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"THE EFFECT OF THE FLIPPED LEARNING STRATEGY IN ACQUISITION FOURTH-GRADE SCIENTIFIC STUDENTS WITH BIOLOGICAL CONCEPTS"

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Abstract

This research aims to know the effect of the flipped learning strategy on the acquisition of the tenth scientific students with biological concepts.

The present research deals with the inverse learning to make the fourth acquire the biological concepts and to develop their scientific culture. To accomplish the objective of the study, the researcher put forward six zero hypotheses and the research was confined to the fourth degree students (scientific branch) at Damascus School for Boys for the academic year (2021-2022). The researcher used the experimental design with two equivalent groups with partial precision. The experimental group was studying in accordance with the inverse learning strategy, while the control group was studying using the ordinary method. The sample feedbacked (52) students divided into (26) students in the experimental group and (26) students in the control group. The equivalence between the two groups of the research was performed in terms of the variables of the age of students measured in months, the education of the parents, the general average of the students' marks in the final examination in the third intermediate grade. To achieve the objective and the hypotheses of the research, the researcher prepared a test to make the students acquire the biological concepts of the biology subject.

To achieve the objective and the hypotheses of the research, the researcher prepared a test to make the students acquire the biological concepts of the biology subject and he also prepared the scale of the scientific knowledge. The researcher verified the invariability of the tools by submitting them to a group of experts who are specialized in the field of methods of teaching. the test of concept acquisition was agreed upon with a percentage of (85%) and above, while the scale of the scientific knowledge was agreed upon with a percentage of (85%), the invariability coefficient of the scientific knowledge scale was (0.861) and this coefficient is considered good with accepted.

in the first term of the academic year (2021-2022) and lasted for 10 weeks as the researcher himself taught the subject to the sample at the school mentioned above

After collecting the data and analyzing it using the SPSS package and the results showed the following:

1. There is a significant difference at the level (0.05) between the average marks of the experimental group of students who studied according to the inverse learning strategy and the average marks of the control group of students who studied in the normal method in the test of biological concepts acquisition in favor of the experimental group in the test of concepts acquisition.

Need, the researcher submitted a set of recommendations, most prominent of which are:

1. It is necessary to hold training courses for the male and female teachers of biology subject of using the modern strategies for teaching biology subject.
2. Advising the teachers of biology subject to adopt the inverse learning strategy in teaching at the secondary schools. The researcher submitted several suggestions for future researching, which includes:
   - Conducting future studies that deal with the dependent and independent variables and apply them to other subjects and other grades of study.
   - The effect of using the inverse learning strategy on the acquisition of the second-gradestudents in the subject of science and developing their scientific knowledge

Definition of research

First : Research Problem: Research Problem

The current era is one of the most era in which the world has witnessed tremendous development and rapid change in various areas of life, especially in the field of education , and as a major step to develop education in Iraq in line with the global developments in this field, the Iraqi curriculum has been developed. (Hassoun et al , 2015 :381)

The researcher has noticed through his teaching of science for the primary stage that there is a lack in the diversity of teaching strategies, and that the tools of technology are not used in the teaching process significantly, as a large number of teachers still adopt the usual method of teaching, which has the largest role in the teaching process for the teacher and the student's role remains limited to receiving information .

In inverse learning, students rely on themselves to watch educational films at home at their own pace and time. This pattern enables them to re-watch the explanation of a certain point more than once , or accelerate the presentation to reach what is required, with the possibility of watching through computers or mobile devices, which allows them to engage in the educational process at any time, and it also gives them an opportunity to take notes during the watching , taking into account that students are not required to understand everything , but only to be familiar with the basic concepts of the subject . (Metwally , 2015:10)

Through research, review and extrapolation of previous studies, the researcher did not find (within the limits of his knowledge) studies to investigate the effect of the flipped education strategy in the acquisition of biological concepts for students in the subject of biology, which the researcher had the sense that there is a need to study the effect of this strategy among fourth grade scientific students, and the use of computer educational software and its integration into education and improve communication between the teacher and students inside and outside the classroom to reach the desired educational goals, God willing.

Based on the above, the research problem can be determined by the following question (What is the effect of the flipped learning strategy in providing fourth-grade scientific students with biological concepts)?

Second: Importance of the study :Importance of the Research

Education aims to bring about continuous growth and adaptation for the student in all physical, mental and emotional aspects and from all the angles that make up society and its culture , as well as its various activities such as social, scientific,

cultural and political based on the experiences of the past, the characteristics of the present and the predictions of the future , so it adopts the new generations in a human society at a certain time and place, and the development of all aspects of their individual personality and in a way that enables them to develop them to the highest degree possible through what they acquire of knowledge, skills and attitudes that make the student adapted to himself and his environment and changing life situations. (Al-Hajj , 2013: 13)

Therefore, the development of education has become inevitable , not the tool that develops and develops the potential of the learner and the transfer of knowledge to him in an orderly manner . (Abbas , 2018 : 4)

Flipped learning is one of the strategies of integrated learning, which is an educational system that benefits from all available technological capabilities and media, by combining more than one method and tool of learning, whether electronic or traditional , to provide a new type of learning that suits the characteristics and needs of learners on the one hand , and the nature of the course and the educational objectives we seek to achieve on the other hand . (Awad & Abu Bakr , 2010: 7)

Johnson , (2014) points out that flipped learning, which is one of the types of integrated learning, which combines the activation of technology in learning without neglecting the role of interaction between the teacher and the learner with the presence of technology and its tools as a specific tool for effective learning; To be a candidate for fundamental changes in the educational context and educational institutions, the flipped learning strategy enriches the educational process, and achieves positive learning outcomes at the cognitive level represented in increased achievement , skills acquisition, and emotional skills represented in the love of the study material and positive interaction with it within the classroom between the teacher and learners , or between learners with each other . (Johnson, 2014:24)

Therefore, the flipped learning strategy is one of the strategies of education that helps to attract the attention of the student and excite him/her from the traditional and routine environment, in which the learner feels pleasure and vitality, as it is included in the e-learning strategies that have emerged recently according to scientific and technological progress in the educational field. (Strayer, 2007:17)

Scientific concepts, including (science), 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 of principles, generalizations and scientific theories by reducing the huge amount of facts. Concepts are easier to remember and more stable and stable. Concepts help to organize experience and reduce relearning and facilitate the transfer of the effect of learning by applying it in different situations several times. They are a successful way to stimulate the process of intellectual growth and push it forward and use the method of scientific thinking in facing problems and solving them by considering (concepts) as one of the tools of thinking and basic investigation. (Rhetorical, 2005, 40) Recent trends in the teaching of science indicate the importance of scientific concepts as a major goal of science education, in contrast to the prevailing great emphasis on separate facts, which at the time teaching methods were limited to confirming the preservation process and its exposure to forgetfulness. The focus on learning concepts facilitates a better understanding of the subject matter as well as the adoption of new teaching methods. The importance of scientific concepts, their status and the benefits of learning them can be explained as follows:

1- Facilitating the process of selecting academic content so that the main criterion in this selection is the extent of the relationship of educational facts and attitudes in shaping, learning and acquiring concepts.

2. Building successive and interrelated curricula at different educational levels, thus contributing to the achievement of the criterion of continuity and continuity in these curricula .

3- An effective means of linking different subjects to each other, thus achieving knowledge integration, which is one of the modern trends in education .

4- Helps the student to remember what he is learning and thus reduces the need to relearn as a result of forgetting, which is one of the main problems in education .

5- Contribute to facilitating the transfer of the effect of learning to other new educational situations.

6- Helps to increase students' understanding of the subject as the concepts help to link between different scientific facts and thus make it easier for the student to learn them . (Abu Diyah , 2011 : 305-306)

Third: Objective of the **research:** The current research aims to identify: -

- The effect of the flipped learning strategy in providing fourth grade students with biological concepts.

Fourth: Research Hypothesis: (Research Hypothesis)

1- There is no statistically significant difference at the level of significance (0.05) between the average scores of students for the experimental group studied according to the flipped learning strategy, and the average scores of students for the control group studied according to the normal method in the test of acquiring biological concepts .

Fifth : Thelimits of the research: The current research is determined :

First : Fourth grade students in the center of Mosul city.

Second: The first semester of the academic year (2021-2022).

Third : Damascus middle School for Boys /on the right side of the city of Mosul .

Fourth : The Book of Biology for the fourth grade middle school by Hussein Abdel Moneim Daoud, Nasr Farhan Abdullah, Mazen Nof Abboud, Rabha Ismail Shaheen, Nadia Hussein Younis, and Salem Adai Asal ,Edition 9, Ministry of Education Press,Iraq , 2018.

Sixth : Search Terms

Flipped learning strategy (Flipped learning strategy) defined by :

Aaron and Sarhan (2015): Built-in learning in a constructive learning environment, teacher-centered and learner-centered learning is integrated, and includes interactive activities for small groups within the classroom and direct individual instruction based on the use of technology . (Aaron and Sarhan, 2015: 18)

Acquisition of concepts : Defined by :-

2-(Al-Hashimi , 2013): -It is a logical organization of scientific experiences and facts that have been reached by knowing the relationships between them and can give a name. (Al Hashimi , 2013 :37)

As for the procedural definition: It is the degree obtained by the student in the test of acquiring biological concepts, which was prepared by the researcher for this purpose .

Theoretical framework:

Flipped learning has been called several things such as flipped learning, feedback learning, inverse learning, flipped classes or inverse classes.

Justification for using flipped learning:-

1. The high cost required by some subjects such as applied subjects, which cannot

The school provides its requirements.

2. The rapid technological development in the use of modern technologies. Most students spend most of their time online using their smartphones or tablets.

3- The accumulation of knowledge momentum, which depends on the need for diversity in learning methods and methods.

6- Individual differences between students in their speed of understanding and comprehension of the content of the lesson.

(Sherman, 2015 : 171-169)

Advantages of flipped learning:-

1-Working to create an educational environment that promotes the student's responsibility to learn and develop special skills while increasing his motivation.

2. Gives the teacher the opportunity to use more time to discuss and clarify concepts for students.

3- The student has the opportunity to access the content of the lessons at any time and see it several times.

4- Flipped learning allows the student to provide a richer participation in the learning process.

5- Flipped learning helps to develop the student and transform him from a recipient of knowledge to a component of knowledge.

(20: Et al , 2013 Mason)

Components of flipped learning:-

1-A video tutorial to be applied outside the classroom.

2. Collaborative interaction between the students themselves and the teacher within the classroom.

4- Absence that occurs to the teacher or student from the lesson due to bad weather or because of

Health conditions and the consequent loss of performance and attendance of the lesson for the teacher and student.

5 - The large numbers of students within one lesson, which makes the teacher spend more time in the process of explaining the scientific material to some students who have not received the information in the required form.

3-Observation and feedback. (29: Marshall, 2013)

Steps to implement the flipped learning strategy: -

1-The student watches the educational video set by the teacher before the home lesson through the computer, mobile device or tablet . (Strayer, 2007,26)

2- The student takes notes and questions while watching the educational video because he can pause the video to take notes as well as provide and return the explanation so that he can understand the points he wants .

(Hockstader, 2013,10)

3. The student comes to the lesson with a basic understanding of the main ideas related to the subject of the lesson , taking into account giving time at the beginning of the lesson to students' questions about the subject they have seen, and a discussion is made about it, after which the teacher has prepared the activity for the day, which may be in the form of laboratory experiments, investigative research tasks, or applied activity on solving the problem related to the lesson , or even a formative test, with the possibility that the activities of the lesson contain more than one activity or task . (Bergmann &Sams, 2012 , 2)

Scientific Concepts

Scientific concepts are one of the most important products of science through

which scientific knowledge is organized and summarized in meaningful forms. Scientific concepts have a role in the growth and development of knowledge because they are the language of science and the key to true scientific knowledge and the common language among scientists. They are the basis of the learning process. The formation of basic concepts from childhood begins when the child tries to explore the factors and stimuli surrounding him. Therefore, learning the concept has become an urgent necessity and an important educational goal for all levels of learning . (Al-Maadidi , 2016: 47)

The teaching of concepts must also be in line with the characteristics of students and their level of maturity in order for education to be meaningful. The teaching of concepts and their acquisition for students has become one of the general objectives that those interested in scientific education seek to achieve through the teaching of science at different stages of education. (Sinjari and Mahmoud, 2000 : 135)

educators have been interested in identifying ways to facilitate the teaching, acquisition and discovery of concepts. There are several directions for teachers that facilitate the process of teaching scientific concepts, including :

1- Separating scientific concepts from facts, principles and examples .....Etc. of the subject matter .

2- Defining the concept by giving it a clear name or definition.

3- Examine the examples and determine their distinctive characteristics to form the definition after identifying the features of the examples and characteristics that are based on the concept and none of them are based on it .

4- Presenting the intended and positive examples that lead to testing the acquisition and learning of the concept through perception cases that extend to the real features of the concept .

5- Comparing the contexts of the scientific concept for its application and dissemination in other situations (Alwan 2014 :70)

Stages of concept formation: -

Bruner, referred to in Al Sahar (2016), has identified three relays for concept formation:

1- The first stage: It is the scientific or sensory stage in direct interaction with environmental things and attitudes, and here the student shapes the concepts by linking them to actions and actions carried out by himself .

2- The second stage: It is the stage in which the student transfers his information to imaginary images.

3- The third stage: The symbolic journey is the stage in which the student reaches abstraction and the use of symbols . (Al Sahar , 2016: 59)

Concept Learning (Concept Acquisition) :

The interest of educators in teaching concepts to students is more difficult than their desire to achieve learning, which may be of the highest value in transferring the educational effect of knowledge and skills to new situations. The non-conceptual knowledge system is transformed during the comparison and discrimination process into a conceptual system, that is, it makes the facts meaningful in the mind. Researchers and

Factors Affecting Concept Learning: -

1.Number of examples : The more examples, the easier it is to learn the concept.

2- Past experiences of the learner : The learning of scientific concepts increases with the increase of mental experiences.

3- The number of characteristics belonging or not belonging to the concept : The more the number of characteristics belonging to the concept, the more the concept will be learned and vice versa .

4- Themethod of displaying examples : The systematic presentation of examples leads to a better acquisition of the concept (Salama , 2004: 60)

Literature Review

First : Studies that dealt with flipped learning: -

1- Basharat Study (2017):

This study was conducted in Palestine . It aimed to know the effect of using the flipped learning strategy on the achievement of students in the tenth grade and on the concept of sports self in the governorate of Jericho. The researcher used a semi-experimental approach and applied the study to a sample of (43) students, where they were divided into two groups, one of whom was an experimental group consisting of (19) male and female students, and the other female officer, whose students reached (24) male and female students during the second semester of the year (2016-2017). The researcher prepared a teaching guide for the Vacuum Engineering Unit according to the flipped learning strategy. A post-achievement test was also used to measure the achievement of students with the material they studied. The results showed that there were statistical differences between the average scores of the experimental and control groups in favor of the experimental group that was taught using the flipped learning strategy. (Badges , 2017 , A-B)

2- Al-Aqaili Study (2019):

This study was conducted in Iraq . This study aimed to identify the effect of using the flipped learning strategy in teaching physics in achievement and developing the scientific thinking skills of students in the fifth scientific grade. The study used the semi-experimental curriculum. The study sample consisted of (68) students who were chosen intentionally and appointed randomly to two groups. The first is an experimental group with (33) students studied using the flipped learning strategy. The second is a control group with (35) students studied in the usual way. The results of the study showed that there is a statistically significant difference in student achievement between the experimental group that was studied using the flipped learning strategy and the control group that was studied in the usual way in favor of the experimental group, and there is a statistically significant difference in scientific thinking skills in favor of the experimental group. (Al Aqaili, 2019: A-B)

Second : Studies dealing with the acquisition of scientific concepts: -

1- Al-Azzawi Study (2013) :

This study was conducted in Iraq in the city of Mosul . The definition was aimed at following the use of the Freyr model in providing first-grade students with average physical concepts and developing their scientific tendencies.

The study sample consisted of (76) first-grade students, who were randomly distributed into two equal groups in a number of variables . The first experimental consists of (37) students studied according to the Freyr model and the second is an officer composed of (39) students studied according to the usual method and to achieve the objectives of the study, two tools were prepared. The first is the test of acquiring physical concepts, which consists of (30) topical paragraphs, and the second is the scale of scientific tendencies, which consists of (43) standard paragraphs. After applying the study, the data was analyzed statistically and the researcher used the following test for two independent samples. The results showed the superiority of the experimental group, which was studied according to Fryer's model, over the control group in acquiring physical concepts and developing scientific tendencies.

(Al-Azzawi , 2013 : a-b)

2- Al-Omrani and Haidar Study (2014):

This study was conducted in Diwaniyah, Iraq. The aim was to identify the

effectiveness of teaching (PDEODE) strategy in acquiring physical concepts among second-grade students .

The study sample consisted of (60) students from the second intermediate grade and then randomly distributed among two equal and equal groups of (30) students in each group. The first experimental test was studied according to the strategy (PDWODE) and the second controlled according to the normal method. To achieve the goal of the study, a test was prepared to acquire physical concepts consisting of (45) objective paragraphs of the type of multiple selection. After the application of the study, the two researchers analyzed the data and used the following test for two independent samples. The results showed the superiority of the experimental group studied according to the strategy (PDEODE) over the control group in acquiring physical concepts.(Al Omran & Haider , 2014)

Research design

First : Experimental Design of Research (Experimental Design)

The researcher adopted the experimental design with partial adjustment, which is called (Cohen , 2003 : 213), which suits the current research procedures, and this design includes two equivalent groups, one of which is an experimental group studied using the flipped learning strategy, while the other control group remains studying in the usual way

Second : Identifying the research community

The current research community has identified all students in the fourth scientific grade of the daytime preparatory schools, which are (6728) students in the middle schools (daytime) in the city of Mosul for the academic year (2021-2022), and the number of (33) preparatory schools for boys .

The researcher has obtained this information under the task facilitation letter

Third : Selection of the research sample (Sample of The Research)

To select the research sample, the researcher followed the following steps:

A- School selection: The researcher intentionally chose a school (Damascus Preparatory School for Boys) to represent the research sample for the following reasons

1- The school is located on the right side of the city of Mosul because the researcher is a resident of the right side.

2. The school administration expresses its readiness to cooperate with the researcher and provide the necessary facilities for the implementation of the experiment, which is necessary for the success of the experiment .

B-Selection of the two research groups: The researcher chose in a simple random way the experimental and control groups. Division (B) was chosen at the Damascus Boys School to represent the experimental group that teaches biology according to the flipped learning strategy and Division (A) from the same school to represent the control group that teaches the same subject according to the usual prevailing method. The number of students in the experimental group was (29) students , and the number of students in the control group was (33) students. The researcher then excluded students who failed in both groups because they had previous experience from last year. Thus, the number of students for the experimental group was (26) students and the control group was (26) students , so the research sample consisted of (52) students , as shown in Table (1)

Table (1) shows the number of students in the two research groups before and after exclusion

group	The School	Class.	Section	Number of students before exclusion	Number of Students who failed	Number of students after exclusion
Experimental group	Damascus	Four	B	29	3	26
Control group	Damascus	Four	A	33	7	26

(first semester, second semester, third semester, fifth semester) .

2- Formulating behavioral purposes: The researcher formulated behavioral purposes in light of the specialized scientific material within the limits of the research in biology , and after consulting the specialists in the field of teaching methods, the researcher decided to adopt the first three levels (remembering, understanding , and applying) of Bloom's classification of the cognitive field, and the behavioral purposes were formulated for the content of the scientific chapters (first , second, third , and fifth) of the Biology textbook scheduled for the fourth preparatory grade (36) goals by (17 , 15 , 4) goals, respectively, and then presenting the list of behavioral purposes to a group of experts in the field of methods .

3. Preparation of educational plans: The researcher prepared educational plans for both the experimental and control research groups in light of the behavioral objectives of the subject and based on the lessons prescribed for this subject at a rate of (3) lessons per week and according to the educational steps specified for the flipped learning strategy of the experimental group and the usual method of the control group, then the researcher presented a model of the educational plan Appendix (4) to a group of experts and professors to judge its validity , and they expressed their approval , and in light of this, the researcher prepared a number of other educational plans for both the flipped learning strategy and the usual method (prevailing) and reached (26) plans for each .

Fourth : Equivalent of the research groups

One of the conditions of experimental research is that the members of the two groups of the research sample should be equal in some variables, not the success of the experiment , and that the researcher should be able to show the effect of the independent or processed variable on the dependent variable (Almarshali, 2016:137)

Therefore, the researcher considered to conduct the equivalence process between the students and the two research groups (experimental and control) statistically in a number of variables that may affect the dependent variable at the expense of the independent variable. These variables are :

(Chronological age in months, educational level of fathers , educational level of mothers, parity in the general average)

Fifth : Research requirements (Requirements off the Research) :

For the purpose of implementing research procedures and verifying its objectives and assumptions, this required the preparation of some requirements, namely :

1-Determining the scientific material: The researcher specified the scientific material covered by the research , which will be taught to the students of the research sample during the duration of the experiment according to the vocabulary of the Biology textbook to be taught to students of the fourth preparatory year (2021-2022) and includes the classes

took an agreement rate of (85%) and more as a criterion for accepting the paragraphs or not. Thus, all the paragraphs obtained this percentage. Thus, the researcher verified the validity of the test .

6- Drafting test instructions: Test instructions are important and necessary to guide the learner in how to perform the test , and whatever the test and its paragraphs are important and an effective expression of the study material, they become useless if the learner can not write their answer to the questions and the learner must know how to write his answer within the specified time to answer , so that his response to the paragraphs fully expresses his real abilities (Melhem , 2017 : 272)

Therefore, the researcher prepared the instructions for answering the paragraphs of the concept acquisition test to look easier and clearer. The instructions included the number of test items, and asked students to read the test items carefully before answering each paragraph of what they think is correct and appropriate .

7. Experimenting with the test :

In order to verify the psychometric properties of the concept acquisition test items (strength of distinction , difficulty coefficient) and to determine the clarity of the test items and instructions , and to calculate the time taken to answer, the researcher applied the test to an exploratory sample of (100) students from outside the basic research sample, on Monday (12/12/2021) , as the sample was tested from Omar Ibn Al-Khattab School.

8- The statistical analysis of the test items: After applying the test to the exploratory sample, the data were collected and corrected and then arranged by the researcher in descending order, as he took (27%) top and (27%) bottom in order to calculate the psychometric properties represented by: -

a- Paragraph difficulty coefficient: Therefore, the researcher used a difficulty equation for the paragraph , where the

4- Research tool: The current research requires the preparation of a test to acquire biological concepts according to the following steps:

1- Viewing previous literature and studies

2- Content analysis: The researcher analyzed the scientific material in the book of biology scheduled for the fourth preparatory grade within the limits of the research experience by adopting the number of concepts in each chapter

The researcher developed a list of (40) concepts and then presented them to the experts with specialization in the field of teaching methods to ensure the validity of these concepts. The experts suggested limiting them to the basic and non-repeated concepts that the student is studying for the first time for each of the chapters that the researcher taught to students. Based on the above, the researcher chose(12) concepts and according to the elements of the concept (definition , application , example) that fit with Bloom's classification (remembering , understanding , and application) and presented them to the experts to ensure that the conditions above are met. All the paragraphs obtained the agreement of the experts, and thus the total number of paragraphs (36) became distributed to the elements specified by (12) items for testing for each element .

4 - Formulation of test paragraphs: After reviewing the tests in the previous studies, the researcher drafted test paragraphs of the objective type, as they were of the type of multiple choice of three alternatives when defining, exemplifying and applying .

5- Test validity: Test validity is the most important characteristic of a good test, and the test is honest to achieve the purpose for which it was designed. (Omar et al , 2010 : 189)

In order to verify the validity of the test, the researcher offered the test to a group of experts with experience and specialization in teaching, measurement and evaluation methods and specialists of this subject. He

apply the experiment in the first semester of the academic year (2021-2022) at the Damascus Boys School. The experiment was applied on Sunday (7/11/2021) and lasted until Monday (17/1/2022), i.e. it took (10) weeks to apply the experiment.

After the completion of the research experiment, the researcher applied the test of acquiring biological concepts on Sunday (16/1/2022) .

Ninth : evaluating research tool: The researcher developed model answers for all the paragraphs of the concept acquisition test, and also set standards to fix the answers to the paragraphs of the concept acquisition test as follows :

- One score for correct answer for each of the test items.

- Zero for incorrect or abandoned answer or which contains no more than one alternative in the paragraphs

Search Results and Discussion

This chapter includes a presentation of the research results reached in accordance with the hypothesis imposed by the researcher and to achieve his goal , and then discussed as follows :

I. Presentation of results :

Hypothesis : There is no statistically significant difference at the level of significance (0.05) between the average scores of students for the experimental group that was studied according to the flipped learning strategy, and the average scores of students for the control group that was studied according to the normal method in the test of acquiring biological concepts. As shown in the table

level of difficulty of the paragraphs ranged between (0.20 - 0.80), which is an acceptable value depending on the tight ratios . (Abu Aqeel, 2017 : 229)

Thus the researcher verified the difficulty of the vertebrae

B – The discriminatory strength of the paragraphs : In order to calculate the discriminatory strength of the paragraphs, the researcher used the discriminatory strength equation for the test paragraphs, as the strength of its distinction ranged between (0.30 – 0.63) , and through the results, all the test paragraphs were adopted because the coefficient of its distinction is greater than (0.30), so I came back distinct .

9- Stability of the test : The test was applied on Tuesday (14/12/2021) to a sample of (30) students of the fourth grade (middle school)

The researcher used the Corder Richardson equation -20 because it deals with scores (0 – one) as well as ease and difficulty. The degree of stability was found to be (0,851), which is a good stability coefficient.

(Al-Abbasi, 2018) indicates that stability is good as the coefficient of stability is (0.7) or more (Al-Abbasi, 2018: 296).

The test was thus ready to be applied to the sample members.

Eighth : Execution of experiment :Execution of experiment

After selecting the research sample and verifying its equivalence in a number of variables , preparing teaching plans and research tools, and the researcher's attempt to control the internal and external safety of the experimental design before applying the experiment, the researcher began to

Mean, standard deviation and test value (s) for test (acquisition of concepts)

Testing	Number of students	Arithmetic mean	standard deviation	T value		Significance level
				Calculated	tabular	
Control group	26	20.343	3.236	3.766	(2.009)	Significant

Experimentation	26	24.034	3.809		(50)	

* Significant at the error rate (0.05) and at the degree of freedom (50) (C) the table = (2.009)

and time and taking notes, unlike what happens in the usual way.

4- It may be attributed to the fact that the flipped learning strategy develops the spirit of cooperation among students and teamwork, through the sharing and discussion of opinions among students before attending class and during the lesson through the activities set by the teacher.

The flipped learning strategy is best provided by the optimal investment of lesson time, and the benefit of the flipped learning strategy lies in helping students to interact with each other, interact with the teacher, and develop positive relationships based on cooperation.

The fact that the flipped learning strategy is one of the modern strategies leads students to wonder and explore what they have seen, and cultivate a spirit of interaction and enthusiasm to explore, and thus students have turned from passive recipients to active and positive in their learning.

In general, the flipped learning strategy makes the student an effective element in the educational process, as the student has become a part of the responsibility, through follow-up and the use of optimal methods to access information , and the desire to learn more and observe scientific phenomena.

The researcher believes that this result is logical because the flipped learning strategy takes into account the individual differences between students , whether in the speed of learning or the method of learning , and therefore following the flipped learning strategy contributed to reducing the differences between students in acquiring self-organized learning skills.

The results of the current study were consistent with many previous studies that dealt with the flipped learning strategy, such as the study of Basharat (2017) , the

It is clear from the above table that the calculated T-value is (3.766), which is greater than the tabular T-value of (2.009) at the level of significance (0.05) and degree of freedom (50), which indicates the existence of a statistically significant difference in the test (**acquisition of concepts**) for the experimental and control groups and in favor of the experimental group, thus rejecting the zero hypothesis and accepting the alternative hypothesis.

II. Interpretation of the results : The results of the first hypothesis show that there are differences in favor of the experimental group, and this result may be attributed to

1- The flipped learning strategy provided the opportunity for students to practice self-learning in which there is a kind of freedom through the various activities it provides, which helps students to focus on the concepts and information in each lesson, especially when using presentations and sending them to students in the form of links , and encourages them to discuss, dialogue and ask questions .

2- The use of the flipped learning strategy may have helped to invest the lesson time better to complete and accomplish the educational requirements, and this in turn leads to the development and development of knowledge and thus raise the level of their acquisition of biological concepts .

3. The excellence in the level of students' acquisition of scientific concepts may be attributed to the use of modern technology represented by tablets and computers, and the way they receive knowledge (information and concepts) in various and varied ways and from various educational sources.

In addition, lessons recorded and sent to students may be more acceptable to them through the possibility of watching them more than once and returning them according to the student's understanding

teachers of biology , to train them in the use of modern models and strategies in teaching, including flipped learning strategy.

Suggestions : to complement the current research The researcher suggests:

1- The researcher proposed to conduct future studies dealing with independent and dependent research variables and apply them in other subjects and stages of study.

2- The effect of using the flipped learning strategy on achievement among second grade students is average in science .

study of Aqaili (2019) , the study of Johnson (2013) , and the study of Akjir (2018) , which confirmed the effect and positive use of the flipped learning strategy.

Recommendations : Based on the research results, the researcher recommends the following :

1-Directing biology teachers to adopt a flipped learning strategy in teaching biology in middle schools.

2- The Directorate of Preparation and Training in the General Directorate of Education holds training courses for

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