Research Article

The effectiveness design of instructional-learning according to the communication theory in the achievement of high school students for physics

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Abstract

The research aims to measure the effectiveness of an instructional-learning design according to the communicative theory in the achievement of high school students in the subject of physics?

To achieve the goal of the research, the following null hypothesis was formulated:

There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who study according to the instructional-learning design and the control group students who study by the traditional method of achievement test.

The quasi-experimental design with two experimental and control groups was used, and the research community was defined by fourth-grade scientific students in secondary and high schools in the education of Baghdad Governorate / Rusafa 2nd - Department of Education of the Peripheries of East Baghdad, Ibn Khaldun high School for Boys was chosen intentionally to implement the research experiment in it, and randomly group (5) was chosen as the experimental group, and group (12) was chosen as the control group, with (20) students for each group.

The equivalence of the two groups was verified by chronological age in months, previous achievement scores for physics and previous information, intelligence test, and parental achievement.

An instructional-learning design has been prepared according to the educational needs of the fourth scientific students, in light of the communicative theory, and the necessary supplies, including teaching plans, the establishment of the educational platform, and the provision of various learning resources.

The researcher constructed an achievement test consisting of (20) items of the multiple choice type and (6) items of the essay type and confirmed its psychometric properties.

The experiment was applied in the first semester of the academic year 2020-2021, and the researcher taught the two groups himself, and after completing the teaching of the entire educational content, the achievement test was applied to the two groups and the research experiment lasted (12) weeks.

The data were processed statistically using the SPSS Statistical Package for Social Sciences, and from the equation of (t-test) for two independent samples, it became clear that the students of the experimental group outperformed the students of the control group in the achievement test.

In light of the research results, the researcher presented a number of proposals and recommendations.

Key words: communicative theory, instructional-learning design, physics achievement.

First: Definition of the search:

1- Research problem: Through the experience of researchers in teaching physics and through exchanging opinions with colleagues from physics teachers at all academic levels, it became clear that there is a decrease in the level of students 'achievement in physics, in addition to the deficiencies of physics teachers in knowing theories and modern strategies, and methods, and how to employ them in

teaching, including communicative theory, which is one of the modern theories that is consistent with modern education trends in the field of education and improving students 'achievement.

In view of the importance of instructional-learning design, communicative theory, physics and its achievement, keeping pace with educational systems in various directions, and innovations in the educational field, the current research idea that aims to answer the following question crystallized:

What is the effectiveness of applying an instructional-learning design according to the communicative theory in the achievement of the high school students of the subject of physics?

2- Research importance: In light of scientific and technological progress, it has become necessary to think about the employment of education technology and its use in a way that serves educational situations, and the need to adopt instructional-learning designs to organize the educational environment in a thoughtful and scientific manner in light of modern and diverse educational programs to achieve the desired goals and facilitate Students must understand the material, and thus improve their scientific level, by using the instructional-learning design according to the communicative theory, which helps to facilitate communication, interaction and coordination, which may lead to an increase in the efficiency and effectiveness of teaching and learning processes, and in raising the level of students' achievement.

Therefore, the importance of the current research lies in:

A. The scarcity of local and Arab research and studies (as far as researchers know) that dealt with the effectiveness of an instructional-learning design according to the communicative theory in the achievement of physics for high school students.

B. Focusing more on the importance of teaching students how to search for information, filter it, analyze it, and synthesize it in order to obtain knowledge, which is one of the principles of communicative theory.

C. Benefiting from this research in helping teachers and those interested in developing strategies for teaching physics.

D. The importance of improving and raising the level of achievement in the subject of physics as it is an indicator of the student's academic performance and an indicator of what has been achieved of educational goals.

E. The importance of self-organization of students' personal knowledge, and the development of skills in using social networks.

3- Research Objective: The research aims to:

A. Preparing an instructional-learning design according to the communicative theory to teach physics to high school students.

B. Recognizing the effectiveness of instructional-learning design according to the communicative theory in the academic achievement of physics for high school students.

4- Research hypothesis: In order to achieve the second research goal, the researcher formulated the following null hypothesis:

((There is no statistically significant difference at the significance level of 0.05 between the mean scores of the students of the experimental group that will be taught by the instructional-learning design based on communicative theory and the students of the control group that will study in the usual way on the achievement test for physics))

5- Research limits: The search is limited to:

A - High school students (students of the fourth scientific grade) in the government high and secondary day schools of the General Directorate of Education in Baghdad, Rusafa 2nd, for the academic year 2020-2021.

B- Physics book scheduled for the fourth scientific grade / ninth edition of 2018.

6- Search terms:

Connectivism:

Defines it (Siemens, 2005) as "a theory that seeks to clarify how learning occurs in complex electronic environments, how it is affected by new social dynamics, and how it is supported by new technologies (Siemens, G., 2005: 3).

7- Achievement:

(Al-Tamimi et al., 2018) defined it as: "The set of knowledge and skills acquired and developed during the course of study, and which are usually indicated by test scores or grades assigned by teachers or both" (Al-Tamimi et al., 2018a: 32).

The researchers define it procedurally as: the amount of information acquired by fourth-grade students (the research sample) in physics, as measured by the grades they obtained in the achievement test prepared by the researcher for this purpose.

Second: theoretical background:

1- The concept of communicative theory and its origin:

Connectivism is a learning theory that integrates educational applications of the principles of chaos theory, network theory, complexity theory, and self-organization theory to explain learning in the current digital age. (Siemens, G., 2008b: 3)

George Siemens is the founder of the Connectivism theory, he is the pioneer of open communication courses that included more than 15,000 educators, students and participants, as well as a spokesperson in many conferences on the impact of technology and media on education, institutions and society more than 30 countries. His work has been documented in local, national and international newspapers, radio and television, has a blog on www.elearnspace.com, and another blog at www.connectivism.ca. He is the author of "Knowing Knowledge", discovering how the context and characteristics of knowledge have changed, and what they represent for societies today, and he has a book on integrating technologies into learning. He is a strategic researcher in technology at Athabasca University, Canada. His book "Knowledge of Knowledge" has been translated into several languages, including Spanish, Persian, etc. (Siemens, G., 2006: 146).

Figure (1) Connectivism theory holder (Siemens)

Because of previous criticisms of learning theories: behavioural, cognitive, and constructivism, Siemens introduced Connectivism, a modern educational theory that seeks to explain how learning occurs in the networked digital age which uses the concept of a network that consists of several nodes that represent the knowledge society, and are linked by links that represent the learning process (Siemens, 2005: 2)

This theory has many names, and these names are as follows:

A. There are those who call it learning theory in the digital age because it is based on the principle of networking on digital learning via networks, and the use of computer technology tools and the Internet in education.

B. There are those who call it the communicative theory because learning in it takes place through the strengthening of communication and interaction across the web, and through a network consisting of several human meeting points, and because the learner is in constant contact with the various learning networks, and because it strengthens the learner's communication and linking him to these networks.

C. There are those who call it associative theory because it links learning and the learner with the environment and peers, and also links the learning and teaching processes with devices and the Internet, so learning is an interconnected network.

Learning theory in the digital age is a theory that integrates educational applications of the principles of Chaos theory, network theory, complexity theory and self-organization theory, to explain learning in the current digital age, and Siemens considered in his theory that learning is procedural knowledge Actionable knowledge acquired outside of ourselves (in databases, a business organization, or social media for example) and that knowledge is distributed among people and things and is not owned by one individual, and that knowledge can only be obtained through contact with those human and non-human sources, and these sources can be represented by a network of nodes representing each node as a source of knowledge, and procedural knowledge is represented by two basic elements, the first is the knowledge itself, which varies from tacit knowledge, and the second is the action, meaning performing the tasks in the appropriate manner, and it considers that learning represents the process of recognizing and building various interconnections through the data and information provided, and that the educational environment represents a real virtual educational network through which the learner can practice self-learning and cooperative activities to discover himself, build his reading, and discover aspects of his distinction in the academic aspects to be invested in treating his deficiencies (Al Kanani , 2020: 108-109).

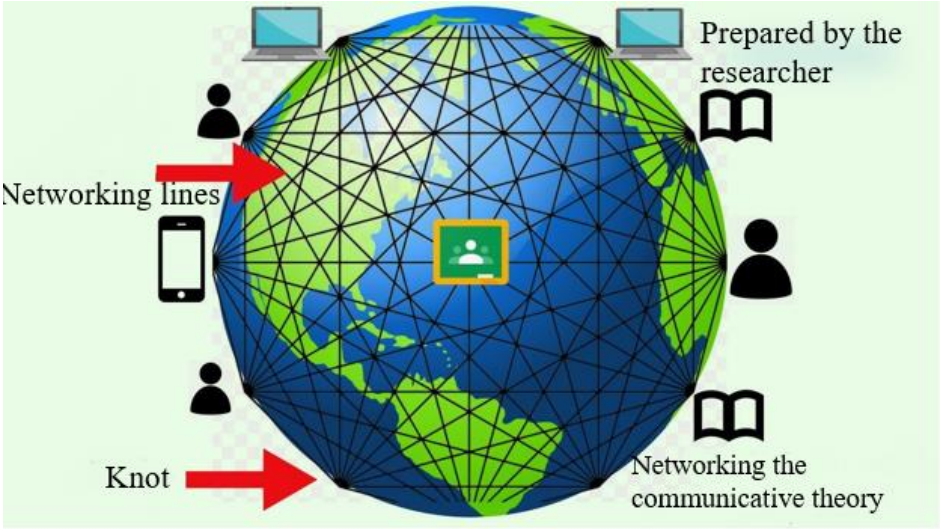

Figure (2) the learning process according to the communicative theory

2- The nature of the role of the teacher and the learner in light of the communicative theory:

The role of the teacher and the learner differed in the light of the communicative theory, as follows:

A- The role of the teacher: "Siemens" prefers to describe the role of the teacher as a director of a learning network, as he helps his students acquire the skills they need in order to build learning networks, and he also helps them evaluate the effectiveness of their learning networks (Siemens, 2008a: 5). The teacher becomes:

- Supports and guides and is no longer a tutor, as in the traditional situation of the teacher, which is represented.

- He trains, meaning that he trains his students to use modern technologies in their learning.

- He becomes a model in the sense that he is a good planner to use modern technologies himself so that he can imitate him and his students in making the things and materials he implements.

Decision-making: that the teacher is able to make a decision and has the ability to communicate with others in order to facilitate the learning process.

- Preparing the appropriate educational environment and creating a learning environment to make the student build his knowledge of himself.

It works to develop and encourage exchange and cooperation between students / and provides them with strong, supportive feedback. (Al-Kenani, 2020: 120)

B- The role of the learner: As for the roles of the learners according to the communicative theory, Siemens believes that they must have the ability to:

- Focusing on learning tasks even though exposure to some distracting factors.

- Managing the flow of information and extracting the important elements from it.

- Connect with others by building personal networks for learning.

- Follow up on the latest information, and the ability to critically evaluate information and examine information in terms of its truthfulness and accuracy.

- Recognizing the hidden patterns of meaning and accepting the occasional lack of clarity.

- Take responsibility for their participation in different learning networks, independence as well as self-confidence. (Siemens, G., 2006: 9)

Third: Previous studies

Due to the lack of a previous study that dealt with the independent variables themselves in this research, and the lack of studies that dealt with the design (educational - learning) according to the communicative theory, we are satisfied with presenting close studies that dealt with the variables in this research, as follows:

1- The study of (Gerges - 2016): It aimed to determine the effectiveness of a program based on the communicative theory by using some interactive Google applications in developing some digital skills and engaging in learning among students of the Faculty of Education, Assiut University.

2- The study of (Abu Hamada-2017): aims to measure the effectiveness of an enrichment program in geography based on communicative theory using second generation web tools in developing some geographical research skills for ninth grade students.

Research Procedures: The process of conducting the research required the following steps:

1- Research Methodology: The research method was used to measure the effectiveness of the instructional-learning design in the achievement of fourth-grade students in science in physics, and because it is appropriate to the nature of the research, the experimental method is the closest research method to solving problems in the scientific way.

2- Building the instructional-learning design according to the communicative theory: achieving the first objective of the research, which is "building an instructional-learning design according to the communicative theory in the scientific achievement of the fourth-grade students of the subject of physics, after reviewing the literature on educational designs, the theoretical background, and previous studies, it became clear that there are different opinions in its construction process and its steps.

Analysis stage: This stage includes:

A. Analysis of educational objectives: The educational objectives may be derived from the general objectives of teaching physics in the high grade curricula, which are approved by the Ministry of Education, in addition to the content of the scientific material from the physics book for the fourth scientific grade / first semester, which is required to be taught, and it was presented to a group of arbitrators and specialists in the field of physics and methods of teaching it to demonstrate its safety and validity, and in light of the observations and proposals of the referees and specialists, the final version has been taken.

B. Analysis of the academic content: by defining the vocabulary (the main and sub-headings contained in the content), defining the facts, concepts, terminology, generalizations, principles and theories that are extracted from each study topic, and then arranging them in a logical context appropriate for the cognitive environment in the subject.

C. Analyzing the characteristics of students: By conducting an equivalence process between the two groups of research in some variables, the researcher revealed:

-Chronological age: the research sample is from a similar age group between (15-17) years.

-Intelligence level: An equivalence was made between the two research groups, and it was found that the two groups are equal

Gender: The research sample is of one gender/males.

D. Analyzing the educational environment: The educational environment in which the educational design will be applied, represented by the Ibn Khaldun high school for Boys, was characterized by certain specifications, including: The type of school attendance is morning only, the system used in it is the one classroom system for each teacher, and the fourth-grade scientific students are divided into (14) separate groups, in addition, there is a large hall that contains a sufficient number of seats and is equipped with a smart board, data show and a computer to be used in displaying some videos, diagrams and illustrations to explain some of the physical topics included in the first semester, it provides a number of educational techniques such as posters and posters.

e. Assessment of educational needs: The needs were assessed from the students 'point of view by directing an exploratory questionnaire to identify the most important difficulties they face in learning the course material, and from the teachers' point of view, and the most important difficulties and needs they faced in teaching the subject were identified.

Preparation stage: it included:

a. Determining and organizing the academic content represented in the second chapter (mechanical properties of the material), and the third chapter (static fluids) of the physics textbook.

b. Formulating behavioral objectives: As (94) cognitive behavioral objectives, (9) skillful behavioral objectives, and (10) emotional behavioral objectives.

c. Identification of Teaching Strategies: A number of digital learning strategies have been identified that fit the instructional-learning design, including participatory learning, virtual classes, electronic knowledge journeys, blended learning, and the flipped classroom, as modern strategies that focus on the use of modern technologies and the Internet, as well as the method of discussion and lecture. writing reports, where a mixture of these strategies can be applied together, or one of them can be used according to the nature of the educational situation and the academic content, and there is a common factor between these strategies in which the student is the center of the educational process, and is active in acquiring knowledge, skills and trends.

d. Define educational activities and techniques.

e. Preparation of evaluation tools: it is a test of previous information that was applied to the experimental and control group as a pre-evaluation, as for the formative evaluation, electronic tests were prepared to be applied at the end of each electronic lesson, and the duties that are given to students to search for knowledge of new topics represented in pictures, summaries and videos from websites like Google & you tube for these topics, the final evaluation to see how much of the goals have been achieved was done through the application of the physics achievement test that was applied at the end of the experiment.

Implementation stage

This stage included the implementation of the instructional-learning design according to the communicative theory and the use of teaching strategies appropriate to the academic content and the educational position, and the use of various educational activities and techniques that are consistent with the subject of the lesson and linking them to the situations, events and life applications that exist in the environment in which the student lives by the researcher himself, because he is the most qualified, he is able to apply the design in all his steps, the teaching plans were implemented according to the schedule allocated for them with three lessons via the (Google class room) electronic platform and an interactive lesson inside the school.

Evaluation stage

It included the introductory evaluation: by presenting the design and its components, steps and content to a group of arbitrators and specialists in the study of physics and its teaching methods, and the structural evaluation by following up on the implementation of the design, as well as the final evaluation through the achievement test prepared by the researcher for this purpose.

Each stage was prepared and presented to experts to ensure its proper preparation and suitability for the mental age of the students and its representation of the scientific content.

3- Choosing the experimental design: The experimental design with two equal groups with a post-test was chosen to measure achievement and the productive habits of the mind, as in chart (1)

S	Group	valence	Independent variable	Dependent variable
1	Experimental	1.Time age in months 2.Intelligence 3. Previous achievement 4. Previous information 5. Parental education	Didactic-learning design according to the communicative theory	achievement
2	Control		The usual way	

Scheme (1) experimental design adopted in the research

4- Determining the research community and its sample: The current research community is made up of fourth-grade scientific students in the governmental day-to-day secondary and high schools of the General Directorate of Education in Baghdad / Rusafa 2nd - Education on the outskirts of eastern Baghdad for the academic year (2020-2021), and in an intentional way, the Ibn Khaldun intermediate school was chosen For boys to apply the research experiment due to the existence of the supplies needed by the researcher, and by the random method (the lottery method), (group 5) was chosen as the experimental group that will be studied by the instructional-learning design, and (group 12) to be the control group, and after excluding students who failed from both groups statistically, the number Students subject to the experiment in each group (20) students.

5- Preparing the requirements for the experiment: To conduct the experiment well, it was required to prepare the following supplies:

A. Preparation of teaching plans: (15) teaching plans were written for the experimental group and the same for the control group, both according to the methods and strategies of teaching tired with it, and its validity was confirmed by presenting a sample of it to the expert committee.

B. Opening a special channel to communicate with students through the (telegram) program, which is the program adopted by the school to communicate with students and broadcast electronic lessons either through printed paper summaries or video clips.

C. Creating a special platform within the (Google classroom) to communicate between the researcher and students and use it to organize and manage assignments, and its application is adopted through the Internet, smart devices and a computer, for viewing and viewing the lectures, assignments and academic content that are published on the application.

6- Building the Research Tool (Achievement Test): The test aims to measure the achievement of the research sample students for the content of the physics subject to be studied, represented in the second and third chapters of the fourth grade physics textbook for the academic year (2020-2021 AD).

(94) cognitive behavioral goals were formulated, distributed over the areas of Bloom's classification for the six cognitive objectives (remembering, comprehension, application, analysis, structure and evaluation).

And through an exchange of views with physics teachers for the fourth scientific grade, and based on exceptional working conditions, it was agreed that the achievement test items would not exceed 30 items only.

A specification table (test map) has been designed with two dimensions, the first for the relative weight of behavioral goals according to Bloom's cognitive six-fold classification, and the second represented by the relative weight of the academic content represented by the number of pages of the book. The test map was used to accurately distribute the test items. (20) items of multiple choice type were prepared, (objective items) with four alternatives, one of which is the correct answer, and the correction criterion for it is (0,1), as it allocated zero to the wrong and abandoned answer, one score for the correct answer, and (6) essay paragraphs, and model answers have been developed for them, and the score for each essay is between (0-5) degree, and by this the total score of the test ranges between (0) -50) degrees, with a hypothetical average of (25) degrees.

Verification of validity is the apparent test by presenting it to a group of specialists who have experience in physics, and the validity of the content by building a (map - test) in which the paragraphs of the course content and the behavioral goals are represented.

By applying to a representative sample of the community, the following were achieved:

- Finding the coefficient of discrimination by the method of the two extreme groups for each of the objective paragraphs, and it ranged between (0.22 - 0.59), and for each article item, the coefficient of discrimination ranged between (0.27-0.55).

- The difficulty coefficients were calculated for each of the substantive paragraphs, and it was found that they ranged between (0.33 - 0.74), and for the article articles, the difficulty coefficient ranged between (0.33 - 0.61).

Many measurement and evaluation scholars believe that the acceptable range for the difficulty factor is between (0,20 - 0,80) (Odeh, 1998, p. 297).

- Calculating the effectiveness of the wrong alternatives for all the objective test items and it was found that all of them are negative, so it was decided to keep the alternatives as they are without change.

- Stability of the test: The test reliability coefficient was calculated by adopting the formula (Alpha Cronbach), it is most suitable for achievement tests that include objective and essay questions, and the value of the reliability coefficient was (80%)

Thus, it is ready to be applied in its final form to the research sample.

7- Procedures for applying the experiment: To ensure the success of implementing the experiment, the researcher carried out the following measures:

A. Organizing a special hall for the purpose of teaching in it, and equipping it with a smart board, a computer and a data show by the school administration.

B. Opening a special channel to communicate with students through the (telegram) program, which is the program adopted by the school to communicate with students and broadcast electronic lessons either through summaries or video clips.

C. Creating two independent classes on the (Google classroom) platform, the first for the experimental group and the second for the control group, so that communication between the researcher and students can be used to organize and manage assignments, and their application is adopted through the Internet, smart devices and a computer, for viewing the lectures, assignments and academic content that are published on the application and for the purpose of subscribing Students are invited to join the classes by entering their email address.

D. The scientific material was taught according to the weekly schedule of lessons at the rate of three lessons per week that are broadcasted electronically through the application (Google Classroom, Telegram) for the students of the experimental group, and what was presented during the interactive attendance inside the school is reviewed. For lessons and send them as images on the Telegram application)) only and review them in the class during the live interactive attendance. For the experimental group

E. The course material has been added, read in PDF format, and images, charts, slides and films have been added directly or by adding links to access it from YouTube or blogs and special sites chosen by the researcher

F. For the purpose of equivalence, apply an IQ test and previous information before starting to apply the experiment.

G. Before starting the actual teaching of the students, the researcher explained the nature of the strategies that he will use in teaching for both groups. H. The researcher studied the students of the two groups of the same research, and according to the previously prepared teaching plans, the experimental group (5) studied the educational design - learning according to the communicative theory, after the researcher made the first class clarifying its meaning, benefits and applications, while the control group (12) was taught according to For the traditional way.

I. After completing the teaching of the course assigned to the two research groups, the achievement test was applied to the two research groups (experimental and control), whereby students were informed of the test date before an appropriate period of time.

Presentation and interpretation of results

The results will be presented according to the research objectives as follows:

- The first objective (building an instructional design - learning according to the communicative theory to teach physics to high school students) was verified, and the details of achieving this goal were presented through the procedures and steps included in the stages of building the instructional-learning design according to the communicative theory that was done detailed in the previous steps.

- The achievement of the second objective was verified: which states: to identify the effectiveness of instructional-learning design according to the communicative theory in the academic achievement of physics for fourth-grade students, through testing the null hypothesis which states:

(There is no statistically significant difference at a significance level of 0.05 between the average scores of the students of the experimental group that will study according to the instructional-learning design based on the communicative theory and the average scores of the students of the control group that will study the same subject according to the usual method in their academic achievement).

By applying the achievement test to the research sample, correcting the answer sheets, monitoring scores, calculating the arithmetic mean and standard deviation for the two groups (experimental and control), and using the t-test for two independent samples, and through the statistical application Spss, the results appeared as in the following table

Table (1) Statistical Indicators for the Achievement Test

Group	Number	Arithmetic average	Standard deviation	Degree of freedom	(t-test) Value		Statistical significance
					Calculated	tabular	
Experimental	20	38.35	7.78	38	3.64	2.04	Statistical function at (0.05) level
Control	20	27.55	10.74				

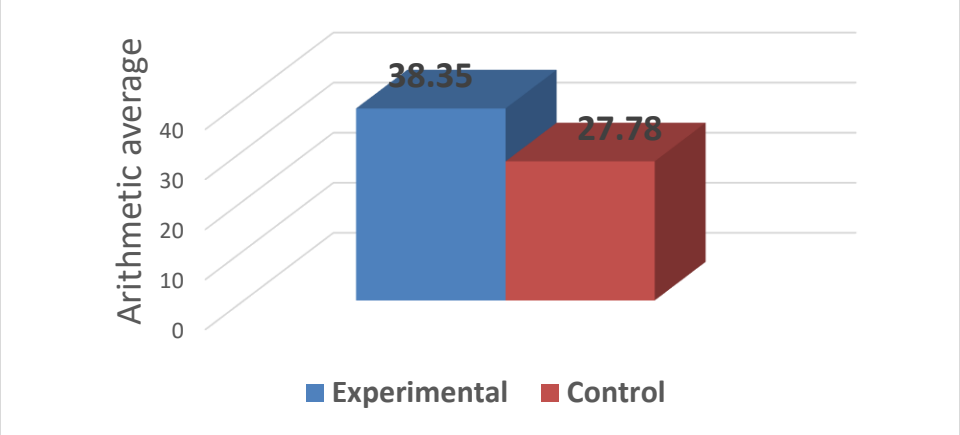

Figure (3) The averages of the two groups on the achievement test

From Table (1) and Fig. (3), it becomes clear that the arithmetic average of the grades of the students of the experimental group is equal to (38.35) with a standard deviation (7.78), while the arithmetic avarage of the grades of the students of the control group is (27.55) and with a standard deviation (7.78).

This means that there is a noticeable difference between the two mean values and that the experimental group's scores were more homogeneous than the control group's scores. It also appears that the calculated T value is equal to (3.64), which is greater than the tabular T value of (2.04) at the level of significance

(0.05) and the degree of freedom. (38), and this confirms that the difference between the two averages is significant and in favor of the mean of the experimental group, thus rejecting the null hypothesis and accepting the alternative hypothesis.

In order to ensure the effectiveness of the instructional-learning design according to the communicative theory as the independent factor on the dependent variable achievement, the researcher used the Ita square test (η^2),and the value (df), which expresses the size of the effect, where the effectiveness can be calculated in more than one way, including the Effect Size (Hassan, 2013, 24), and as in Table (2)

Table (2) values of (η^2), df and the effectiveness of the effect on the achievement variable

Independent variable	**Dependent variable**	**T-value**	**η^2 - value**	**value df**	**Effect Size**
Instructional-learning design according to the communicative theory	**Achievement**	**3.64**	**0.259**	**38**	**Large**

(Nassar, 2006) indicates that the effect size for two independent samples should be determined using the Ita square if it is large, medium or small, as shown in the following table.

Table (3) A criterion table to determine the level of the effect size

Equation used	**Effect Size**		
	small	**medium**	**large**
η^2	**0.01**	**0.06**	**0.14**

(Nassar, 2006, 54)

We notice from Table (2) and (3) that the size of the impact of instructional-learning design on achievement of the research sample is large, because the value of (2) is greater than (0.14), this means that the didactic-learning design has a clear effect on increasing the achievement of the experimental group students compared to that of the control group students.

And the size of the difference resulting from the use of the T-test is due to the effect of instructional-learning design according to the communicative theory and not to other variables.

This result is consistent with the results of the study of (Gerges, 2016) and (Abu Hamada, 2017), which indicated the superiority of the experimental group over the group in the post-test of academic achievement.

That the superiority of the experimental group over the control group in achievement may be attributed to:

A. Instructional – learning design according to the communicative theory has provided an educational environment according to the students' educational needs, and the educational content is presented in a somewhat new way to what students are accustomed to in time and place, and that the diversity of educational activities and the adoption of different sources of information, especially digital ones, and the effective participation of students in the search for information, in terms of quantity and quality, and exchanged with each other, which provided an atmosphere of suspense and motivation and increased their motivation to learn and acquire information.

B. The instructional-learning design according to the communicative theory has provided a learning environment according to the students' educational needs, including real and virtual activities and practical experiences that link the students' previous experiences with the new ones to be learned, and the current learning with the previous learning, all of which create situations that challenge the students' minds, and it works to stimulate their thinking and motivate them to understand and acquire knowledge and physical information, and then increase their cognitive achievement in this subject.

C. The diversity of activities included in the educational-learning design according to the communicative theory, such as displaying pictures, educational videos, and summaries, increased the students' motivation to learn new experiences, which helped in acquiring knowledge and some skills and realizing relationships, which led to an increase in understanding of the educational content and the growth of their cognitive, skill and emotional abilities.

D. Instructional - Learning design provided the opportunity for students to work in cooperative groups and share with each other while carrying out learning tasks through electronic communication through the educational platform outside the scope of the formal lesson, which led to achieving understanding and generating a greater number of ideas and expressing them freely, and effectively sharing with others Accept the other opinion.

E. Instructional-learning design, making students the focus of the educational process, and encouraging them to participate in the collection of knowledge from its various sources such as websites, blogs, and groups specialized in presenting physical information, it was easy to get rich and interesting educational experiences, which increased their spirit of enjoyment and joy, and broke the feelings of boredom and frustration.

F. The diversity in the use of digital learning strategies provided the opportunity for students to search for physical knowledge from many sources of information online, analyze and summarize this information, and thus discover physical knowledge for themselves.

G. Using the Google Classroom platform, making the course physics content just a meeting point among other meeting points, and the student interacted with it through networked learning activities, so that it became an enriching educational environment and provided opportunities for students to dialogue and socialize with each other and with the teacher and share knowledge and activities.

Sixth: Recommendations: In light of the findings, the following can be recommended:

1. Paying attention to modern technology and integrating it into the educational process in general, and teaching and learning physics in particular.

2. Employing and translating the principles of communicative theory into teaching models (instructional plans) in teaching and learning physics.

3. Using participatory electronic-learning tools and applications and the principles of communicative theory in teaching and learning the physics curriculum for high school students.

Seventh: Proposals: To complete the findings of this research, the researcher proposes to conduct the following studies:

1. The effectiveness of an instructional-learning design based on the communicative theory in physics achievement and the development of other variables (reflective thinking, visual thinking, and creative problem solving) among high school students.

2. The effectiveness of an instructional-learning design based on the communicative theory to acquire scientific concepts in the different stages of education and to develop some science fiction skills and future thinking among high school students.

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