

The Effect of Flipped learning strategy on cognitive and practical learning of physical exercises and the development of deductive thinking among students of the of Physical Education and Sports Sciences

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Abstract

The research aims to identify the impact of the flipped learning strategy on the cognitive and practical achievement of physical exercises and the development of deductive thinking among students of the College of Physical Education and Sports Sciences at the University of Mosul. The research community is made up of third year students for the academic year (2020-2021). The samples are chosen randomly, They represent the two groups (H), the experimental group, (and the control group), and the researchers have used the experimental method as a way to solve the research problem by designing equal groups with two pre- and post-tests. The prepared educational program took (6) weeks, as it include many educational activities based on the steps of the flipped education strategy. The most important results of the research are the effectiveness of the flipped learning strategy in the cognitive learning of physical exercises among third-year students in the College of Physical Education and Sports Sciences, as well as its effectiveness in the practical learning of physical exercises. The strategy work on developing deductive thinking, so the researchers recommended the necessity of Adopting the flipped learning strategy in teaching the concepts of physical education teaching methods.

Keywords: flipped teaching, cognitive learning, practical learning, deductive thinking, teaching methods.

1-1 Introduction and the importance of the research:

The modern era is witnessing many changes in information technology this has led to unprecedented changes in the use of educational technology on a large scale. This era is characterized by continuous change and rapid development in various aspects of life, including scientific knowledge and facts. The concept of electronic learning is one of the methods that supports the educational process shifting from the stage of indoctrination to the stage of creativity, interaction and skill development, and e-learning combines all electronic forms of teaching and learning, where the latest methods are used in the fields of education and publishing by relying on computers and their storage media and networks (Al-Bakri, 892, 2016).

At the present time, modern methods and techniques, modern educational theories and strategies, and advanced concepts in education have appeared that help us evaluate effective learning appropriate to students' abilities. There are large numbers of learners working to turn their learning process upside down, by turning the traditional learning process into using videos, the Internet, and photos. ...etc.) This process is called the flipped learning process or flipped classes (Rakha, 2017, 387), and the pattern of thinking that the student resorts to when facing the problem in the educational situation has been used to derive detailed facts that contain introductions and generalities and are based on logic and inference to solve the questions and problems raised and overcome them (Al Kanna, 2011, 173).

Here, there is a great necessity to carry out mental operations that the learner performs while he is aware of practicing the cognitive process and using appropriate strategies for the subject of learning also his knowledge of the intended goal and reaching it through several stages such as planning, monitoring and evaluation (Suwaidan and Al-Zuhairi, 2017, 358).

In view of the importance of the subject of teaching methods in the third stage, it was necessary to study the most difficult topic that students suffer from in understanding and applying it optimally, which are physical exercises. They can be defined of the exercises that shape and build the body and works to establish the foundations of movement, stability of performance, and reaching to the stage of automaticity (Ali, 24, 2011).

1-2 Research Problem:

The importance of the teaching methods subject lies in the fact that it is a basic subject in preparing the students of the College of Physical Education and Sports Science professionally to enter the field of applying physical education subject in intermediate and secondary schools, the researchers being teachers of this subject, they have felt the importance of modern technologies in the study of the subject of physical exercises that has long students suffered to understand and apply its instructions through the stages of studying this subject, since reverse education emphasizes that the student must study the subject under study with care and attention and he devote to devote part of his time in searching for everything related to his subject, a student should exploit the time he spends using his own phone in an attempt to reach an accurate understanding of the subject of physical exercises, so the researchers provoked the use of the strategy Which is known as inverted flipped education in teaching physical exercises and studying.

The impact of this strategy on the cognitive and practical achievement of physical exercises and the development of mathematical reasoning thinking, which may be considered of great importance in developing the mental abilities of third-year students in the College of Physical Education and Sports Sciences, so the research problem can be summarized in the following question:

(What is the effect of using the flipped learning strategy on the cognitive and practical learning of physical exercises and the development of mathematical inferential thinking among third-year students in the College of Physical Education and Sports Sciences?).

1-3 Research Objectives:

The research aims to identify:

1-3-1 The effect of the flipped learning strategy on the cognitive learning of physical exercises among third-year students in the College of Physical Education and Sports Sciences.

1-3-2 The effect of the flipped learning strategy on the practical achievement of physical exercises among third-year students in the College of Physical Education and Sports Sciences.

1-3-3 The effect of the flipped learning strategy on the development of deductive thinking among third-year students in physical education and sports sciences.

1-4 Research Hypotheses:

In light of the research objectives, the researchers have assumed the following:

1-4-1 There are no significant moral differences between the experimental and control groups in the cognitive achievement of physical exercises.

1-4-2 There are no significant moral differences between the experimental and control groups in the practical achievement of physical exercises.

1-4-3 There are no significant moral differences between the experimental and control groups in

1-5 domains of the sport deductive thinking:

1-5-1 The human field: students of the third academic year in the College of Physical Education and Sports Sciences for the academic year (2020-2021).

1-5-2 The temporal field: the first semester of the academic year (2020-2021).

1-5-3 The spatial field: halls and parks of the Faculty of Physical Education and Sports Sciences at the University of Mosul.

1-6 Definition of Terms:

- Physical exercises: These are the physical movements that include the body and develop its motor capabilities according to special rules that take into account educational foundations and scientific principles in order to reach a high level of performance and to work in various fields of life (Al-Bakr, 24, 2011).

- Inferential thinking: It is the method that relies on logic, it depends on the application of general rules to prove the validity of specific issues ,inferential thinking is a method to extract results from general cases such as direct proving double negatives , on deletion (qasim ,2012,205)

2- Related studies:

2-1 A Study by Sido and Abdul Karim (2018):

The effect of flipped learning on academic learning and attitudes of students of the faculties of education. The study has aimed to identify the importance of using the flipped learning strategy on the academic learning and attitudes of fifth-semester students at the Faculty of Education at the University of Gedaref in the State of Sudan, in the Arabic language specialty and Islamic studies, in the academic year (2016-2017 AD), the two researchers followed the descriptive research method and the experimental research approach. The sample of the study consists of (80) male and female students who were tested on, We are randomly tested . they are divided into two groups, an experimental group and a control group, the study used the achievement test and the trends scale, and it has found that there are statistically significant differences in academic achievement and in favor of the experimental group who studied the course through the reverse learning strategy, there are strong positive trends within the experimental group Towards the use of flipped learning strategy in teaching. Therefore, the researchers recommended using the flipped education strategy in university teaching. (Seido and Kabir, 2018, 1)

2-2 Karim's study (2017):

A comparative study of the deductive thinking of the players of the southern clubs in basketball The aim of the research is to identify the degree of inferential thinking of the players of the clubs of the southern region in basketball, as well as to identify the differences in the inferential thinking between the clubs of the southern region in basketball. In order to achieve the objectives of the research, the researcher has assumed that there are statistically significant differences in the deductive thinking of the players of the clubs of the southern region in basketball.

The researcher has used the descriptive approach in the survey method due to its suitability and the nature of the research. The research community consisted of first and second class basketball players for the southern governorates for the sport season (2014-2015) With (56) players representing (20) clubs . the researcher used statistical methods (arithmetic mean, standard error, and Spearman Brown).

The researcher concluded that the players of the basketball clubs of the southern region for the first and second degrees enjoy a high level of deductive thinking because the arithmetic mean is higher than the hypothetical mean of their scores on the scale, therefore the researcher recommended the use of scientific methods in the psychological preparation and mental abilities of the players that enhance inferential thinking (Karim,2017,1) .

3- Research procedures:

Research Methodology: The researchers adopted the experimental approach due to its suitability and the nature of the research.

The research community and its sample:

The researchers determined the research community with third-year students in the College of Physical Education and Sports Sciences at the University of Mosul for the academic year (2020-2021) the reason behind choosing them is their study of the subject of teaching methods, the number of which is (204) students distributed over eight academic divisions, while the research sample was chosen randomly from the divisions of the third stage , to be Division (H) the experimental group on which the reverse learning strategy will be applied.

The control was group (F), which is taught according to the usual method used in teaching physical exercises. After excluding a number of students who failed and were absent from the experiment, the research sample consisted of (37) with (18) students for the experimental group and (19) students for the control group. Table (1) shows , the research sample before and after exclusion:

Schedule (1)

Shows the number of the research sample and their percentage

Percentage Of Society	Number After Exclusion	Number Of Students Excluded	Number Before Exclusion	Group	Variants groups And the people
48 %	18	5	23	h	Experimental
52 %	19	4	23	o	control
100%	37	9	46	-----	the total

Experimental design:

The researchers have used the experimental design called (the design of equal, randomly selected groups with well-controlled pre and post observations) (Allawi and Rateb, 1999, 30), Figure (1) illustrates this:

Figure (1)

Statistical variables	Dimensional tests	the independent variable	Pre-tests	Variants groups
Calculation of variances by means of the final test	1-Practical attainment for physical exercises	Flipped Education strategy	Practical attainment for physical exercises deductive reasoning	experimental group third (h)
	2- Cognitive learning of physical exercises. 3- Inferential thinking . the athlete	The usual style		the control group third (f)

It shows the research variables according to the experimental design used in the research for the two groups experimental and control

The equivalence of the two research groups: The researchers relied, in order to achieve equivalence between the experimental groups, on the test of intelligence, chronological age, and the degree of teaching methods for the second year, as shown in Table (2).

Schedule (2)

It shows the arithmetic mean and standard deviations of the two research groups in the equivalence variables

value (v) calculated*	the control group		experimental group		variables
	deviation normative	the middle Arithmetic	deviation normative	the middle Arithmetic	
49.0	19.13	82.27	64.13	37.28	intelligence

96.0	87.12	53.280	20.13	16.279	chronological age in months
74.0	03.2	57	84.1	61	The grades of the students of the two groups for the second stage of teaching methods 100 %

* The tabular value of (t) under an error ratio $\leq (0.05)$ and at a degree of freedom ($n - 2 = 35$) equal to (2.05).

It is clear from the above table that the experimental and control groups are equivalent in the variables that gave been measured .

Data collection methods:

The researchers used several research methods to collect information in order to reach the required data and results, which are

- 1- Scientific references and sources.
- 2- Questionnaires.
- 3- Al-Jubouri test (2013) for the practical achievement of physical exercises.
- 4- Karim's scale (2017) for deductive thinking in the mathematical field.
- 5- Raven test for intelligence matrices.
- 6- Al-Jubouri test (2013) for cognitive achievement of physical exercise search tools:-

Cognitive learning test for physical exercises (Al-Jubouri, 2013):

The researchers relied on the cognitive achievement scale prepared by (Al-Jubouri, 2013) and also applied in the study of Al-Abbasi (2018), due to the similarity of the research sample that was applied to the current research sample. By choosing one answer from among four alternatives, as the degree of the correct answer was determined for each paragraph of the test paragraphs (1 degree), and the wrong answer (zero) degree, and a time of (50) minutes was set to answer the paragraphs of this test.

Practical achievement test for physical exercises (Al-Jubouri, 2013):

The researchers used Al-Jubouri test (2013) for the practical achievement of physical exercises prepared by Moayad Hamid Suleiman Al-Jubouri (2013) (Al-Jubouri, 2013, 79), based on the scale prepared by (Al-Zubaidi, 2009) after making the necessary changes and adding some paragraphs to the scale to be usable. For the category of university students and the Iraqi environment, the test consists of (10) paragraphs, and each paragraph is given (1-3) marks for each performance of the test items, in proportion to the appropriate degree for it when applying the teaching of physical exercises. Appendix (1) was shown to a group of teaching method experts and they agreed on the items of the scale, Appendix (3) clarifies the practical measure in the final form The deductive reasoning scale in the mathematical field (Karim, 2017):

The researchers used the Karim scale (2017) for mathematical deductive thinking, Appendix (4), which consists of (54) items to measure mathematical deductive thinking prepared by Maitham Salih Karim (2017) (Karim, 9, 2017), in order to use it in the research, the researchers conducted scientific transactions it before applying it to the research sample, the paragraphs of the scale, appendix (4), were presented to a group of experts in the fields of teaching methods and measurement for evaluation to ensure its apparent validity in achieving the research objectives, to achieve stability, the researchers used the re-test method, where the researchers applied the deductive reasoning scale to a group of the third academic year students.

The third division (G), which is from the research community outside the research sample, on Sunday corresponding to (12/15/2020), and after a period of two weeks, the same scale was applied to the same sample, and it was found that the correlation coefficient between the two tests is high and reached (0.79), which is a correlation coefficient Significant in comparison with the tabular value of the correlation

coefficient, which indicates that the scale is stable in measuring the trait for which it was developed.

- Vocabulary curricula of Teaching Methods (Physical Exercises):

The curriculum for students of the College of Physical Education and Sports Sciences for the third academic year includes many topics that cover teaching skills appropriate to the process of teaching physical education. The subject of physical exercises is dealt with in the curricula of physical education lessons in a diversified manner ,educational units , or modern method in teaching physical education methods , accordingly the researchers relied on the outcome that was explained by the third-stage teacher responsible for the subject of teaching methods in determining the required vocabulary .

Steps of the flipped learning strategy:

The researchers adopted the steps that Al-Kahili (2018) called the six calls:

1- Determine the subject or lesson from which he intends to turn the chapter on the condition that it is valid for the reverse (and since the subject of physical exercises is important and difficult and that it is suitable to be studied with this strategy, the researchers made this subject appropriate to this form of research).

2- Analyzing the content into important values, knowledge, skills and concepts that must be known. The researchers carried out the process of analyzing the content of concepts, facts and skills related to the physical exercise.

3- Designing an educational or interactive video that includes audio-visual scientific material in for a period that does not exceeding ten minutes. The researchers filmed the types of physical exercises, conditions, and everything related to the subject of physical exercises on third-year students and published the videos related to the subject of physical exercises.

4 - Directing the students to watch videos from the Internet or CDs at home at any time. The researchers made video recordings and copied the discs for each student of the experimental group in order to overcome the problem of the lack of the Internet among some members of the experimental group.

5- Applying the concepts learned by the students from the videos, photos, and lessons learned in the classroom through discussion and active learning activities. The researchers gave the necessary lessons, which amounted to eight lessons, on the experimental group.

6- Evaluation: Evaluation of students' learning in the classroom with appropriate evaluation devices, where the researchers prepared many theoretical and practical tests in order to measure the extent of students' learning in the experimental group on the subject of physical exercises (Sido and Hassan, 2018 ,13).

- Steps to design a special program on the Internet to teach physical exercises using the flipped learning strategy:

After reviewing many programs for social communication and examining their positives and negatives sides, the researchers chose the most appropriate program for social communication to be used with the students of the experimental group (third h) to teach them physical exercises in all its details, develop their understanding of exercises and how to apply them, and choose the most appropriate among them in physical education lessons. How to design a channel on the Telegram program to teach physical exercises:

1- Choose the Telegram program for social communication and see all the details related to it.

2- Creating a special channel on Telegram and giving the name "Physical Exercise Group" channel, in order to facilitate its knowledge by students.

3- The channel ID was sent by the researchers to the research students, and the students were introduced to the channel to start the work.

4- All students of the experimental group (third h) have been added to the channel in order to start work and determine appointments

5- Files were uploaded via the (pdf - word) program for everything related to physical exercises in terms of their importance, types, uses, types of initial conditions and movements, in order for the experimental group members to view them and have visual feedback on the subject of physical exercises.

6 - Pictures and videos related to the primary conditions and the types of formations used in them were uploaded, as well as the organization of these exercises in an accurate way, due to their importance .

7 - Their videos were downloaded, including an explanation of the most important primary conditions and answers to the questions that the students were asking them about the subject of physical exercises and their plastic and non-formal types.

8 - Videos about physical education lessons were downloaded, including parts of the lesson, including regular physical exercises, which were well received by the students in terms of identifying the parts of the lesson, including the preparatory part, which is based on physical exercises in directing the physical education lesson.

9 - The researchers used the channel in order to identify the level of students' performance of physical exercises through videos that the students of the experimental group filmed and sent to the channel (group) in order to know the level of students in teaching physical exercises and obtain information about the students of the experimental group (third h) and also displaying all measures for searching and receiving the results of their answers to them.

The level of students' achievement of the subject of physical exercises by conducting a pre-test for physical exercises using the scale (Al-Jubouri-2013) to measure the practical achievement of physical exercises, and this is considered as a starting line for the performance of the research sample represented by the experimental and control groups.

Field procedures of the research:

- Pre-tests: The researchers conducted a pre-test for the two research groups in the practical achievement test and the inferential thinking scale on .

The main research experiment: After completing the requirements of the main research experiment in defining the two research groups, achieving equivalence between them, and defining the educational material previously referred to, the main research experiment started from 11/17/2019 to 12/29/2019 over a period of (6) weeks, where it was used The researchers used the flipped learning strategy with the students of the experimental group, represented by group (H), as for the control group

In which the usual method was used, it was the group, where the teacher of the subject taught the two research groups.

Post-tests: The researchers conducted the post-test after completing the main experiment to test cognitive learning, practical learning and deductive thinking for the two research groups on .

Statistical means: The researchers used the statistical bag (SPSS) to process the data.

4- Presentation and discussion of the results:

4-1 Viewing the Results:

For the purpose of verifying the first hypothesis, which states that "there are no significant differences between the experimental and control groups in the cognitive achievement of physical exercises." the second, hypothesis states that "there are no significant differences between the experimental and control groups in the practical achievement of physical exercises. "the third one , which states that "there are no significant differences between the experimental and control groups in mathematical deductive thinking " . the researchers compare the marks of the experimental group with that of the control group of the post –test of practical learning and the deductive thinking

schedule (3)

It shows the statistical coefficients for the post-test of the experimental and control groups in the post-test of cognitive and practical achievement and deductive thinking.

Indication	Values Sig	The calculated t-value	the control group		experimental group		Variants
			\bar{x} p	S	\bar{x} p	S	
معنوي*	0.00	67.3	36.2	56.29	77.1	73.41	Cognitive achievement

*معنوي	0.00	06.3	67.0	18	13.0	24	Practical attainment
*معنوي	0.00	19.3	1.72	93.8	1.36	127.3	deductive reasoning

* Significant if the value of (Sig >0.05)

It is to be noted from table (3) that the value of (sig) for all research variables was (0.00), which is less than (0.05), it indicates the existence of statistically significant differences between the mean scores of the experimental and control groups in cognitive and practical learning of physical exercises and deductive thinking, which is Thus, the null hypothesis is rejected while the alternative hypothesis is accepted.

4-2 Discussing the results:

The results in the table (3) showed that the curvature is significant in the three research variables, and the researchers attribute this to:

1- The flipped learning strategy is based on presenting the scientific material to the student in a digital and computerized manner, characterized by being simplified and graduated from easy to difficult, and in a hierarchical, sequential and logical way, which facilitates the learning process for students.

2- The learning education strategy has worked on building an initial motor perception of the exercises in the minds of the students, which has led to the development of their mental abilities, increasing their knowledge of physical exercises. Modern technologies intelligently provide education commensurate with the requirements of students for the current era by displaying educational video clips of the required content so that students interact with them, thus giving them sufficient ability in the process of presenting and explaining physical exercises, so a preliminary motor perception of the exercises is built according to the learners' physical and mental abilities" (Al-Zuhairi, 20, 2021).

3- The strategy of reverse education through the educational techniques has worked to bring about positive changes in the educational process, which led to an increase in the cognitive achievement of students. Sequential steps lead to a specific result, but it is a technique added to the many other techniques that seek to bring about positive changes in the educational process" (Al-Sherman, 2015,13).

4- The flipped learning strategy, being one of the blended education strategies, was with its steps, activities and events included in it electronically and skillfully. In this regard, (Johnson, Becker, Estrada, and Freeanm, 2014) point out that "the flipped education strategy, being one of the blended learning strategies, is likely to bring about fundamental changes in the educational context and educational institutions, as it works to enrich the educational process and achieve positive learning outcomes on the cognitive level of the increasing achievement" (Johanson and another, 2014, p.256)

5- The researchers noticed through the use of social media, including (Telegram), which the researchers used to communicate with the students of the experimental group in order to increase understanding and how to perform the basic and derivative positions and the types of physical exercises that are given to students through the lesson of physical education, the researchers' also use photos, videos, charts and papers All this led to an increase in the electronic work for them, and their work was in a dynamic way, with the cooperation with each other, and thus led to an increase in practical achievement.

For students in the field of physical exercises, in this regard, bisharat (2017) indicates that "the completion of worksheets and class activities within the group, which is carried out in a dynamic manner through the cooperation of students and making them active through the strategy of flipped education, led to an increase in their ability to discuss and know the educational points For each skill, therefore, this has led to the positive effect of the strategy of loving the subject, which was automatically reflected in the improvement of their achievement and the production of positive skill outcomes for them (basharat, 2017, 52).

6- Abu Al-Sheikh (1991) mentions that "the deductive skill according to R.Gagne is one of the nine basic skills in humans which are: observation, inference, classification, prediction, communication, the use of temporal and spatial relationships, the use of numbers, measurement, and implementation." (Abu Al-Sheikh, 1991 235), Ghanem (2001) states that "inference is choosing, organizing, understanding, and foresight,

because it entails choosing previous experiences in the light of these relationships between means and the goal, and organizing previous experiences in light of these relationships (Ghanem, 2001, 190), according to the researchers' opinion, based on the aforementioned sources, the previous experiences of students in the field of physical exercises and the reorganization of these experiences through reverse education and focusing on these relationships led to the development of the reasoning skill of the experimental group.

7- Abdel Aziz (2009) mentions that "deductive thinking is among the mental processes that take place when the player or the learner obtains new information and ideas that are combined with his previous information to enable him to form new ideas and plans that are compatible with the skill given and to be learned" (Abdul Aziz Al-Aziz, 2009, 8), and the researchers believe that teaching according to flipped education, including activities, assignments, videos, pictures, and illustrations, affected the experimental group positively through the new ideas presented and the integration of the students' knowledge in finding relationships with the skills given to them, which are physical exercises. And their formations, this led to an increase in the development of deductive thinking among the students of the experimental group compared to the control group.

5- Conclusions and recommendations:

5-1 Conclusions:

The researchers have concluded the following:

5-1-1 The effectiveness of the flipped learning strategy in the cognitive leaning of physical exercises among third-year students in the College of Physical Education and Sports Sciences.

5-1-2 The effectiveness of the flipped learning strategy on the practical achievement of physical exercises among third-year students in the College of Physical Education and Sports Sciences.

5-1-3 The effectiveness of the flipped learning strategy in developing mathematical deductive thinking among third-year students in the College of Physical Education and Sports Sciences.

5-1-4 The effectiveness of flipped learning as a hypothetical strategy for e-learning in the light of the difficult circumstances such as (covid -19) and for all theoretical and scientific subjects in the College of Physical Education and Sports Sciences.

5-2 Recommendations:

In light of the conclusions, the researchers recommend the following:

5-2-1 Adopting the flipped learning strategy in teaching the concepts of physical education teaching methods.

5-2-2 Adopting the flipped learning strategy in developing the types of thinking patterns associated with the concepts of physical education teaching methods.

5-2-3 Adoption of the electronic educational material prepared by the researcher in teaching the concept of physical exercises for other stages in the College of Physical Education and Sports Sciences.

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