Research Article

The effectiveness of an instructional-learning design based on the dimensions of deep understanding in the acquisition of physical concepts by high school students

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Abstract

The aim of the current research is to identify the effectiveness of an (instructional -learning) design based on the dimensions of deep understanding in the acquisition of physical concepts by middle school students, to achieve the goal of the research, the research sample was randomly selected from Thawrat Al-Hussein Preparatory School for Boys, affiliated to the (General Directorate of Education in Baghdad, Al-Rusafa / Third), numbering (46) students divided into two groups, with (23) students in the experimental group who studied with the proposed instructional - learning design, and (23)) students in the control group studied in the usual (followed) way, and the equivalence of the two groups was verified in the variables (chronological age in months, previous physical information, and intelligence).

The researchers prepared the requirements of the experiment that included the proposed teaching-learning design (identifying the scientific material, defining physical concepts, formulating behavioral objectives, preparing teaching plans for the experimental and control groups, and preparing learning activities) the physical concepts acquisition test consisting of (27) objective paragraphs of a multiple-choice type with four alternatives was also built. Its psychometric properties were confirmed.

The two groups were studied by the third researcher, and after the end of teaching the scientific material, the research tool was applied, and the results were analyzed using the (t-test) equation for two independent samples.

The results showed that there was a statistically significant difference at the level of significance (0.05) in favor of the experimental group over the control group in the physical concepts acquisition test, with a large effect size.

Keywords (instructive-learning design, dimensions of deep understanding, physical concepts)

Research problem:

Through the results of studies and research that dealt with the misunderstanding of physical concepts among secondary school students in Iraq, including my studies (Al-Bawi, 87) and (Al-Bawi, and Al-Shammari, 2006), the researchers attributed the reason for the misunderstanding due to the failure to use modern methods, strategies and methods in teaching based on the participation of students and diversifying their educational environment for the purpose of facilitating the process of acquiring physical concepts correctly.

From the researcher's experience in studying and teaching physics, as well as exchanging views with colleagues from high school physics teachers, parents and students themselves, it became clear that physics is one of the abstract school subjects that needs clarification and facilitation through a high effort by the teacher to deliver it to students it is necessary to adopt modern strategies, methods and models in teaching that focus on linking the scientific material to the student's life and making him an effective participant in the instructional-learning process, especially since most of the results of studies and research in this field showed that science teachers, including physics teachers, still adopt the traditional methods of existing teaching on indoctrination.

Accordingly, the research problem can be determined by the following question:

((Is the instructional-learning design based on the dimensions of deep understanding effective in the acquisition of physical concepts by high school students))????

Importance of the Research

Educators focused on acquiring scientific concepts as the most important goals of teaching science, because it is the language of science and the key to scientific knowledge, most studies indicated that scientific concepts in general and physical concepts in particular are taught in a way that requires abstract thinking, and this leads to difficulty in learning and teaching these concepts, so I conducted Several studies to develop the appropriate treatment for learning difficulties (Al-Khawaldeh: 2003: 87). Scientific concepts (including physical) are the basis of science and scientific knowledge and are useful in understanding the structure of science and its development, and are considered the basic building blocks in building principles, generalizations and scientific theories by reducing the huge amount of facts, and they are easier to remember and more stable, help to organize experience, and facilitate the transmission of impact learning through its application in different situations, as it is a successful way to stimulate the process of mental growth and push it forward and use the method of scientific thinking in facing problems and solving them, considering (concepts) among the basic tools of thinking and investigation (Khatabia: 2005: 40).

The fourth scientific high school grade has a special importance as it is the real breakthrough towards the specialization of scientific study in general and the study of physics in particular, and one of the objectives of teaching physics for this stage is for the student to achieve a link to the physical concepts he studies with the reality of his daily community life and to provide him with the methodology of scientific thinking and the transition from accredited education On memorization to self-learning (Mohammed et al., 2013:3).

The methods of teaching modern sciences, their strategies, methods and models have varied according to the changing perception of the nature of learning and teaching, and among these modern strategies in teaching are the dimensions of deep understanding that the teacher can use in the classroom. Therefore, deep understanding and its dimensions are among the factors that are important in the educational process because it increases effectiveness and contributes to achieving the desired goals of learners (Sardawi: 2011: 305).

The importance of the research is evident from the following:

1. The scarcity of local and Arab research and studies (to the knowledge of the researcher) that dealt with an (instructional-learning) design based on the dimensions of deep understanding in the variable of acquiring physical concepts for fourth-grade students.

2. The importance of physics and the correct acquisition of physical concepts.

3. Use design based on deep understanding dimensions.

4. The importance of fourth-grade students acquiring the scientific concepts correctly in their first path to scientific specialization, especially that physics will accompany them in most university courses in the future.

Research Objectives: The research aims to:-

1. Building an instructional-learning design based on the dimensions of deep understanding in physics for the fourth grade of middle school.

2. Recognizing the effectiveness of instructional-learning design based on the dimensions of deep understanding in the acquisition of physical concepts by fourth-grade students.

Research hypothesis: To verify the goal of the research (second), the following null hypothesis was formulated:

There is no statistically significant difference at the level (0.05) between the average scores of the experimental group students who study by the instructional-learning design based on the dimensions of deep understanding and the average scores of the control group students who study according to the usual method in the physical concepts acquisition test.

Research limitations: The search was limited to:

1. Students of the fourth scientific preparatory grade in the governmental middle and secondary daytime schools of the General Directorate of Education of Baghdad, Rusafa 3rd, for the academic year 2020/2021.

2. The first semester of the physics textbook for the fourth grade of high school / 9th edition of 2018.

Define terms:

1. Instructional-Learning Design: define it

- (Al Rawadiyah and others: 2011): "It is to define the specifications of the elements of the educational situation and determine how these elements interact together, and to produce that in the form of shapes, maps and drawings, and then submit them to the educational developer in order to convert them into a physical form" (Al Rawadiyah and others: 2011: 53).

Procedurally, the researchers define it as: a set of methods, strategies, and sequential and organized steps to organize the content of physics for the fourth grade of middle school with the aim of achieving educational goals for students according to the conditions and dimensions of deep understanding, taking into account their cognitive levels and training needs in the form of codified schemes that are followed in the teaching process to contribute to the acquisition of concepts physics for students.

2. Dimensions of deep understanding: define by

- (Cox & Clark, 2005): "It is a set of mental abilities with which the student tries to include a particular subject within his cognitive structure through several aspects" (Cox & Clark, 2005, 83).

The researchers define it procedurally as: a set of mental processes that the researcher follows during the process of teaching physics for the fourth grade of middle school in order to achieve the objectives of the class according to the dimensions (generative thinking, critical thinking, the nature of interpretations, asking questions, and decision-making), which makes students more able to Understand the content of the article.

3. Acquisition of concepts defined by:

- (Maree and Muhammad 2005): "The learner is able to identify the distinguishing features of the concept, give affiliated and non-affiliated examples, compare the concept with other similar concepts and put it into practice" (Maree and Muhammad, 2005: 211).

The researchers define it procedurally as: the ability of fourth-grade middle school students to identify the characteristics of the concept, define it and distinguish it from examples and examples and determine its application in daily life, and it is measured by the degree that the student obtains in the physical concepts acquisition test.

Background theory and previous studies:

First Axis: Theoretical Background:-

First: instructional-learning design

The instructional-learning design process is a systematic process that aims to set standards and specifications for the most appropriate methods, environments and educational resources that achieve the desired educational outcomes according to certain conditions for a sample of learners, in accordance with their perceptual and cognitive characteristics, with the translation of these methods in the form of schemes to guide the teacher in implementing the process Education to bring about the desired learning (Saraya, 2007: 24).

The importance of instructional design is defined as follows:

1. Directing attention to the various educational goals, because defining the educational goals is one of the first steps in the design, and thus the teacher can distinguish the main value goals from the side goals.

2. Bridging the relationship between theoretical principles and their applications in the educational situation.

3. Using educational aids, materials and devices in an optimal way.

4. The effect of the teacher is clear that he is a regulator of the environmental conditions that facilitate the occurrence of learning, as well as the director and implementer of the educational situation (Obeid et al.: 2001: 19 - 21).

5. Reducing the tension of the teacher as a result of good and sound teaching methods, and making him able to give and manage the classroom effectively.

6. Facilitate interaction and communication between participants in the design of educational programs, and encourage them to work as a team.

7. Saving effort and time, as it is a process of studying, changing and modifying all educational methods before starting the application, in order to delete the failed or weak educational methods, and focus on the effective educational methods that lead to achieving the desired goals (Al-Adwan, Muhammad: 2011: 20).

Stages of constructing instructional design: There are types of instructional design models that were brought by a number of instructional designers and educational programs, so that these models were keen to provide clear frameworks for interpreting the instructional-learning design process and the procedures involved in this process, and that some of these models are complex and others it is simple, and there are basic common elements required by the nature of the instructional and learning process, as for the difference between them, it may be due to the difference in psychological schools (behavioral, cognitive, or structural),

The researchers reviewed the educational design models and it was found that there are many different opinions in the construction process, but most of the models agree on a number of basic stages (analysis stage, preparation stage (design), development and production stage, implementation stage, and evaluation stage).

The second axis: Dimensions of deep understanding:

Deep understanding is the product of deep learning that is based on the transfer of knowledge to new situations to solve problems with knowledge of what? How? Why? When? Apply this knowledge.

(Li Deng & Dong Yu, 2014, 87)

And (Al-Smadi and Al-Naqeeb, 2017) define it as the way that is easy to distinguish by making attempts with the intention of defining the issue in depth or trying to create the largest possible number of relationships between the parts of the problem (the data and the required) to determine the possible relationships between them, in order to facilitate the task of solving the issue and being satisfied with the solution (Al-Smadi and Al-Naqeeb: 2017: 74).

Dimensions of deep understanding:

There have been many classifications that focused on identifying the dimensions of deep understanding. The study of (Chin & Brown, 2000) identified five dimensions of deep understanding, which are generative thinking, the nature of explanations, asking questions, metacognition activities, and task completion entrance (Chin & Brown). , 2000, 110).

Lutfallah (2006) and (Ahmed, 2012) agreed to measure deep understanding in the dimensions of generative thinking, giving explanations, asking questions, and making decisions (Lutf Allah: 2006: 610) and (Ahmed: 2012: 167).

As for (Hani and Al-Demirdash, 2015), the dimensions of deep understanding depended on generative thinking, providing explanations, and making decisions (Hani and Al-Demirdash: 2015: 116).

In light of the above, and by reviewing previous studies that dealt with the strategies of the dimensions of deep understanding, the researchers see that there is agreement among the above-mentioned studies that the dimensions of deep understanding are (generative thinking, interpretation, asking questions, and decision-making).

The current research will focus on the following dimensions of deep understanding:

The first dimension: Generative thinking: which is defined as "mental abilities in which the student interacts with the many experiences he faces in order to assimilate and link new information with the old one he has, in order to reach a new understanding or a new production that achieves an original solution to the problem of discovering something new" (Al-Najdi and others: 2005: 473).

The second dimension: Critical Thinking: It is a complex and purposeful mental activity governed by the rules of logic and reasoning and leads to predictable outcomes. Its purpose is to verify and evaluate something based on acceptable criteria, and it consists of a set of skills that can be used individually or in combination to distinguish between assumptions and generalizations, and between facts, opinions and allegations, differentiating between types of evidence and linking premises to results, and between excess and incomplete, revised and unedited information" (Shehata and Al-Najjar, 2003: 127), and encouraging inquiry, research and questioning, and not accepting facts without investigation and discovery leads to broadening the students' horizons of knowledge, and pushes them to launch into broader scientific fields, which works to enrich their cognitive structures and increase their qualitative learning (Abu Jadu and Nofal: 2010: 225-226).

The third dimension: The nature of interpretations: Interpretation is a mental process that aims to give meaning to life experiences or extract meaning from them, when we provide an explanation for an experience, we explain the meaning it revealed to us, and when we ask about how we arrived at a specific meaning from our experience, we give details that support our interpretationbfor that experience, and when students are shown graphs, tables, pictures, or caricatures, and they are asked to derive meaning or a lesson from it, in fact, they are faced with a task that requires giving an explanation of what they see, the meanings may also result from the interpretation of the sightings of flights or as a result of making comparisons or making summaries or linking rewards and punishments to behavior, in all areas where the interpretation or conclusion is a result of a reaction to an experience, it can be examined the accuracy of the interpretation in light of the facts given to ascertain whether the data actually support the interpretation or not (Jarwan: 2002: 178).

The fourth dimension: Asking questions: The science teacher needs help to possess the educational competencies and skills in asking "level and quality" questions so that his teaching and learning (theoretical and practical) in science will be fruitful and successful. And he needs to know and practice how to ask questions whose answers can be reached using the available materials on the one hand, and knowing how to investigate the aspects of the problem investigated each time on the other hand (Zaitoun: 2007: 244).

The fifth dimension: decision-making: Decision-making is defined as the choice based on a number of criteria for one alternative among two or more alternatives. In other words, it is a logical selection process between two or more choices based on judgments that are consistent with the values of the decision maker (Ali and Amira: 2007: 168).).

The researchers believe that the dimensions of deep understanding occur through:

1. Focusing on instructional -learning activities and techniques related to the removal of deep understanding, as they are the basis for the growth and development of the student's responses.

2. Making the student the main focus in the instructional-learning process.

3. Providing a large amount of accurate and in-depth information that encourages students to positively interact with the material.

4. Focusing on the use of more than one strategy of the dimensions of deep understanding of the subject and one chapter to draw the student's attention towards the subject.

5. Focus on the use of deep questions during learning to encourage the student to link between new ideas and knowledge and previous experiences.

6. Working on generating new meanings and models through cooperative work among students within groups.

7. Attention to the development of constructive critical interaction between students regarding the content of the material.

8. Focusing on encouraging the student to reach the appropriate decisions that are compatible with the topic.

9. Using regular and varied assessment methods in order to integrate ideas and take into account individual differences among students.

Third Axis: Acquisition of Concepts:

The concept is what the individual possesses of meaning and comprehension related to certain words, phrases or operations, and this meaning that each word carries with a particular person expresses his concept about something, and this depends on the degree of maturity of the person and his previous experiences, or it is the mental image that consists of sensory perceptions, and there are many views on the meaning of the concept there are those who defined it as a group or class of things, events or special symbols that are gathered together on the basis of their common characteristics that distinguish them from other groups and other categories (Atiya, 2009:44).

The importance of learning concepts: the process of learning concepts takes place if the student can link his conceptual structure with what he receives of new concepts, when the student is exposed to new concepts, he performs many mental operations that help him to link these concepts with the concepts he previously had of his conceptual structure. (Al-Afoon and Fatima, 2011) believes that scientific concepts are more related to the life of the student, as they help him to adopt science in explaining the phenomena that draw attention in the environment, and also help to guide and predict any scientific activity that may lead to the discovery of new things (Al-Afoun and Fatima: 2011: 6).

The teacher's role in students' acquisition of the concept:

The (tunner) quoting from (Al Yamani, 2009) identified factors related to the role of the teacher in providing students with the concept, including: -

1. Determining the necessary stimuli and informing the students of them.

2. Determining the desired responses and informing the students of them.

3. Determining the appropriate strategy and informing the students of it.

4. Determining the necessary information for the concept.

5. Prepare students to retrieve appropriate information.

6. Increasing the student's level of motivation (Al-Yamani: 2009: 252).

Previous studies:

- Rasheed study 2015: Building a design (instructional - learning) according to active learning strategies and measuring its impact on the qualitative achievement of physics for fifth grade scientific students and their probing thinking.

- Al-Jahouri 2012 study the effectiveness of the self-scheduling strategy (K.W.K.h) in developing a deep understanding of physical concepts and metacognitive skills among eighth grade students.

- Al-Hassani study 2009: The effect of using higher-order questions in acquiring physical concepts for students of the fourth year of secondary school in physics and their inferential thinking.

Search procedures: The search procedures were as follows:

First: The stages of building the design (instructional - learning):

To achieve the first goal of the research, building an (instructional -learning) design based on the dimensions of deep understanding in the fourth grade students' acquisition of physical concepts, an instructional -learning design with five stages in addition to the feedback stage was designed:

1. The first stage analysis: in which the general objectives of teaching physics for the fourth scientific grade were determined and analyzed, and the study material represented by two chapters of the physics book for the fourth scientific grade for the academic year (2020-2021) was determined, the research sample was randomly selected from students of the fourth scientific grade at Thawra Al-Hussein high School for Boys, as well as an analysis of the educational environment of this school, which contains most of the requirements for the application and the materials and tools required to implement the design (instructional -learning), the students' common characteristics were also determined, and the educational needs were determined from the teachers' and students' point of view, and this stage included determining the subject to be learned, where the researchers analyzed the content of physics for the fourth scientific class, and organized it to suit the teaching strategies adopted in the instructional – learning design.

The second stage of design (preparation): The (57) observable and measurable behavioral objectives were formulated, representing the six levels of Bloom in the cognitive domain, (23) behavioral objectives in the skill domain, (19) behavioral objectives in the emotional domain, and the preparation of The materials, activities and teaching aids were prepared, teaching strategies were chosen, and teaching plans were prepared.

Research tool: The physical concepts acquisition test was prepared according to the following procedures: -

1. Determining the objective of the test: As the test aims to measure the level of physical information for students of the fourth scientific grade in the two semesters of physics for the academic year (2020-2021).

2. Determining the scientific subject: The scientific subject included the second and third semesters of the fourth-grade physics textbook for the first academic course, 9th edition, for the year (2018), which was established by the Ministry of Education, the General Directorate of Curricula.

3. Determining the number of test items: In light of the opinions of a number of specialists in physics and teaching methods, the behavioral objectives to be achieved and the importance of each chapter were taken into consideration, taking into account the response time, the test items were determined by (27) multiple-choice items. A typical answer key was prepared for all test items, as a score of (one) was assigned for each correct answer, and (zero) for each incorrect answer, the left answer was treated as the wrong answer, and thus the total score for the test ranged between (0-27) degrees, and with a hypothetical average of (13.5)

The researchers verified the apparent validity and content validity of the test by presenting the test items and its instructions, the behavioral objectives, and the correct answer key, in its initial form, to a number of specialists in the field of physics and its teaching methods, no modifications, additions, or deletions were made to the test items, this is how validity is achieved.

Through the results of the exploratory application of the physical concepts acquisition test, an exploratory sample consisting of (120) students from the research community and not from its sample, the psychometric properties (difficulty coefficient, discrimination coefficient, and the effectiveness of wrong alternatives) were found for each paragraph of the physical concepts acquisition test, in addition to that the clarity of the test instructions and the clarity of its paragraphs have been verified, as well as calculating the stability of the test by using the (Alpha Cronbach) equation, which has a value of (0.928).

The third stage of development: The researchers used educational materials and activities, and these activities may be (individual or group) or other demonstrations so that they can develop the students' physical concepts and develop higher-order thinking skills, explanatory experiments were also conducted in the physics teaching

laboratory and related to the educational content, in addition to the use of various educational technologies such as data show to display pictures, videos, laptops, graphics and various physical models.

The fourth stage of implementation: This stage includes a set of procedures to implement the (instructional - learning) design based on the dimensions of deep understanding through its experience on the original research sample, these procedures include the following steps:

groups	Group parity	independent variable	dependent variable
Experimental	**1- Chronological age** **2- Intelligence** **3- Test the previous information**	**Instructional-learning design based on the dimensions of deep understanding**	**Acquisition of physical concepts** **dependent variable**
Control		**the usual way**	

Scheme (1) Experimental design of the research

4-1 Experimental design of the research: The design of equivalent groups with partial control with two experimental and control groups was used as in the diagram (1).

4-2 Research community: The research community consists of all fourth grade students in all government day schools affiliated with the General Directorate of Education in Baghdad / Rusafa 3rd for the academic year (2020-2021).

4-3 Research sample: Thawrat Al-Hussein High School for Boys was deliberately chosen for the facilities provided by the school administration to implement the research experience.

By means of random drawing, section (H) was chosen to represent the experimental group with (23) students, and section (I) to represent the control group with (23) students as well.

Control procedures: Before initiating the experiment, the researcher deliberately controlled some variables that may affect the credibility of the experiment results through: selecting the research sample and dividing it randomly into two groups (experimental and control), and rewarding the two groups (the research sample) with chronological age calculated in months, intelligence and previous information for Physics).

In light of the foregoing procedures for statistical equivalence among the members of the research sample, some extraneous variables that the researcher believes may affect the integrity of the experiment, including (teaching, study material, time period and confidentiality of the experiment, and physical conditions) have been controlled:

Procedures for applying the experiment: The academic semester for the year (2020-2021) began on Sunday 29/11/2020, and in order to preserve the integrity of the design, and to reach accurate results and to answer the research questions, the following steps and procedures were adopted:

1. The previous information test was applied in physics (for the purposes of equivalence between the two research groups).

2. The third researcher studied the experimental and control groups by himself at a rate of two hours per group per week.

3. The physical concepts acquisition test was applied to the students of the two research groups after completing the teaching of the scientific subject.

4. Statistical analyzes were conducted after applying the research tool to the experimental and control groups.

5. The fifth stage of evaluation: It is the last stage, but it continues in all stages of the instructional-learning design, and it is an important part of it, as evaluation and judgment are made on the process of research progress towards achieving the required goals.

6. Feedback: The feedback for the designer is necessary because it is based on evaluating the inputs in terms of collecting information to detect, analyze and correct errors in order to improve its quality and development, and after it is presented through its inputs, its outputs are also evaluated through the work procedures that he performs The designer and these procedures must be characterized by continuity in order to reach improvement and development to increase the students' ability to perform during the learning process.

Statistical methods: The Statistical Package for Social Sciences (SPSS) and Microsoft Excel were used in data processing and analysis.

Presentation and interpretation of the results: Since the research aims to:

1. Building an instructional-learning design based on the dimensions of deep understanding in physics for the fourth grade of science.

This goal was verified based on what was presented in the previous item (research procedures) from the procedures for building the design (instructional - learning).

2. Recognizing the effectiveness of instructional-learning design based on the dimensions of deep understanding in acquiring physical concepts for fourth-grade students.

The second research objective was verified by testing the following null hypothesis:

- There is no statistically significant difference at the level (0.05) between the average scores of the experimental group students who study by the instructional-learning design based on the dimensions of deep understanding and the average scores of the control group students who study according to the usual method in the physical concepts acquisition test.

After calculating the arithmetic mean and standard deviation of the scores of each of the two research groups in the physical concepts acquisition test, and using the t-test equation for two independent samples to show the differences between the mean scores of the two groups in the physical concepts acquisition test, and Table (1) illustrates this.

Table (1) The data of the two research groups on the physical concepts acquisition test

Group / **Experimental**	**Student number**	**Arithmetic mean**	**Standard deviation**	**Degree of freedom**	**T value**		**Statistical significance at the level (0,05)**
					calculated	**tabular**	
Control	**23**	**18,65**	**4,848**	**44**	**2,688**	**2**	**function**
	23	**14,95**	**4,466**				

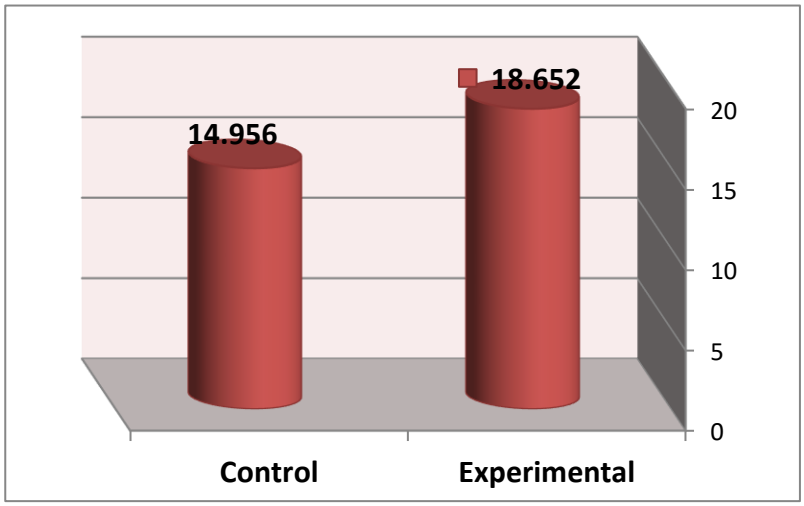

Figure (1) The average scores of the two groups on the physical concepts acquisition test

Table (1) and Figure (1) show that the arithmetic mean value of the scores of the experimental group students in the physical concepts acquisition test was (18.65), while the standard deviation was (4,848), while the arithmetic mean of the scores of the control group students was (14, 95) with a standard deviation of (4,466), and the calculated t-value was (2,688), which is greater than the tabular t-value of (2) at a degree of freedom (44) and a level of significance (0.05), which means that there is a statistically significant difference in favor of the experimental group in the physical concepts acquisition test, thus rejecting the first null hypothesis and accepting the alternative hypothesis.

In order to find out the size of the effect of the independent variable on the dependent variable, the Cohen equation was adopted to measure the effect of the independent variable on the dependent variable (Table 2).

Table (2) The effect size of the independent variable

independent variable	**dependent variable**	**The value of the effect size of the effect**	**The magnitude of the effect**
Instructional-learning design based on the dimensions of deep understanding	**Acquisition of physical concepts**	**0,79**	**large**

And by extracting the value of the effect size, which amounted to (0.79), which is an appropriate value to explain the effect size and by the amount of (large) for the variable dimensions of deep understanding in the test of acquiring physical concepts according to the gradient set by Sayed (2017), who sees that the effect size is large, according to what he explained and according to the table (3):

Table (3) values of the equation for calculating the effectiveness (the size of the (effect)

(Seid: 2017: 160)

We conclude that the size of the large effect as a result of applying the (instructional - learning) design according to the

Effective value	**Effectiveness (Effect)**
0-0.3	**ineffective**
0.3- 0.7	**Medium effective**
0.7 – 1	**large effective**

dimensions of deep understanding on the dependent variable, the acquisition of physical concepts, was effective in the research sample (the experimental group).

This may be due to the fact that teaching the students of the experimental group by adopting the instructional-learning design based on the dimensions of deep understanding and the content of this design of experiences, information and individual and group activities about the subject, and because it also took into account the students' mental abilities by following an organized method according to organized steps She encouraged the students to exchange experiences with each other, and to give them greater confidence in participation and education, and to learn constructive criticism on the other hand.

Third: Conclusions: In light of the research results, the researchers concluded: The effectiveness of the (instructional - learning) design based on the dimensions of deep understanding in acquiring physical concepts for fourth-grade scientific students (the experimental group) the research sample in physics.

Fourth: Recommendations: In light of the research results, the following is recommended:

1. The necessity of holding seminars and workshops by educators, academics and researchers and involving physics teachers to highlight the importance of the instructional-learning design and work to clarify how to implement its steps as a strategy in implementing the lessons in order to advance the (instructional-learning) process.

2. Adopting the instructional-learning design based on the dimensions of deep understanding in teaching physics to middle school students, because of its role in improving and developing the acquisition of physical concepts.

3. Providing the General Directorate of Curricula (curricula authors) with sufficient and clear information on the importance of deep understanding dimensions in order to take this into account in the design and planning of curricula.

4. The necessity of working on training students and preparing them in faculties of education on how to implement strategies that fall under the dimensions of deep understanding and make them within the vocabulary of one of the relevant educational materials.

5. The necessity of identifying and analyzing the educational needs of students because of its great importance in removing many of the obstacles associated with teaching and learning physics.

Fifthly: the proposals: As a continuation of the current research topic, the researcher suggests the following:

1. Conducting other research similar to the current research in other disciplines such as chemistry and biology.

2. Conducting the current (instructional-learning) design on other samples, such as students of stages other than the fourth scientific stage.

3. Studying the effectiveness of instructional-learning design based on the dimensions of deep understanding in other variables such as habits of mind, systemic thinking, critical thinking, or multiple intelligences.

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