptability to learning. education ", thus making it an effective and active component and increasing its resilience to new ideas, making it central to the educational process, creating social relationships among students and knowing how to adapt to the environment in which it lives (Sera, 2023:15).

**Steps of the form (D.U.I.T):**

1. Introduction of the target concept: How to harmonize topics is briefly explained, to introduce the concept to be presented
2. Remember the basic concept from the pupil's cognitive inventory: retrieve some information from the pupil's memory by having some scientific discussion to indicate the similarity between new and previous knowledge.
3. Comparing similar and different features between the two similar areas: comparing the similarities between the two concepts and then highlighting the differences between them.
4. Reference to similar shortcomings: The teacher discusses his pupils in order to ensure that they do not have misconceptions or unacceptable perceptions of the target concept and if he finds it, seeks to correct it.
5. Conclusions: The teacher concludes with what has been learned about the new concept compared to the old one. (Al Obaidi, 2023:148)

**Academic achievement:**

Numerous specialist scientists have taken a wide range of approaches to the idea of educational achievement. These approaches have been taken in a variety of different ways. This concept's link to the idea of education is perhaps the most significant tendency that has emerged in the process of defining this concept. There are a lot of definitions that are supplied in this approach, one of which being the definition that Nasrallah has provided. According to Nasrallah (2020:136), achievement is defined as the degree of acquisition or level of success that an individual has in a certain subject, field of education, or training. Other definitions of achievement include success in a particular field of study. The purpose of the examinations that are given to students by the teacher throughout the course of the school year is to evaluate the students' academic performance or their level of academic achievement.

**Future thinking**

Interest in the future dates back to the earliest beginnings of humanity's aspiration for comprehensive knowledge of the universe, its mysteries and its secrets. The primitive human being observed the manifestations, terrain, earthquakes and movement of its planets, and the wonders of the animal and plant, and then he noticed himself finding a space full of questions that crowded and accumulated. As time progresses and goes beyond its experiences with nature, and from moments of consciousness and reflection, it moves towards itself to compose and link recurring events and phenomena to produce new results. But he remained puzzled by the unknown future, which he felt might be raided by new developments. And then he finds a way out of it, and this thinking and suffering has been an incessant fantasy nightmare. And he thought that he had to stop and study it, and he also thought that his efforts and glories and what he establishes today might be broken tomorrow. And so he exhausted his inner powers and lived a state of anticipation, caution and caution. He then searched for insurance methods and plans for his future (Razouqi, 2019:132).

**Future thinking skills:**

1. Future planning: It means that the learner can see that he or she is able to develop structured plans for the future in general, whether they are plans for his or her future, plans for the work of an enterprise or a societal or global issue.
2. Future prediction: It means that a learner is able to develop predictions, expectations, prospects, knowledge and guesses about what is expected to happen in the future, and that these different intellectual products have creative characteristics such as fluency in the sense of producing multiple and complex predictions about the idea of what is expected, flexibility, namely diversity, authenticity and meaning to come up with new predictions.

3. **Future Scenario Development:** This dimension is for the learner to see that he or she can formulate a number of sequential scenes for anticipating a particular event in the future. And this scene is expressed in a set of written words, or through mental maps or their development and expression through the conceptual map and that the learner has sufficient communication skills to write and explain the scenario and make it clear to others.
4. **Future imagination:** This dimension means an individual's ability to think outside the ordinary setting, the ability to think in depth without controls or boundaries with a view to reaching extraordinary predictions, expectations and guesses, and to see the learner as capable of thinking outside the limits of the present time and going beyond the old time.
5. **Assessment of the future perspective:** This dimension means that the learner sees that he or she can make correct judgments on his or her future thinking, assessing his or her vision and predictions for future expectations (Saada, 2019:158).

### Second Axis: Previous studies:

After familiarizing the researcher with previous studies and literature, the researcher found no study on the D.U.I.T model as an independent variable, but rather a previous study on future thinking as a dependent variable:

*Zaidi Study (2022)*

The effectiveness of Becks' strategy in achieving female fourth graders and their future thinking in physics). The study was conducted in Iraq. The study measured the effectiveness of Becks' strategy in achieving fourth-graders and their future thinking in physics.

In order to achieve the researcher's objectives and hypotheses, the researcher adopted an experimental design located in the field of partially adjusted experimental designs for the remote test of academic achievement and future thinking of the two research groups and the researcher identified the course to be studied during the five-chapter trial period of the fourth grade physics book, The researcher used appropriate statistical means of research. In the light of the results of the research, the researcher found the superiority of the pilot group's students over those of the control group.

### Research curriculum and procedures:

- 1) **Research curriculum:** The experimental curriculum is how a researcher identifies and controls various circumstances and variables that appear in the investigation of information relevant to a phenomenon as well as the control and control of such conditions and variables (Alsaneh, 2018:198); and follow Experimental curriculum researcher to achieve research goal.
- 2) **Experimental design:** Choosing an experimental design is crucial for the researcher. It is beneficial for the researcher to be aware of the factors that are influencing the experiment in order to understand the situation and the actions being taken. The present study comprises three variables: one is independent and is represented by the D.U.I.T. model, while the other two variables (achievement and Forward Thinking) are dependent. The experimental design that the researcher has selected is partially modified, as illustrated in the form (1).

Shape 1. Experimental design

| Research tool               | Dependent variable     | Independent variable | Group        |
|-----------------------------|------------------------|----------------------|--------------|
| Educational attainment test | Educational attainment | D.U.I.T Form         | Experimental |
| +                           | +                      | Usual way            | Control      |
|                             | Forward thinking       |                      |              |

Measure of forward  
thinking

### Second: Research society and its sample:

- 1) Research society: The morning elementary schools for males under the Directorate of Qadisiyah Education are the sole focus of the current research community. In order to identify elementary schools for males with two or more divisions, the researcher visited the Directorate General of Qadisiyah Education.
- 2) Search Sample: The search sample is divided into:
  - a) School sample: The researcher randomly selected the school (simple draw) from among the community schools as a whole to conduct his research on it.
  - b) Pupil Sample: After the researcher chose the school to apply the experiment, the researcher visited the selected school, found it contained two divisions, and reached the number of pupils in the two divisions (66) 34 pupils in Division A who represented the experimental group that will study science according to the D.U.I.T model and (32) pupils in Division (b) who represented the control group that would study the same subject in the usual manner, and the two pupils who failed were excluded as shown in Table (1).

**Table 1.** Distribution of the Research's sample to the experimental group and control before and after exclusion

| Number of students |          |                  | Group        | T |
|--------------------|----------|------------------|--------------|---|
| After exclusion    | Excluded | Before exclusion |              |   |
| 33                 | 1        | 34               | Experimental | 1 |
| 31                 | 1        | 32               | Control      | 2 |
| 64                 | 2        | 66               | Total        |   |

### Parity of the two research groups:

The researcher guaranteed parity with the following variables: (age of pupils computed by months, previous educational achievement, previous information, intelligence test, measure of future thinking), and a table listing the aforementioned equivalencies:

**Table 2.** Parity of research groups in some variables

| Statistical significance | T value |            | Free degree | Standard deviation | Arithmetic average | Number | Group        | Variable                      |
|--------------------------|---------|------------|-------------|--------------------|--------------------|--------|--------------|-------------------------------|
|                          | Tabular | Calculated |             |                    |                    |        |              |                               |
| No significance          | 2.000   | 0.958      | 62          | 5.261              | 127.067            | 33     | Experimental | Chronological age             |
|                          |         |            |             | 5.337              | 126.849            | 31     | Control      |                               |
|                          | 0.747   | 0.747      | 62          | 3.517              | 10.473             | 33     | Experimental | Students previous achievement |
|                          |         |            |             | 3.650              | 10.997             | 31     | Control      |                               |
|                          | 0.853   | 0.853      | 62          | 4.144              | 19.471             | 33     | Experimental | IQ test                       |
|                          |         |            |             | 4.617              | 18.965             | 31     | Control      |                               |
|                          | 0.697   | 0.697      | 62          | 7.814              | 57.628             | 33     | Experimental | Forward thinking test         |
|                          |         |            |             | 8.006              | 55.995             | 31     | Control      |                               |

### Control of extraneous variables:

Control of all extraneous variables that impact the experience, such as the duration of the experiment, physical factors, scientific material, researcher's requirements, and classes: The two research groups adhered to the prescribed quotas for science, which were four portions per division per week, and the distribution of the school department for quotas, as illustrated in the following table :

**Table 3.** Weekly classes for pupils of two research groups

| Time of classes | Class Time  | Research groups | Day       |
|-----------------|-------------|-----------------|-----------|
| Am              | 8:40 – 8:00 | Control         | Sunday    |
|                 | 9:30 - 8:50 | Experimental    |           |
| Pm              | 1:40 - 1:00 | Experimental    | Tuesday   |
|                 | 2:25 - 1:45 | Control         |           |
| Pm              | 1:40 - 1:00 | Experimental    | Wednesday |
|                 | 2:25 - 1:45 | Control         |           |
| Pm              | 1:40 - 1:00 | Experimental    | Thursday  |
|                 | 2:25 - 1:45 | Control         |           |

### Fifth: The requirements of the researcher:

Before applying the experiment, the basic requirements of the experiment must be prepared:

1. Identification of scientific material: During the course of the experiment, the researcher was responsible for identifying the scientific material that could be studied by the students who were a part of both of the research groups. There were two sections of the science book for the fifth grade in primary school, which was written by Mohammed Kassem Aziz and his colleagues and was titled T5, 2024. Additionally, there was a table (4) that demonstrated the following:

**Table 4.** Subject to be taught during the duration of the experiment

| Page | Lesson  | Chapter                                    | Unit                                |
|------|---|--|-------------------------------------|
| 18   | Lesson 1: Floral Plants                             | First: Floral Plants and Floral Plants     | First: Classification and diversity |
| 24   | Lesson 2: Non Floral plants                         |  |                                     |
| 34   | Lesson 1: Vertebral Animals                         | Second: Vertebral and Invertebrate Animals | Second: Human Body and Health       |
| 42   | Lesson 2: Invertebrate Animals                      |  |                                     |
| 54   | Lesson 1: Circulation Device and Health             | Third: Rotation and Breathing Device       | Second: Human Body and Health       |
| 60   | Lesson 2: Respirator and Health                     |  |                                     |
| 70   | Lesson 1: digestive system and health               | Fourth: Digestive and urinary system       | Third: Article                      |
| 76   | Lesson 2: Urinary system and its health             |  |                                     |
| 88   | Lesson 1: Elements and Types                        | Fifth: Elements                            | Third: Article                      |
| 94   | Lesson 2: Common elements and their characteristics |  |                                     |
| 106  | Lesson 1: Chemical compounds and their types        | Sixth: Vehicles and mixtures               |                                     |
| 112  | Lesson 2: Mixtures and their types                  |  |                                     |

### Formulation of behavioral objectives:

Based on the general objectives and the content of the material to be studied in the experiment, the researcher (175) developed a behavioral purpose that was distributed among the first three levels in Bloom's classification: The researcher presented the course



content and the methods of instruction to a group of education professionals in order to confirm its validity and accomplish the course's requirements (recollection, understanding, application). The arbitrators' responses were analyzed, and some of the objectives were modified in accordance with their observations and opinions, as their value was determined. Kai Square (c2) The validity of all behavioral purposes was demonstrated by comparing them to the tabular value for each purpose. All of the purposes were adopted and maintained in their final form, as per the expert and specialist opinions. Seventy-five A behavioral objective, specifically (69) the target of the level of recollection, (58) the level of assimilation, (48) the level of application, and (5) a table that illustrates this.

**Table 5.** Number of Behavioral targets in the first three levels of Bloom classification

| Total | Applying | Absorptive | Remembering | Chapter   | Unit   | T |
|-------|----------|------------|-------------|-----------|--------|---|
| 34    | 8        | 12         | 14          | Chapter 1 | First  | 1 |
| 25    | 6        | 7          | 12          | Chapter 2 |        | 2 |
| 30    | 9        | 10         | 11          | Chapter 3 | Second | 3 |
| 27    | 8        | 9          | 10          | Chapter 4 |        | 4 |
| 34    | 9        | 12         | 13          | Chapter 5 | Third  | 5 |
| 25    | 8        | 8          | 9           | Chapter 6 |        | 6 |
| 175   | 48       | 58         | 69          | Total     |        |   |

#### **Preparation of teaching plans:**

In order to improve the formulation of these plans and make them sound to ensure the success of the experience, the researcher prepared teaching plans for the scientific subjects to be studied during the experiment based on the written book's content, the behavioral objectives that were developed, and the D.U.I.T model for students in the experimental group and students in the control group. The researcher also presented two modular plans to a group of education professionals and their teaching methods in order to get their opinions, observations, and suggestions. Based on the arbitrators' statement, some necessary adjustments have been made and are prepared for implementation.

#### **Research tools:**

The following is a breakdown of the tools' preparation:

First, I follow the researcher to build a science test for the fifth grade primary and according to the following steps:

1. Determining the objective of the test: The objective of the attainment test is to measure the attainment of elementary fifth grade pupils (researcher's sample) in the subject of science.
2. Quantifying the number and type of test paragraphs: The researcher identified the test paragraphs with 30 substantive test type paragraphs.
3. Preparation of the specification table: The researcher prepared the specification table for the collection test, and table (6) shows this:

**Table 6.** Specification table for the collectible testing

| Total<br>%100 | Percentage of Behavioural targets |                      |                    | Relative<br>importance | Number<br>of<br>pages | Chapters     |
|---------------|-----------------------------------|----------------------|--------------------|------------------------|-----------------------|--------------|
|               | Applying<br>%28                   | Understanding<br>%33 | Remembering<br>%39 |                        |                       |              |
| 5             | 1                                 | 2                    | 2                  | %17                    | 13                    | Chapter<br>1 |
| 6             | 2                                 | 2                    | 2                  | %20                    | 15                    | Chapter<br>2 |

|    |   |    |    |      |    |              |
|----|---|----|----|------|----|--------------|
| 5  | 1 | 2  | 2  | %16  | 12 | Chapter<br>3 |
| 5  | 1 | 2  | 2  | %19  | 14 | Chapter<br>4 |
| 4  | 1 | 1  | 2  | %15  | 11 | Chapter<br>5 |
| 5  | 1 | 2  | 2  | %13  | 10 | Chapter<br>6 |
| 30 | 7 | 11 | 12 | %100 | 75 | Total        |

#### **Formulation of test paragraphs:**

The researcher (30) has prepared a survey test paragraph, all of which is of a multi-choice type. In preparing the survey test paragraphs, the researcher has taken into account the following observations: (the test paragraphs are clear and specific, making each paragraph measure a specific and clear objective).

#### **Response and Correction Instructions for Achievement Test Paragraphs:**

The researcher prepared the test in order to obtain good and accurate results because understanding the question is half the answer. As a result, he prepared a number of instructions that were developed prior to the test that indicated the method of answering the paragraphs. Additionally, the researcher developed a key for correction of the substantive paragraphs (multiple selection), with the goal of achieving the highest possible grade as a whole (30) degree and the lowest possible grade (zero).

#### **Sincerity Test: To ensure the sincerity of the attainment test, the researcher adopted two types of sincerity:**

- A. The researcher gave the achievement exam to a group of education experts and science teaching techniques, along with an attachment to the behavioral objectives and specifications table. This was done in an attempt to establish the researcher's credibility. In light of their comments and ideas, the paragraphs or alternatives that needed to be modified were modified, and the results demonstrated that all of the test paragraphs were legitimate; hence, the thirty test paragraphs were kept.
- B. Content authenticity: The specifications table is employed to guarantee that the test paragraphs are comprehensive and reflective of academic content.

#### **Exploratory application of the test: The test was applied in two phases:**

- A. During the initial phase of the exploratory application, the test was administered to a group of students who were in the fifth grade of elementary school. The total number of students was thirty. The objective of the test was to determine the level of comprehension and clarity of the test paragraphs among the students, as well as to determine the amount of time that would be required for the test. The researcher was able to determine the average amount of time required to respond to the test paragraphs by calculating the average amount of time that the students took to respond. This was accomplished by noting the amount of time that each student took to finish and recording it on their answer paper.
- B. Second exploratory application: The test was applied to a sample of (100) pupils in the fifth grade primary for the purpose of statistically analysing the paragraphs of the achievement test.

#### **Statistical Analysis of Survey Paragraphs:**

The researcher corrected the responses of the 100 survey students in order to conduct the following statistical analyses:

- A. Paragraph difficulty level: When calculating the difficulty factor of each test paragraph (multiple selection), it is found to be limited between (0.33 - 0.68) and thus the test is considered good.
- B. The power of paragraph distinction: In calculating the discriminatory force of each test paragraph, it was found that the test paragraphs (multiple selection) ranged from 0.30 to 0.57, all of which were very good and applicable.
- C. The effectiveness of erroneous alternatives: when calculating the effectiveness of correct alternatives to objective test paragraphs, the researcher found that they were confined between (-0.037 - 0.296), meaning that incorrect alternatives attracted more lower group pupils than higher group pupils.

#### **Test Stability:**

The researcher used the halfway method of fragmentation of the test stabilization, the stabilization was achieved using the Pearson correlation coefficient (0.864) and then corrected the Spearman Brown equation to 0.916, and the test is fixed.

#### **Measure of future thinking:**

The researcher has built a test of future thinking.

- 1) Setting the target of the scale: This measure aims to measure future thinking in the research sample and is the fifth grade primary pupils.
- 2) Determining the skills and number of paragraphs of the Future Thinking Scale: After defining the concept and purpose of the scale, the scale includes (five) skills for future thinking: (Future Planning Skill, Future Prediction Skill, Future Scenario Development, Future Imagination Skill, Future Perspective Assessment Skill).
- 3) Benchmarking paragraphs: After determining the future thinking metric skills, the benchmarking paragraphs and each of its five skills were drafted. A set of paragraphs was drafted, numbering 30. These paragraphs were distributed to the future thinking scale skills already identified, and each of the five skills included 7 paragraphs.
- 4) Identification of alternatives to the scale: three alternatives have been developed to answer each paragraph (always applicable to me), (often applicable to me) and (not to me), and scores (3,2, 1) have been given, thus the highest degree a sample individual can obtain on the scale is (90) a degree and the lowest degree is (30) a degree, while the hypothetical average (theoretical) of the scale is (60) a degree.
- 5) Future Thinking Measure instructions: The instructions for the scale encompassed the ability to answer it accurately and the encouragement of students to do so. I inquired that the students attentively and accurately read the scale paragraphs and mark (√) the item of the alternative that aligns with their opinions. Additionally, I requested that the students leave no paragraph unanswered.
- 6) Scale correction instructions: The researcher selected the Likert method for scale correction due to its widespread use in the development of psychometrics.
- 7) Test sincerity: The ostensible veracity of the measure of future thinking has been extracted, with the researcher presenting the measure to a group of experts for their opinions to be used in this research and the researcher using Cooper's equation of agreement by an agreement (80%) and more as a criterion for the validity and suitability of the paragraphs of the measure to measure the quality for which it was developed.
- 8) Application of the forward thinking measure to the reconnaissance sample:
  - a) First survey sample: In order to evaluate the clarity of the paragraphs and the time required to respond to all test paragraphs, the researcher administered the scale to a survey sample of thirty students. Under the supervision of the application, the researcher observed that the answer instructions and measurement paragraphs were unambiguous, as evidenced by the absence of

- any inquiries regarding how to respond. The average time taken by all pupils in the first survey sample was used to determine the duration of the measure.
- b) Survey Sample II: The researcher applied a forward thinking measure to a sample of (100) pupils and supervised the application of the scale himself.
- 9) Build Honesty: The researcher checked build sincerity for a measure of future thinking to find what comes:
- a) The degree to which the subparagraph is related to the overall scale: The researcher used the Pearson correlation coefficient to compare the grades of the 100 pupils in the second reconnaissance sample to the overall grade of the scale in order to ascertain the degree of each paragraph in relation to the overall grade. The correlations, which lie within the statistically indicative range of (0.29 to 0.62), are presented in table (7).

**Table 7.** Correlation factors between the paragraph and the scale's overall grade

| Linkag | T  | Linkag | T  | Linkag | T  | Linkag | T  | Linkage | T |
|--------|----|--------|----|--------|----|--------|----|---------|---|
| 0.62   | 25 | 0.53   | 19 | 0.49   | 13 | 0.64   | 7  | 0.37    | 1 |
| 0.41   | 26 | 0.60   | 20 | 0.35   | 14 | 0.51   | 8  | 0.41    | 2 |
| 0.48   | 27 | 0.36   | 21 | 0.60   | 15 | 0.43   | 9  | 0.51    | 3 |
| 0.54   | 28 | 0.64   | 22 | 0.48   | 16 | 0.38   | 10 | 0.63    | 4 |
| 0.33   | 29 | 0.36   | 23 | 0.52   | 17 | 0.32   | 11 | 0.44    | 5 |
| 0.66   | 30 | 0.48   | 24 | 0.30   | 18 | 0.66   | 12 | 0.39    | 6 |

- b) The degree of the subparagraph in relation to the overall degree of ability is as follows: In order to statistically verify the internal consistency of the scale, the Pearson correlation factor and the level of statistical significance between the degree of each paragraph and the degree of skill are presented in table (8).

**Table 8.** Correlation transactions between paragraph and field levels.

| FIFTH area |    | Fourth area |    | Third area |    | Second area |    | First area |   |
|------------|----|-------------|----|------------|----|-------------|----|------------|---|
| Paragrap   | T  | Paragrap    | T  | Paragrap   | T  | Paragrap    | T  | Paragraph  | T |
| 0.35       | 25 | 0.64        | 19 | 0.43       | 13 | 0.57        | 7  | 0.33       | 1 |
| 0.63       | 26 | 0.51        | 20 | 0.32       | 14 | 0.38        | 8  | 0.69       | 2 |
| 0.39       | 27 | 0.65        | 21 | 0.55       | 15 | 0.68        | 9  | 0.47       | 3 |
| 0.51       | 28 | 0.31        | 22 | 0.65       | 16 | 0.34        | 10 | 0.37       | 4 |
| 0.30       | 29 | 0.53        | 23 | 0.49       | 17 | 0.45        | 11 |            | 5 |
| 0.61       | 30 | 0.41        | 24 | 0.36       | 18 | 0.67        | 12 | 0.59       | 6 |

- c) The relationship of skill grade to the overall scale: the correlation factors between each skill degree and the overall scale degree are calculated using the Pearson correlation factor and table (9) showing this:

**Table 9.** Correlation factors between skill grade and total scale grade

| Correlation Coefficient | Skill                                  | T |
|-------------------------|--|---|
| 0.83                    | Future Planning Skill                  | 1 |
| 0.85                    | Future Prediction Skill                | 2 |
| 0.81                    | Skill for Future Scenario Development  | 3 |
| 0.86                    | Skill of future imagination            | 4 |
| 0.82                    | Skill evaluates the future perspective | 5 |

- 10) Strength of paragraph distinction: The differentiation factor was calculated for each paragraph of the scale, finding that the T value ranged from 2.47 to 5.32.
- 11) Scale Stability: The ALFA \_ CRO plant coefficient has been calculated to calculate the internal consistency of the scale from the second reconnaissance sample score of 0.91, which is a good stability coefficient.

Seventh: Statistical means: The researcher used the statistical pouch SPSS statistical analysis program to extract research data.

### 3. Results and Discussions

#### 1) Presentation of results:

Results of the initial hypothesis: The researcher developed an attainment test for the field of science. The two research groups were subjected to it. The researcher corrected the papers of the two groups and recorded the grades of the learners in each group following the administration of the test. The grades of the pupils in the research and standard deviation categories were computed.

**Table 10.** Results of the T Test for the Two Research Groups in the Collection Test

| Statistical significance | T value |            | Free degree | Standard deviation | Average arithmetic | Number | Group        |
|--------------------------|---------|------------|-------------|--------------------|--------------------|--------|--------------|
|                          | Tabular | Calculated |             |                    |                    |        |              |
| Function                 | 2.000   | 4.059      | 62          | 4.587              | 24.578             | 33     | Experimental |
|                          |         |            |             | 5.031              | 20.048             | 31     | Control      |

The calculated average grades of the pilot group's pupils are (24.578) and standard deviation (4.587), while the control group's pupils are (20.048) and standard deviation (5.031). The calculated test value (t-test) is (4.059), which is greater than the tabular free T value of (2,000), as indicated in table (10). Thus, the attainment test demonstrates the experimental group's superiority over the control group. To determine the extent to which the independent variable (the D.U.I.T model) influences the subordinate variable (academic attainment), the researcher employed the impact equation as illustrated in table (11).

**Table 11.** Magnitude of impact for the independent variable on the dependent variable

| Volume of impact | D value impact size | Dependent variable     | Independent variable |
|------------------|---------------------|------------------------|----------------------|
| Big              | 0.90                | Educational attainment | D.U.I.T Form         |

Results of the second hypothesis: computational average, standard deviation and variability of future penetration were calculated for the grades of the two research groups' pupils, and the T-test was then applied for two separate samples as in the table (12).

**Table 12.** T test results for the two research groups in the Future Thinking Scale

| Statistical significance | T value |            | Free degree | Standard deviation | Average arithmetic | Number | Group        |
|--------------------------|---------|------------|-------------|--------------------|--------------------|--------|--------------|
|                          | Tabular | Calculated |             |                    |                    |        |              |
| Function                 | 2.000   | 4.517      | 62          | 9.251              | 74.251             | 33     | Experimental |
|                          |         |            |             | 10.654             | 64.517             | 31     | Control      |

It is noted from Table (12) that the computational average of pupils' grades of the pilot group is (74.251) With standard deviation (9.251), the calculated average of the pupils' grades of the control group is (64.517), standard deviation (10.654) and t-test application for two separate samples, with a test value reached (t-test) for two independent samples (4.517), which is greater than the tabular T value of 2,000, thus demonstrating the experimental group's superiority over the pupils of the control group in future thinking, and to see how much impact the independent variable has. (D.U.I.T model) in the subordinate variable (forward thinking), the researcher used the effect equation and the results were as shown in table (13).

**Table 13.** Gnitude of impact for the independent variable on the dependent variable

| Volume of impact | D value impact size | Dependent variable | Independent variable |
|------------------|---------------------|--------------------|----------------------|
| Big              | 0.91                | Forward thinking   | Form D.U.I.T         |

## 2) Interpretation of results:

- a) Interpretation of the results of the first zero hypothesis:
  - i. The D.U.I.T model presents or provides information that is compatible with the thinking of pupils' learning, so that learning is more effective and accessible which increases pupils' attainment.
  - ii. Using a model (D.U.I.T) to teach the experimental group, which stimulated and supported several capabilities, including the ability to think effectively and positively about the problem, to deepen its removal and interpretation, and to discover relationships among its elements to find the right solution to the problem, thereby increasing educational achievement.
- b) Interpretation of the results of the second zero hypothesis:
  - i. The D.U.I.T model plays a major role in encouraging pupils to think forward by asking questions from the teacher.
  - ii. The use of the D.U.I.T model has had an incentive to stimulate future thinking for pupils in researching and investigating facts and information and uncovering their ambiguity in the content of the subject during its reading and concluding what is true and judging the validity of the information therein, which has stimulated future thinking.

## 4. Conclusion

- 1) The D.U.I.T model has a positive impact on increasing Primary 5 students' attainment in science and their ability to understand information, facts and knowledge and raise their level of education.
- 2) The D.U.I.T model has a major role to play in raising the level of future thinking for Primary 5 pupils.

## 5. Recommendation

- 1) The researcher recommends that the D.U.I.T model should be used to teach science at the primary and middle levels.
- 2) The need to include the D.U.I.T model in the subject of science teaching methods for the primary and postgraduate stages.

## 6. Proposals

- 1) Conduct a similar study using the D.U.I.T model in other variables (convergent thinking, intelligent thinking, selective thinking).

- 2) Conduct a comparative study between the D.U.I.T model and modern teaching methods emanating from active learning strategies in different age variables and phases.

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