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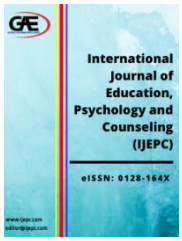

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THE EFFECT OF APPLYING THE "FLIPPED CLASSROOM" STRATEGY ON THE ACHIEVEMENT OF PHYSICS AND SYSTEMIC THINKING AMONG FIRST-YEAR MIDDLE SCHOOL STUDENTS

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Abstract:

The research aims to identify the effect of applying the "Flipped Classroom" strategy on the achievement of physics and systemic thinking among first-year middle school students. The researcher chose an experimental design with partial control. The research sample consisted of 62 first-year middle school students at Al-Warkaa Secondary School affiliated with the General Directorate of Education in Baghdad / First Al-Rusafa. The experiment sample was distributed into two groups, the first experimental, who studied according to the flipped classroom strategy, and the second, control, who studied according to the usual method. The researcher made sure of the equality of the research groups in the variables of chronological age in months, IQ, previous achievement, and systemic thinking scale. The researcher prepared a multiple-choice test and applied it to both research groups. He adopted a measure of systemic thinking after verifying its validity and reliability. Using a t-test to determine the results, the researcher concluded that the flipped classroom strategy has an effective effect on systemic thinking for the experimental group compared to the control group. The researcher proposed a number of recommendations and proposals.

Keywords:

Flipped Classroom Strategy, Academic Achievement, Physics, Systemic Thinking, First Grade Middle School Students

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Introduction

The common use of regular teaching methods in our educational institutions, based on diction and indoctrination by the teacher and memorization and memorization by the learner , was a reason for the poor achievement of the learner , as confirmed by the results of previous studies such as a study (Hassan , 2015) , as well as through the researcher's participation in many seminars for physics teachers as well as the researcher's experience in the field of teaching for more than (25) years. He noted the extent of students' suffering in their understanding of the material and their low level of achievement due to the use of traditional teaching methods and the inclusion of many abstract concepts in the curriculum, which increases the difficulty of the material.

Therefore, recent trends in education are moving towards using a modern strategy in teaching, including the flipped classroom strategy. This strategy combines regular learning with e-learning, which makes the learning process more interesting, exciting and enjoyable. Therefore, the researcher decided to use this strategy, which the researcher believes may be understood in solving these problems. Therefore, the current research came to raise the following question:
Does The Flipped Classroom Strategy Have An Effect On The Achievement Of Physics And Systemic Thinking Among Middle First Graders?

Second:The Significance of Research

Physics is no longer just the transfer of scientific knowledge to the learner, but it is a process concerned with his comprehensive mental, emotional and skill development, the integration of his personality, and teaching him how to think, not how to memorize courses and the content of books (Zaitoun , 2004 : 133).

Achievement is one of the important aspects of the mental activity carried out by the learner in school , as it is a cognitive variable that includes all that the learner can reach in his learning and his ability to express as he learned (Okasha , 1999 : 71).

Recent trends in the learning and teaching process are moving towards the use of modern teaching strategies that help learners revitalize their previous knowledge, stimulate their motivation, and help them overcome the difficulties they face in understanding scientific subjects in particular, including physics.

The flipped classroom strategy is one of the modern strategies in the educational process that blends regular learning and e-learning as advanced blended learning to activate the role of the learner and make learning more interesting, exciting and fun. The role of the school changes for the better and the rearrangement and use of time inside and outside the classroom makes the transfer of control of learning from the teacher to the learner , and the class time is better used to do discussions and practical applications of concepts(Al-Mallah , 2017 : 314-315).

Recently, the focus on systemic thinking has begun due to the rapid developments in scientific, social, cultural and other systems, and the complexity in the dynamics of obtaining knowledge and summarizing its components through Internet satellites and systems of interest in the basic and complex components is important to keep pace with the development of different sciences. Hence, the idea of systemic thinking in models and systems as one unit helps to understand the whole instead of entering into the detailed aspects and molecular components in order to follow and keep pace with rapid scientific progress (Afaneh and Obaid , 2003 : 62)

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Because of the above, it is possible to determine the significance of research in the following:

1. The significance of using modern strategies in teaching, including the flipped classroom strategy, to keep pace with scientific progress and technological development in the twenty-first century, which may contribute to increasing the achievement and thinking of learners.
2. This strategy helps the learner to prepare and prepare for learning the lesson by reviewing the video prepared by the teacher , before starting the classroom , which may contribute to raising the level of achievement of learners.
3. The significance of systemic thinking, as this type of thinking has the potential to create a generation capable of keeping pace with the scientific developments of the current era.

Third: Research Objectives

The research aims to find out :

1. The effect of the flipped class strategy on the **achievement** of physics among middle first graders.
2. The effect of the flipped classroom strategy on systemic **thinking** among middle first graders.

Fourth: Research Hypotheses

- There is no statistically significant difference at the level of (0.05) between the average scores of the experimental group students who study physics according to the flipped class strategy and the average scores of the control group students who study the same subject according to the usual method in the achievement test.
- There is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who study physics according to the flipped classroom strategy and the average scores of the control group students who study the same subject according to the usual method in the scale of systemic thinking.

Fifth: Research Limitations

1) Students of the first middle school grade in the schools of the Directorate General of Education in Baghdad / Rusafa First.
2) The first semester of the academic year (2023-2024).
3) Chapters (the first is the properties of the material , the second is the force , the third is the pressure).

From the physics textbook for the first middle school grade, 6th edition, 2023 AD , Ministry of Education , Republic of Iraq.

Sixth: Definition of the Terminology

Flipped Classroom : : Defined By: -

(Al-Ghamdi , 2018): It is one of the types of blended education in which regular education merges with e-learning through the exchange of roles between the school and the home. The learner at home follows up the pre-prepared material by the teacher through a video , and the

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teacher in turn in the school answers all the questions of the learners as well as discussing the material and solving the assignments sent a day earlier by the teacher (Al-Ghamdi , 2018 : 32).

Achievement : Achievement Defined By: -

(Al-Radadi , 2019): - The degree to which the learner acquires or the level of success that the learner achieves or reaches in a specific subject or educational field (Al-Radadi , 2019 :50).

Procedural definition of achievement: - The outcome of what the students of the experimental group receive, who study according to the flipped class strategy, and it is expressed in the scores they receive in the achievement test prepared by the researcher.

Systemic Thinking: Known By: -

(Al-Kubaisi , 2008) : Thinking that addresses concepts and contents through an integrated system that clearly shows the relationships between them, which makes the student able to link his previous experiences with his new experiences, and analyze this overall picture into its parts or link those parts to an integrated system (Al-Kubaisi , 2008 : 7).

Procedural definition: A system of complex mental processes that gives the learner the ability to perceive relationships between concepts and topics and is measured by the degree to which the learner obtains when responding to the items of the systemic thinking test that the researcher has adopted for the purposes of the current research.

E-learning: E-learning is a modern concept that adopts a set of processes related to the transfer and delivery of various types of knowledge and science to students around the world using information technology. It is an educational method using modern communication mechanisms from the computer, its networks and multimedia , such as audio, image, graphics and electronic libraries, as well as Internet portals, whether remotely or in classrooms (Al-Sayed , 2011 : 96).

- Flipped classroom
  That the idea of the flipped classroom simply includes the opposite of the roles, that is, what is done at home within the regular learning is done during the classroom lecture and that what is done in the classroom in regular learning is done at home , so the lesson material is presented to the learner outside the classroom through an educational video that the teacher records a day before to explain a specific topic or decisions related to the subject of the lesson. Within the flipped classroom, the regular lecture is prepared, through appropriate and available technology. The recorded lessons are uploaded to the Internet so that learners can access them outside the classroom , to give room for other activities inside the classroom , such as discussions, solving problems and duties. It is learning in which teaching through technology (the Internet) replaces direct teaching in the classroom (Al Fahid , 2014 : 23).

Flipped Classroom Strategy Scale: -

1. Integrating technology with education, which results in learning the activity for students, where modern technology is used in learning as sites in the Internet such as educational video and(You Tube) and sites (Whats app) and others.

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2. Participatory collaborative learning among students ,by dividing students in the hall into working groups to practice activities and perform the duties and tasks required of them.
3. The students' interaction and enthusiasm for learning, their sense of confidence in themselves, taking responsibility during the dialogue , the discussion inside the classroom , and not feeling fear and dread during the discussion.
4. Renewal and innovation in classroom management, by changing the educational style in classroom management in learning in the traditional way to a new style in classroom management in flipped learning.
   (Al-Maqati , 2016 : 141-142)

- **Systemic Thinking :**

Systemic thinking is a form of higher levels of thinking that differ, of course, from lower levels of thinking. It is open thinking that stems from the reality of awareness and comprehensive awareness of the dimensions of the problem that a person faces. It starts from a (total) perspective and from the relationship of the whole to the part and the relationship of the parts to each other and the relationship of each to the total situation. Systemic thinking includes managing thinking processes and thinking about thinking. Systemic thinking requires the development of higher skills in thinking , and sufficient efficiency that enables him in turn to adapt to the conditions of change and complexity of the distinct human era, which requires teaching thinking curricula (Al-Saeed and Hamad , 2006 : 119-120)

- **The significance of systemic thinking in education: -**
  1. It encourages the use of different teaching methods to organize society , as it requires a structured thought that works to bring about modern transformations in concepts.
  2. It works to transform the lessons learned into a network of relationships within the community.
  3. Ensures a shift from analytical to holistic thinking.
  4. Flexible and acknowledges different learning and knowledge modalities.
  5. It helps to raise the level of learning efficiency by systematically linking different branches of knowledge (Tibary & CooK, 2005 :3-5).

Second : Previous studies: -

- Studies dealing with the strategy of the flipped classroom : -
  1. Study (Abdul Sada , 2022) The study was conducted in Iraq , the aim of the research is to identify (the effect of the inverted grade strategy on the achievement of chemistry and deft thinking among fifth-grade students)

The researcher chose the partially controlled experimental design. The research sample amounted to (58) students from the fifth bioscientific grade, distributed into two experimental groups that were studied according to the Flipped classroom strategy and the control was studied according to the usual method. The research variables were rewarded in variables (chronological age in months , IQ test, previous information test, and dexterous thinking scale). The researcher prepared an achievement test that included (40) items . As for dexterous thinking, the researcher adopted the scale (fighting , 2018). The psychometric characteristics of the achievement test and the scale were verified after presenting them to a number of arbitrators. The data were analyzed using the statistical bag (SPSS). The results showed that the experimental group outperformed the control group in the achievement test for chemistry

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and dexterous thinking scale. The researcher presented a number of recommendations and suggestions. (Abdel Sada , 2022).

Studies On Academic Achievement:

A Study (Hassan , 2015) Conducted In Iraq
The Aim Of The Research Is To Identify (The Effect Of Teaching Using The Systemic Approach In The Achievement Of Physics Among Students Of The Second Middle School Grade).
The researcher deliberately selected the middle second grade students in the average of Hama al-Watan of the Directorate of Education in Baghdad / Rusafa Al-Oula as a field for the experiment. The research sample consisted of (44) female students of the experimental group studied according to the systemic approach and (22) female students of the control group studied in the usual way. The two groups were rewarded in the variables (chronological age in months, IQ , and previous information). The researcher prepared an achievement test whose validity and reliability were verified by presenting the test items to a number of experts and specialists. The test was analyzed by extracting the difficulty factor , the strength of discrimination, and the effectiveness of the wrong alternatives. The researcher applied the experiment in the second semester of the academic year (2014-2015). After applying the test to the two groups and correcting the answers , the results were analyzed statistically. In light of the results, the researcher concluded that the use of the systemic approach had an effective effect on achievement compared to the usual method (Hassan, 2015).

Studies On Systemic Thinking:

Study (Dukhaina , 2021) : The Study Was Conducted In Iraq
The Aim Of The Research Is To Identify The Relationship Between Stage Students' Acquisition Of Physical Concepts And Their Systemic Thinking.
The researcher relied on the descriptive approach to suit the research objective, as the research sample consisted of (400) students from the third middle school grade students for the academic year (2020-2021).

To achieve the objectives of the research, the researcher prepared the two research tools, namely the concept acquisition test, which consisted of (60) objective items of the type of multiple test and the systemic test, which consisted of (20) items according to skillfully defined thinking skills (relationship perception, systems analysis, systems installation, and systems evaluation). The psychometric characteristics of each of the two tests were calculated, and the data were analyzed and statistically processed using the (SPSS) program. The researcher found a strong positive correlation between the acquisition of physical concepts and systemic thinking among middle school students, and the researcher made a number of recommendations and proposals (Dukhaina, 2021).

Research Methodology
It is the method of data Achievement aimed at obtaining information in fixed ways that have value and can be relied upon (Abu Allam , 2011 : 5)

The researcher adopted the experimental research approach, because it is more appropriate to the nature of the research, as he defined it (Abdul Rahman and Adnan , 2007) as "an intentional

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modification of the specific circumstances of a phenomenon and the observation and interpretation of changes that occur to it" (Abdul Rahman and Adnan , 2007 : 474).

*** Search Procedures:Procedures of the researched**

First : Experimental Design Of The Research: -

Experimental design is a blueprint and work program for how to implement the experiment. By experiment, it means planning the circumstances and factors surrounding the phenomenon we are studying in a certain way and then observing what is happening. (Abdul Rahman and Adnan , 2007 : 487)

The researcher chose the experimental partially tuned design for the experimental and control groups with the pre-post test for systemic thinking and the post-test for the achievement test for physics as shown in Figure No. 1

Figure 1 Experimental Design Of The Research Group

Group	Valence	The independent variable	The dependent variable
Experimental group	* Chronological age (months) IQ. Previous Achievement * Systemic Thinking Test	Flipped classroom Strategy	Achievement * Systemic Thinking Test
Control group		The usual method	

Second: The Research Community And Its Sample: -

The research community means all individuals who are part of the subject of the problem that the researcher seeks to study , and therefore the results of the research can be generalized to it (Al-Saadawi , 2007 : 14)

Where the current research community consists of all students of the first middle school grade in the public day secondary schools of the Directorate General of Education in the province of Baghdad / Rusafa First for the academic year (2023-2024), the researcher chose the research sample intentionally Warka School for Boys for several reasons, the most important of which are: -

- Full cooperation by the school administration with the researcher.
- The school is close to the researcher's place of work.
- Convergence of the social and economic level of students.

The researcher randomly selected two out of three sections , as Division (A) was chosen to represent the experimental group and Division (B) to represent the control group. The number of students in the two research groups reached (70) students by (34) students in Division (A) and(36) students in Division (B) , and after excluding the 3 failed students in his division (A)

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and (5) students in Division (B), the number of members of the final sample became (62) students , by (31) students in the experimental group and the same in the control group.

The reason for the exclusion of the failing students, in the belief of the researcher that they have prior knowledge of the topics studied during the experiment , and therefore this knowledge will affect the accuracy of the research results and the internal safety of the experiment , noting that they were excluded from the results only while ensuring that they remain in the classroom in order to preserve the school system.

Third: Control Procedures:

Internal safety of the experimental design: Before starting the experiment, the researcher addressed the following matters:

1. Procedures for the equivalence of the two research groups
   That is, the formation of equivalent groups in relation to variables that have to do with research (Van Dalen , 1993 : 398).
   The researcher was keen to establish parity between the two research groups in a number of variables that the researcher believes may affect the results of the experiment.

Among these changes (chronological age in months , IQ , previous achievement, systemic thinking test) as shown in Table No. (1)

Table (1) Shows The Equality Of The Students Of The Research Group (Experimental And Control) In A Number Of Research Variables And The Calculated And Tabular T-Value And Statistical Significance

Group	Experimental group		Control group		Degree of freedom	T value		Statistical significance at the level of 0.05
Variables	mean	Standard Deviation	Arithmetic mean	deviation, perversion, variation		Calculated	tabular	
Time Number of Students in Months	155	10,846	157.7	10,048	60	1,01	2.00	(Nonsignificant)
IQ test	23,6	6,73	23:45	6,11		0,1		
Previous Achievement	69,35	14,861	67,35	12,479		573		
Systemic Thinking Test	48,25	8,354	49,93	7,932		0,811		

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Control Of Extraneous Variables (Internal Safety): -

The Effect Of Experimental Procedures: -

- Teaching : The researcher taught the two groups (experimental and control) as a teacher and on the school staff.
- Maturity : This factor did not have any effect on the results of the experiment , because the duration of the experiment is short, limited and unified for the two groups if it started on 8/10/2023 and ended on 10/12/2023.

Weekly Class Schedule

The researcher taught physics to the two groups (4)classes per week and two classes for each group distributed over two days , as scheduled in the weekly class schedule by the school administration.

- Subject: - The researcher made sure that the lessons given are equal for the experimental and control groups, and include the first chapter (properties of the material), the second chapter (strength) and the third chapter (pressure) , from the physics textbook for the first middle school grade for the academic year (2023-2024).
- School building: - The researcher applied the experiment in one school, and in similar classes in terms of distance, lighting and ventilation , which indicates that there is no effect of this factor.

Research Requirements

Determining The Scientific Material

The educational material that the researcher teaches to the students of the two research groups was determined during the period of the experiment (the first semester, and the educational material included the first semester, the second semester, and the third semester of the physics textbook for the first middle school grade for the academic year (2023-2024) in the following order: -

Chapter One (Substance Properties), Chapter Two (Force) and Chapter Three (Pressure).

Formulating Behavioral Objectives

A behavioral objective is defined as: - " A specific written statement that describes a specific observable and measurable behavior that a student is expected to be able to perform after completing his study of a specific subject or a specific teaching activity" (Qatami et al., 2000 : 734-735).

The (138) behavioral objectives were formulated, classified according to Bloom's classification of the cognitive field and levels (remembering , comprehension, application and analysis), where they were presented to a group of experts in the field of education, psychology and methods of teaching science and physics (Appendix 1) , to verify the accuracy of their formulation and dummies of their representation of the educational material and the time allocated to the teaching material. In light of the opinions of the experts, some of them were reformulated and the proposed amendments were made to others.

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Preparing Teaching Plans

Teaching plans: A structured process that includes taking a set of measures, decisions and alternatives to reach certain objectives within a period of time using all available human and material resources (Qatami , 2007 : 430).

The researcher prepared a set of daily teaching plans for the topics covered in the research of physics for the academic year (2023-2024), which are (18) teaching plans for the experimental group and represented them to the control group , where a model of these plans was presented to a number of specialists in the field of teaching science and physics (Appendix 1) to ensure their validity and modify what they deem appropriate.

Research Tools

Building The Achievement Test In Physics

The achievement test is defined as " a systematic way to determine the student's level of achievement of information and skills in a subject that he has learned by answering a sample of questions that represent the content of the subject" (Qatami et al., 2000 : 744)

It is a tool that demonstrates the extent to which the subject has achieved its specific objectives (Webster, 1981, p: 16).

The researcher prepared a test to measure the students' achievement of the topics covered in the research, after completing the study of the required classes, according to the following steps:

- Determining the scientific subject: -
  The scientific subject, which includes (first semester, material properties), (second semester, strength) and(third semester, pressure), was determined from the physics textbook for the first middle school grade for the academic year (2023-2024).
- Determining the number of test items : -
  It was agreed to identify (35) test items of the subject matter items , after the researcher used the views of a number of experts in the methods of teaching science and physics (Appendix 1) after reviewing the behavioral purposes of the content of the physics subject scheduled from the physics textbook to be taught to the first middle school grade.
- Select item type:
  The test passages were formulated as objective passages (multiple choice) and for levels (recall , comprehension , application , and analysis).
- Formulating instructions for answering the achievement test: -
  Instructions have been drafted for the test , how to answer and distribute the response scores to all items , not to leave a item unanswered, in addition to not choosing more than one answer for one item .
- Test Validity
  It means its validity in measuring what it claims to measure , and the concept of honesty refers to the special inferences it makes from the scores of the scale in terms of their suitability, meaning and usefulness.
  (Abu Hawij ,2013 : 65)

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Honesty is one of the most important factors with regard to the quality standards of tests (Brown, 1981 , p:107). In order for the test to be honest and achieve the purposes for which it was designed, it was confirmed that:

- **Face validity**

The test is characterized by face validity if its title and appearance indicate that it measures the characteristic for which it was developed (Al-Anani , 2002 : 255). The researcher presented the achievement test to a group of experts and specialists in teaching methods of science and physics (Appendix 1) to judge the validity of the test items in terms of the clarity of their items and the extent to which they measure the levels of behavioral purposes. Based on the opinions of experts and arbitrators, some items and some alternatives were modified.

Content Validity

It is concerned with the content of the test subject and the extent to which the content of the subject is represented in the test , and the honest test in its content is the one that represents a good sample of the contents of the subject without neglecting any aspect of it (Attia , 2008: 298) , and to achieve the validity of the content, the researcher presented the achievement test with behavioral objectives to the experts and arbitrators (Appendix 1), which is an indicator of the validity of the content , and based on their opinions and observations, it was agreed that the validity of the test by the arbitrators and specialists is more than (80%), and thus the test is ready for application in its final form.

- The **exploratory experiment of the test:** The test was applied to a first exploratory sample of (30) students of the falcon medium for boys , and to ensure the clarity of the items and the clarity of the test instructions and the time taken to answer the test , and then modify the test in the light of the exploratory experiment (Ihsan and Adnan , 2008 : 38) , and for the purpose of statistical analysis of the test items and determine the level of difficulty and the strength of discrimination of each item and the effectiveness of its alternatives and the reliability factor of the test, the researcher applied the test to a second exploratory sample of (100) students of the average age of the chosen for boys after the researcher confirmed their completion of the material and in cooperation with the school administration, and the average time of answering the test items was calculated after the first student's time of answering the test and the time of the last student was (40 minutes).
- **Statistical analysis of test items: -**
  Analysis of test passages is a means of improving its quality by knowing the strength of the difficulty of passages and their ability to distinguish and exclude invalid passages (Scannel, 1995 : p 211).

After correcting the answers, the students' scores were arranged in descending order , and the highest (27%) of the scores were selected to represent the upper group and the lowest (27%) of the scores to represent the lower group, and the answers of the upper and lower groups were analyzed statistically according to the following steps: -

- **Difficulty factor for items :**

The **difficulty factor means:** "The number of students who answered the item incorrectly on the total number of students," (Kawafha , 2010: 289), as its value ranged between (0.32-0.70) , as the test item is acceptable between (0.20-0.80) (Al-Azzawi , 2008 : 81).

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- **Discrimination Power of items :**

The discriminating power of each test item was calculated by the special discrimination equation, in order to retain the items with good discrimination and delete the items with low discrimination. I found that they range between (0.7-0.3) , where (Al-Roussan et al., 1992) indicates that the degree of discrimination is acceptable starting from (0.25) and more (Al-Roussan et al., 1992 : 86).

Effecitiveness Of Worong Alternatives

The effectiveness of the false alternatives was verified by analyzing the respondents' responses to the objective items . By applying the law of the effectiveness of the alternatives , the calculated percentages of the alternatives and all the items indicated that they were negative , which means that the false alternatives are all good and effective, which requires keeping them as they are without change.

Test Reliability

It means the convergence of the scores obtained from the same test when the procedure is different in time , and the correlation factor s are often more than (0.70) on the basis that they are an acceptable reliability factor (Al-Obaidi , 2011 : 251).

The researcher used the equation (Kuder-Redchardson-20) , and the reliability value of the test items was (0.83), which is a good reliability factor (Melhem , 2009: 204).

Systemic Thinking Scale

One of the requirements of the research is to measure systemic thinking among the students of the research sample. In order to achieve this objective , the literature and previous scales of systemic thinking were reviewed. The researcher adopted the scale (Dakhina , 2021) for the secondary study. In order to adopt the scale, the researcher followed the following steps:

The **validity of the scale: -** This validity is called the validity of the arbitrators. The validity of the test or scale can be reached based on what the arbitrators agreed upon, because this type of validity measures what has been set for it and does not measure another alternative or additional to it (Al-Zamili et al., 2009 : 240). To verify the face validity of the scale, the items of the systemic thinking scale were presented to a group of experts and specialists in education and psychology (Appendix 1).

In order to state their opinions and verify the truthfulness of its content and in the light of their observations , some items of the scale were deleted and modified.

Scoping Application In The First Place For The Scale

To reveal the clarity of the instructions for the items and the time of the answer, the scale was applied to a random sample of (35) students from the middle school (Abu Tamam) for boys of the Directorate General of Education of Baghdad / Rusafa First , where the average total time at all items was calculated to be (45) minutes.

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The Second Survey Application Of The Scale

The scale was applied to a second exploratory sample of middle first grade students (100students) randomly selected from the medium of (Abdul Mohsen Al-Kadhimi) for boys of the Directorate General of Education in Baghdad / Rusafa First to find the reliability of the scale.

Scale Reliability

Reliability means accuracy and consistency in the performance of individuals and reliability over time. A fixed scale gives the same results if it is applied to the individuals themselves again, and also if the individual obtains the same scores if the same tool is applied to him and under the same conditions.
(Murad and Suleiman , 2002 : 359)

The reliability was calculated for the scale of this research by adopting the Fakronbach equation. The average internal factor s are the best estimate of the average reliability factor . This can be achieved in several ways, including the Fakronbach equation, where the reliability reached (86%). (Abdul Hadi , 2002) believes that the good correlation factor of the test must be increased by 80% or more (Abdul Hadi , 2002 : 129).

Implementation of the experiment : The researcher followed the following procedures in implementing the experiment: -

1. The researcher began the experiment on the students of the experimental and control groups on 8/10/2023 by four sessions per week , at the rate of two sessions for each group and the experiment continued until 10/12/2023.
2. The researcher taught the students of the two groups the subject of physics based on the teaching plans that he developed himself , and according to the strategy of the Flipped classroom for the experimental group, and according to the usual method for the control group.
3. Apply the post-systemic thinking scale to the students of the two groups simultaneously on 11/12/2023.
4. The achievement test was applied to the students of the experimental and control groups simultaneously on 12/12/2023.

Statistical Means:

- T-test
  It was used in the equivalence of the experimental and control research groups, as well as to find the significance of the difference between the mean of the two research groups in the achievement test and the systemic thinking scale.
- Item difficulty Coepfficient
  Use to calculate the difficulty factor for the objective items of the achievement test.
- Effectiveness of Distracters
  Used to measure the effectiveness of false alternatives to achievement test clauses.
- Discrimination Formula
  Use to calculate the strength of discriminating objective vertebrae for achievement testing.
- Equation (Kjödert Richardson 20)
  Use to calculate the Achievement Test Reliability Factor .
- Fakronbach equation

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Use to calculate the reliability factor of the systemic thinking scale.

Presentation Of The Results Of The Achievement Test

The researcher used the t-test with two independent ends to test the significance of the difference between the mean achievement scores of the experimental and control groups, where the statistical results of the test were shown as shown in Table (2)

Table (2) Shows The Arithmetic Mean, Standard Deviation, Variance, The Calculated T-Value Of The Scores Obtained By The Experimental Group And The Control Group Students In The Achievement Test, And The Tabular Value (Theory)

Group	Sample Individuals:	Arithmetic mean	Standard Average S	Variance s^1	T value		Statistical significance
					Calculated t.abs	Tabular t.crt	
Experimental group	31	77.7	13,311	177,202	6,87	2.00	Significant at 0.05
Control group	31	60.8	11,219	125,876			
Total							

It is clear from Table (2) that the students of the experimental group outperformed the students of the control group, as the average achievement of the students of the experimental group exceeded the average achievement of the students of the control group by statistically significant teams at the level of (0.05) and in favor of the experimental group, and this shows that the use of the strategy of (Flipped Classroom) has an effect on increasing the achievement of the students of the experimental group.

Presentation Of The Results Of The Systemic Thinking Scale

The researcher used the t-test for two independent and equal samples to identify the significance of the difference between the mean scores of the experimental and control groups in the scale of systemic thinking and as shown in Table (3).

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Table (3) Shows The Arithmetic Mean, Standard Deviation, Variance, And Calculated T-Value Of The Scores Obtained By The Students Of The Experimental And Control Groups In The Scale Of Systemic Thinking And The Tabular Value (Theory).

Group	Sample Individuals:	Arithmetic mean	Standard Average S	Variance s^1	T value		Statistical significance
					Calculated t.abs	Tabular t.crt	
Experimental group	31	60,77	10,529	110,87	5,508	2.00	Significant at 0.05
Control group	31	47,77	7,868	61,906			
Total	62						

It is clear from Table (3) that the T-value with a degree of freedom of (60) is equal to (5,508), which is greater than the table T-value at the level of significance (0.05). Therefore, the difference between the experimental and control groups is statistically significant and in the interest of the experimental group. The results of this research can be attributed to the following reasons.

- The use of the flipped classroom strategy works to integrate technology with education, resulting in active learning for students and increasing their awareness and awareness and thus their superiority in achievement.
- The use of the flipped classroom strategy made the learner from a negative listener to a positive participant in the educational process.
- This strategy makes the student the focus of the educational process. He reads and practices various activities and learns automatically and through the supervision of the teacher.
- The use of modern strategies in teaching, including the flipped classroom strategy, led to students practicing systemic thinking skills better, and therefore this strategy helped to increase their self-confidence, improve their achievement, and encourage them to practice other types of thinking.

Conclusions :

1. The preference of using the flipped classroom strategy in achievement for the experimental group compared to the control group.
2. Teaching using the flipped classroom strategy has an effect on improving systemic thinking among middle first graders.

Recommendations :

1. The need to include the physics teacher's guide for the secondary stage with modern strategies in teaching, including the flipped classroom strategy.
2. Enriching curricula and textbooks with systemic thinking skills.

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Suggestions :

1. The effectiveness of the flipped classroom strategy in other variables such as (creative thinking, cognitive preference)
2. Studying the effect of the flipped classroom strategy on the development of metacognitive skills among secondary school students.

References

Abdul Rahman , Anwar Hussein and Adnan Haqqi Zanganeh (2007) : **Methodological Patterns and Their Applications in the Humanities and Applied** Sciences, 1st Edition , Dar Al-Kutub Press, Baghdad.

Abdul Sada , Tabarak Najm , (2022) : The Effect of the Flipped Classroom Strategy in Chemistry and Dexterous Thinking among Fifth Grade Scientific Students**, Unpublished Master's Thesis,** College of Education for Pure Sciences/ Ibn Al-Haytham , University of Baghdad.

Abdul Hadi , Nabil , (2002) : **An Introduction to Educational Measurement and Evaluation and its Use in the Field of Classroom Teaching**, 2nd Edition , Dar Wael , Amman.

Abu Hawij , Marwan , (2013) : **Contemporary Educational Research**, Arabic Edition, Amman.

Abu Allam , Raja Mahmoud , (2011) : **Research Methods in Psychological and Educational Sciences**, 6th Edition, University Publishing House, Cairo.

Afana , Ezzo, and William Obaid , (2003): **Thinking and School Curriculum**, Al-Falah Publishing Library, Kuwait.

Al-Anani , Hanan Abdul Hamid , (2002) : **Educational Psychology**, 2nd Edition, Safaa Publishing House, Amman , Jordan.

Al-Azzawi , Rahim Younis Kroo , (2008) : **Measurement and Evaluation in the Teaching Process**, 1st Edition , Dar Degla ,Amman , Jordan.

Al Fuhaid , Mai , (2014) : Effectiveness of the Flipped Classroom Strategy Using Mobile Devices in Developing Attitudes towards the Classroom Environment and Academic Achievement in the English Language Course for Preparatory Program Students at Imam Muhammad bin Saud Islamic University, **Unpublished Master Thesis**, Imam Muhammad bin Saud Islamic University, Saudi Arabia.

Al-Ghamdi , Ahmed bin Muais Mohammed , (2018) : The Effectiveness of the Inverted Grade on Achievement of Third Grade Students Middle school in Teaching Computer and Information Technology Course, **Unpublished Master Thesis**, Faculty of Education , Ain El-Shams University, Egypt.

Al-Kubaisi , Abdul Wahid Hamid , (2008) : **Methods and Methods of Teaching Mathematics**, 1st Edition , Al-Maysara Publishing House, Amman.

Al-Maqati , Saleh bin Ibrahim , (2016) : The effect of the flipped learning strategy in the academic achievement of fourth grade students in the course of the teaching entrance of the Faculty of Education at Shaqra University, a **semi-experimental study, International Journal, Specialized**, Volume(5) , Issue (8).

Al-Mallah , Tamer Al-Maghawi , (2017) : **Adaptive Learning (Adaptive Learning Environments)**, 1st Edition , Dar Al-Sahab Publishing , Cairo.

Al-Obaidi , Muhammad Jassim , (2011) : **Psychometrics and Tests**, Dar Al-Thaqafa, Jordan.

Al-Radadi , Fahd bin Ayed , (2019) : **Self-Organized Learning and Academic Achievement**, 1st Edition , Scientific Copier, Al-Madinah Al-Munawwarah.Al-Saadawi, Mohsen Ali et al., (2007): **Scientific Research Tools in Physical Education Research**, Talent House, Iraq.

International Journal of Education, Psychology and Counseling
IJEPC
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Volume 9 Issue 53 (March 2024) PP. 101-117
DOI 10.35631/IJEPC.953010

Al-Saeed , Reda Massad and Mohammed Abdel Qader Al-Nimr , (2006) : **Developing Curricula Applications (and Systemic Models)**, 1st Edition , Dar Al-Fikr Al-Arabi , Cairo.

Al-Rusan, Salim Salama et al., (1992): **Principles of Measurement and Evaluation and its Educational and Humanitarian Applications**, 1st Edition, Al-Awaniya Press, Amman , Jordan.

Al-Zamili , Ali Abdul Jassim, Ali Kazim and Abdullah Al-Sarimi, (2009): **Concepts and Applications in Educational Evaluation and Measurement**, 1st Edition , Al-Falah Library for Publishing , Kuwait.

Attia , Mohsen Ali , (2008) : **Modern Strategies in Effective Teaching**,1st Edition , Safaa Publishing House, Amman , Jordan.

Brown, Frefick, G (1981) : **Measurement and Evaluation in Education and Psychology , Rinnhart and Winston**, Inc. , New York.

Dukhaina , Hana Kazim , (2021) : The Relationship between Middle School Students' Acquisition of Physical Concepts and Their Systemic Thinking, **Unpublished Master's Thesis**, Faculty of Education for Pure Sciences/ Ibn Al-Haytham , University of Baghdad , Iraq.

Hassan , Aref Abdel , (2015) : The Effect of Teaching Using the Systemic Approach in Achieving Physics among Second Grade Middle school Students, **Al-Ustaz Magazine**, Issue 220 , Volume Two , 2017.

Ihsan , Aliwi Nasser and Adnan Muhammad Abbas , (2008) : **Measurement and Evaluation in the Educational Process**, Faculty of Education , Ibn Al-Haytham , University of Baghdad.

Kawafha , Tayseer Mufleh , (2010) : **Measurement, Evaluation and Diagnosis in Special Education**, 2nd Edition , Dar Al-Masirah , Amman , Jordan.

Melhem , Muhammad Sami , (2009) : **Measurement, Evaluation and Psychology**, 4th Edition, Dar Al-Masirah , Amman , Jordan.

Murad , Salah Ahmed , and Suleiman Amin Ali Mohamed , (2002) : **Tests and Metrics in Psychological and Educational Sciences, Steps of Preparation and their Characteristics**, Modern Books House, Cairo.

Okasha , Mahmoud Fathi , (1999): **Mental Health**, Republic Press, Alexandria.

Qatami , Ibrahim , (2007) : **Teaching Methods of Sociology, Dar Al-Fikr for Publishing**, Lebanon.

Qatami , Youssef et al., (2000) : **Teaching Design**,1st Edition, Dar Al-Fikr for Printing and Publishing , Beirut , Lebanon.

Seannell, D. (1975) , **Testing and Measurement in the classroom**. Boston. Houghton Miffinco.

Tibury , D. & Cook, K (2005): **A national review of Environmental** a Education and contribution of systuinability in Australia

Van Dalen , Diopold , (1993) : **Research Methods in Education and Psychology**, 10th Edition, Anglo-Egyptian Library, Cairo.

Webster , A, M. (1981) : **Webster's new international Dictionary** London Murrain Webster Inc.

Zaytoun , Kamal , (2004) : **Teaching Science for Understanding: A Constructive Vision**, 2nd Edition , World of Books , Cairo.