

Doi: 10.34120/0085-036-144-022

The Effectiveness of Flipped Classroom Method on the Academic Achievement and Critical Thinking Development of Female Students at Arab Open University

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Abstract

This research aims to explore the effectiveness of flipped classroom method on academic achievement and critical thinking development of female students at Arab Open University. In order to answer the research questions and examine its hypotheses, a quasi-experimental approach was adopted. The sample consisted of 40 female students; 20 of them were assigned to an experimental group in which they studied the course using flipped classroom method, and 20 of them were assigned to the control group in which they studied the course using the conventional method. The research instruments consisted of an academic achievement test and critical thinking test, that were applied before and after the intervention on both groups. Findings showed that there were statistically significant differences between the mean scores of the experimental group and the control group in favor of the experimental group in terms of the achievement test. Furthermore, findings also indicated that there were statistically significant differences between the mean scores of the experimental group and the control group on the post application of the critical thinking test in favor of the experimental group.

Keywords: Flipped Classroom, Academic Achievement, Critical Thinking.

Introduction

The world is witnessing scientific and technical progress in various areas of life. This has created many challenges that have imposed on those in charge of education the need to keep pace with this evolving reality and to try to adapt to it by reviewing the education system to find alternatives and modern trends to develop and improve the learning process. On an ongoing basis, researchers have sought to come up with educational strategies that keep pace with this era and its developments in various fields and in a way that suits the learners and their levels, their different abilities to acquire different knowledge, and their different experiences. In addition, they have investigated educational technology and its various characteristics and have tried to employ them in the educational environment. Likewise, the educational field needs modern teaching methods that keep pace with the digital age in which we live, so that they may contribute to raising the educational efficiency of teachers and learners in a manner that meets the needs of learners (Al-Shalabi, 2017).

The flipped classroom is one of the practices that emerged with the aim of using modern technologies to develop learning strategies. The idea of this strategy came as a result of long research on the best ways to enable learning to be in the hands of the learner by taking advantage of the effective applications of modern technology (Herreid, Schiller, Herreid & Wright, 2014). Flipped classroom is a form of blended learning that employs modern technology to provide a generalization that commensurates with the needs of learners and the requirements of the age. It is a modern educational model in which the lecture and typical homework change to another curriculum in which the teacher gives female students the scientific content that is usually presented in the lecture as a homework assignment in which learners watch short video lectures at home before they come to the university or during the time allocated to perform exercises and projects or discussions. At the regular time of the lecture, learners use the content they have learned by working on various classroom activities, answering test questions prepared by the teacher, and in solving problems, which would reinforce the main ideas in the lesson, while the teacher answers learners' questions, troubleshoots errors, and helps students work on correcting them (Al-Rusaa, 2018; Habib, 2003).

Teaching practices should not only aim at transferring knowledge to the learner but also to develop the personality of the learner in its mental, emotional and skillful aspects. Thus, the basic task of teaching becomes to encourage learners to know and think for themselves; that is, teaching them how to think. Therefore, critical thinking is one of the important and vital topics that have preoccupied education in the past and present because of its great importance in empowering learners with basic skills in the learning and teaching process. Aspects of this importance are reflected in the tendency of educators of all scientific positions to adopt strategies for teaching and learning critical thinking skills. The primary goal of teaching and learning critical thinking is to improve students' thinking skills, which enable them to succeed in various aspects of their lives including encouraging the spirit of research and inquiry and not accepting facts without investigation or exploration. All of this leads to broadening students' knowledge horizons, and pushes them towards launching into broader scientific fields which works to enrich their cognitive structures and increase their specific learning abilities. Its importance increases if we are convinced of the viewpoint that learning is thinking (Milman, 2012; Schmidt & Ralph, 2016; Strayer, 2007; Tune, 2013).

Al-Kilani et al. (2015) postulate that the evaluation of critical thinking skills is in solving non-routine problems and includes three parts: identifying and interpreting information, analyzing information, and evaluating evidence and arguments. Routines do not focus on developing critical thinking skills. One of the methods of developing critical thinking skills, as mentioned by Peter (2012), is a learning method based on solving unfamiliar problems and dealing with activities related to these complex tasks. This process encourages higher-order thinking skills, including critical thinking, and therefore complex problem-solving activities. It, also, helps enhance students' understanding and enables them to apply knowledge in new situations. Verification and judgment motivate students to explore non-routine math problems that can develop critical thinking skills. As for Watson & Glaser (1991), they focused on the most important five skills, which are:

- 1 - The skill of defining hypotheses; i.e. the ability to examine the facts and data contained in a subject, so that the individual can judge that a hypothesis is verified based on the facts given.

- 2 - Interpretation skill; represented in the individual's ability to derive a certain conclusion from assumed facts with a reasonable degree of certainty.
- 3 - Conclusion skill; i.e., the ability to distinguish between the degrees of probability of being right or wrong depending on a certain result given to it.
- 4 - Inference skill: It is the individual's ability to know the relationships between certain facts given to him, so that he can judge in light of these facts or not. This knowledge is based on whether a result is completely derived.
- 5 - Evaluation skill: It is the individual's ability to know the relationships between certain facts given to him, so that he can judge in the light of this knowledge whether it is a result of these facts or not. Such skills are highly related to constructive self-learning.

Many studies explored the effectiveness of using the flipped classroom on achievement level, while the results of some of them varied in the extent of its effectiveness in developing students' different thinking skills. The study of Alnamrat and al. (2020) investigated the effect of mathematical modeling on the development of critical thinking skills in mathematics among the ninth-grade students. To achieve this, the study tool was designed to test critical thinking skills, (determining hypotheses, inference, evaluating the arguments). A quasi-experimental approach was used in the study. The study was applied to a randomly chosen sample (n=74). 36 students in the experimental group learned using Mathematical Modeling technique. 38 students in the control group learned using the conventional method in the second semester of 2017- 2018. Results showed statistically significant differences in favor of the experimental group using mathematical modeling in the development of critical thinking skills as a whole. Sirakaya & Ozdemir (2018) conducted a study to explore the effect of a flipped classroom model on students' academic achievement, self-directed learning readiness and motivation. The participants of this study were a total of 66 students who took the "Scientific Research Methods" course and were studying in two different classes in the Faculty of Education at Ahi Evran University in the fall term of the 2014 –

2015. They applied the flipped classroom model to the experimental group while a classical blended learning method was applied to the control group. An achievement test, a self-directed learning readiness scale and a motivation scale were used as data collection tools. Study findings showed a significant difference between groups in terms of academic achievement, motivation and retention. However, no significant difference between the experimental and control groups in terms of self-directed learning readiness was found.

Another study (Al-Rusaa, 2018) revealed the effectiveness of the flipped classroom on academic achievement. Results, also, indicated no statistically significant differences between the mean of the experimental group and the control group in the scores for the post application on the Habits of Mind Scale. Results of another study (Al-Shalabi, 2017) also showed the effectiveness of using the flipped classroom in developing the habits of mind of the student / teacher at Imam Muhammad bin Saud Islamic University in the course of Measurement and Evaluation. The results of another study (Al-Dossary & Massad, 2017) showed the effectiveness of the flipped classroom strategy in student achievement to learn programming in the computer and information technology course, first-grade secondary students at Al-Shifa Secondary School in Riyadh.

Likewise, the Qeshta study (2016) demonstrated the effectiveness of using flipped classrooms in developing the reflective thinking skills of female students in a life sciences course in Gaza. The results of another study (Hamid, 2016) also showed the effectiveness of the reflexive classroom environment at the expense of the combined classrooms in developing the skills of designing educational web pages among the students of the College of Education at the Islamic University of Gaza. Al-Zabin (2015) showed the effectiveness of flipped classroom strategy on the academic achievement of students of the College of Education at Princess Noura Bint Abdul Rahman University. Al-Mutairi's study (2015) indicated the effectiveness of the flipped classroom strategy using the educational platform according to the levels of TEMs as a whole, and in the levels of: knowledge - application - inference, and in developing self-learning skills in the biology course of first-grade secondary school students. Moreover, the results of (Haroun & Sarhan, 2015) indicated the ef-

fectiveness of flipped classroom strategy in improving the achievement and performance levels of e-learning skills for third-level students of the College of Education at Al-Baha University in the e-learning applications course and of information security concepts and the existence of positive attitudes among female students towards it.

Reviewing educational literature and previous studies showed the following:

- There are many studies and diversified trends in the field of using the flipped classroom in teaching.
- The study samples differ in terms of academic levels, subjects and grades, and their tools vary between achievement tests and multiple measures.
- The studies followed the quasi-experimental approach to examine the effect of using the flipped classroom on achievement and the development of different types of thinking, motivation, and attitudes.
- The results showed consensus in terms of the positive effect of using the flipped classroom on achievement, and others.
- Previous studies provided for developing the general framework for current research tools and in interpreting the results.

It is noted that no study examined the effect of using the flipped classroom on student achievement and critical thinking at the university level. The present study comes to fill such gap. Thus, what distinguishes this research is its treatment of the effect of using the flipped classroom method; as related to two variables, namely achievement and critical thinking, not covered in previous studies.

Research Problem and Questions

Looking at the status of university teaching at the present time, we find that the traditional method is mostly used by teachers where the focus is on students' preservation of information without acquiring it. This is not commensurate with the nature of the skills to be developed by learners at this stage, and it does not satisfy the needs of the current generation of educated

people for whom modern technology forms the center of their activities. Looking at recommendations postulated by some conferences, such as the Fifth Annual Scientific Conference of the Arab Society for Educational Technology (2009) and the Third Annual Forum for University Teaching (2016) held at King Saud University, we can easily note that they recommend focusing on educational and pedagogical aspects and to support self-learning, as a life-long experience. They also recommend the necessity of developing and designing interactive electronic educational communities and employing them effectively to achieve educational goals with the necessity to change traditional teacher-based education only, provided through indoctrination and learner's passivity, and transforming the teaching method into active learner-based, in accordance with advanced technology and keeping pace with modern global changes.

The problem of the current research is determined by the low level of achievement of female students in a children's literature course and their weakness in practicing critical thinking that plays a role in organizing their cognitive abilities and conceptual understanding. Perhaps the reason is mainly due to the teaching methods, where lecturing and rote learning still represent the largest percentage in the performance of faculty members at the bachelor's level, and the lack of time available for activities and female students' questions. Therefore, the research tried to address this problem. This research aims to explore the effect of using the flipped classroom compared to the traditional method on student achievement. To achieve this purpose, the research problem was formulated by answering the following main question:

What is the effectiveness of flipped classroom on academic achievement and critical thinking among female students of the Education Program at Arab Open University?

The following two sub-questions emerged from this:

- 1 - What is the effectiveness of flipped classroom on improving academic achievement among female students of the Education Program at Arab Open University?

- 2 - What is the effectiveness of flipped classroom on developing critical thinking among female students of the Education Program at Arab Open University?

Research hypotheses

To answer the main research question, the following two hypotheses were formulated:

- 1 - There are no statistically significant differences ($\alpha = 0.05$) between the means of academic achievement among female students of the Education Program at Arab Open University due to the method used in teaching (the flipped classroom and the traditional method).
- 2 - There are no statistically significant differences ($\alpha = 0.05$) as of the level of critical thinking of the female students of the Education Program at Arab Open University due to the method used in teaching (the flipped classroom or the traditional method).

Objectives of the study

This study aims to shed light on the importance and feasibility of FC technique in pedagogical and personality aspects of learners' development (the subject matter and critical thinking), thus providing a comprehensive look to educational outcomes. Moreover, the study relies on prospective teachers to secure sustainability in the educational domain.

The significance of the study

The significance of the current study stems from the following:

- Its results may contribute to improving university learning methods and overcoming deficiencies resulting from the use of traditional teaching methods by highlighting the employment of modern strategies that simulate the capabilities and interests of the generation in the twenty-first century, such as flipped classroom.
- It may contribute to focusing on learners and helping them study and learn in the appropriate place and time; by taking advantage of the wide-

- spread technical applications available in the hands of the learners by employing them in flipped classroom.
- It may direct the researchers' attention to conduct more studies on the topic of flipped classroom and critical thinking.

Research Terms

Effectiveness: The intended cognitive change that occurs in the female students (the experimental group) as a result of participating in FC activity; as measured by the achievement test and the critical thinking test.

Flipped Classroom: Procedurally defined as an educational strategy centered on students rather than instructors (faculty member), whereby students watch short video lectures at their homes prior to lecture time, while a faculty member uses time in classroom to provide an active, interactive learning environment in which the females students are guided to apply what they have learned.

Academic Achievement: The outcome of what the student learned after a learning activity, as measured by means of the achievement test consisting of 25 multiple choice questions.

Critical Thinking: The set of capabilities that provide the learner with the skills of examining and evaluating a cognitive claim by using his ability to distinguish similarities and differences, and to identify basic information and distinguish it from the marginal information less related to the vocabulary and concepts related to the lessons of the prescribed unit. These skills are measured in the current research by the students' grades on the designed test consisting of 15 items (approved by teaching staff).

The Traditional Method: The method by which the control group is taught, that depends on oral presentation, and some oral questions.

Limitations

The research is subject to applying the (FC) model in teaching the unit types and characteristics of the sample and measuring its impact on achievement and critical thinking.

Research Methodology

Quasi-experimental approach based on the design (pre and post test) was used for the experimental and control groups.

Research Participants

The research participants consisted of 40 female students from the education program at the Arab Open University in Jordan; constituting (10% of study population) divided into two groups: the experimental group (20 female students), to be taught using the flipped classroom, and the control group (20 female students), taught using the traditional way. The sample members were chosen randomly.

Procedure

The achievement test was developed and applied to the research groups. t-test was used to ascertain that the two groups are equivalent, and Table (1) shows the results of this test.

Table 1

Results of t-test Analysis of Pre-Achievement Test

Group	Number	Mean	SD	Df	Calculated t	Critical t	Level of significance
Control	20	9.92	1.931	38	0.575	1.69	Non-S
Experimental	20	9.61	2.00				

Adjusting the Female Students' Critical Thinking Skills

The female students' critical thinking skills variable was adjusted before applying the treatment according to the teaching method by applying the pre-test to the research individuals, as both the arithmetic means and standard deviations of the female students' performance were calculated as of the critical thinking test. T-test was used to find out the significance of the statistical differences between the mean of the two research groups, so the calculated t value was equal to 0.757 and the tabular t value was equal to 1.69, indicating

equivalency between the two research groups. Table 2 shows the results of this test.

Table 2

Results of the Analysis of the t-test for the Pre-Critical Thinking test

Group	Number	mean	SD	Df	Calculated t Critical Value	Level of significance
The officer.	20	8.86	1.431	48	0.757	1.69
Experimental	20	8.45	1.634			Non-D

Research Tools

The research tools were represented in the teaching guide according to the flipped classroom, the achievement test, and the critical thinking test; as follows:

First - Teaching Guide According to the Flipped Classroom:

The guide was prepared to guide the teaching process undertaken by a fellow researcher while applying the research to the group. The guide included:

- a - The Theoretical Framework: The theoretical framework includes an introduction to the teaching guide according to the flipped classroom, its concept, its stages, and its importance.
- b - The Procedural Framework and the Educational Material: The procedural framework includes the instructions for implementing the lessons, the proposed time plan for implementing the unit, and plans for preparing lessons. The educational material on children's literature was designed as an educational activity including nine lessons. The following steps were taken in preparing the educational material:
 - Determining the educational material was before starting the experiment.
 - Defining the concepts within the topics determined for the experiment from the methodological book.

- Preparing samples of the daily lessons according to the flipped class in which the experimental group was taught, and samples of the daily lessons according to the traditional method in which the control group was taught.

The steps for implementing the flipped classroom strategy were implemented as follows:

First - At Home:

- a - The student watches the educational video sent by the faculty member through the Internet or various mobile devices and communicates with her classmates in the group via various social media before attending the class.
- b - The student takes notes and questions while watching the educational video.

Second - In the Classroom:

- a - The student discusses with the faculty member the notes and questions that she wrote down while watching the educational video.
- b - The student applies what she has learned from the scientific content in the video through activities, and follows up with the faculty member and her colleagues.

As for the means, techniques and tools used in the program, introductory slides were prepared with an audio explanation of the scientific material and links to some videos that cover the academic content and they were sent via e-mail to the group. A communication group was also created with the female students of the experimental group through the “What’sApp” application. The safety, correctness, and appropriateness of the guide and the educational material were verified by a jury of 8 university professors from Department of Curricula and Teaching Methods. They were asked to give their opinions, suggestions and observations, and the suitability of the material to the level of female students. Their notes were taken in consideration.

Second - The Achievement Test:

A test was developed in its final form consisting of 25 multiple-choice questions; to measure the females students' achievement in the course, according to the following steps:

- 1 - Course content analysis for the first semester of the academic year 2019/2020.
- 2 - Defining and formulating objectives that cover aspects of the content in light of the analysis.
- 3 - Preparing items that measure the goals that were formulated according to a table of specifications that included the type of test items, and the levels of goals to ensure coverage of the content.
- 4 - Securing the validity of the test, through presenting it to a group of expertise, including faculty members (n=14) in the specialization of Curricula and Teaching Methods (Arabic Language) at the University of Bahrain, the University of Jordan, Al-Bayt University and M'utah University. Each was handed a copy of the test in its initial form, consisting of 40 questions. In light of their remarks, the necessary amendments were considered.

The reliability of the test was ascertained by applying it to a neutral sample (n=24) outside the research sample using the Test-Retest method. After two weeks the test was repeated on the same sample. The test took 60 minutes, with the same conditions in which it was applied for the first time. After completing that, the difficulty and discrimination coefficients were calculated for the test items. The difficulty coefficients ranged between 0.30 - 0.61, and the discrimination coefficients ranged between 0.24 - 0.47. These ratios were acceptable for research purposes. On the other hand, the reliability coefficient was calculated using the K-R equation (K.R.20) and it reached 0.84, and the Pearson correlation coefficient between the two applications was calculated as 0.88, which means that the tool has statistically acceptable stability ratio.

Third - The Critical Thinking Test

The critical thinking test was based on the Mary McFarland method, which focuses on related words. This strategy is characterized by distinguishing between related and irrelevant words then writing a generalization expressing a related sentence. This means that there are two skills associated with this type of test: the skill of choosing interconnected words by distinguishing similarities and differences, and the skill of determining the point of view. The test was developed according to the following steps:

- 1 - Analyzing the content of the children's literature course for the first semester of the academic year 2019/2020.
- 2 - Defining and formulating behavioral goals that cover aspects of the content in light of the analysis.
- 3 - The critical thinking skills test was prepared in accordance with the requirements of the study. It is known that the process of building any test passes through the basic steps:

First: Planning for the test by defining the areas covered by its items. The areas of the test were determined in the light of the targeted capabilities; referring to Watson-Galcer Critical Thinking Test; including five critical thinking skills:

- 1 - The skill of defining hypotheses: It is a result that we accept based on available facts or evidence: Each exercise in this test consists of a statement that follows it. Four hypotheses are proposed and only one is accepted, and the student must verify that this assumption is possible or not possible by developing mark (X) under the word in the appropriate place of the answer sheet.
- 2 - Interpretation skill: It is to derive a certain result from suggested facts with a reasonable degree of certainty: in this test the student finds a statement followed by four proposed explanations, one of them arranged, and the student should put a mark (x) under the word arranged in the appropriate place on the answer paper.
- 3 - Inference skill: Distinguishing the possibility of a result being true or false according to the degree to which it is related to certain facts. In

this test, the student finds an expression followed by four conclusions, one of which is correct, and the student must put a mark (x) under the word true in the appropriate place on the answer paper.

- 4 - Inference skill: judging the extent to which a result is truly related to the given situation or not. In this test, the student finds the following phrase four proposed inferences, one of which is in agreement, and the student must put a mark (x) under an agreed word in the appropriate place on the answer paper.
- 5 - The skill of evaluating arguments: the ability to distinguish between strong arguments and weak arguments, and this is determined according to their relevance to the given situation (communication direct, secondary communication) In this test the student finds a statement followed by four arguments, one of which is a strong argument, and the student must put a mark (x) under the word strong argument.

Second: Formulation of items for each field. After reviewing previous tests and literature, 20 items were formulated covering the five critical thinking skills, by 8 items for each skill, all of them were placed in one form. The apparent validity and construct validity were verified by displaying the test was conducted on a group of experts specialized in the disciplines of mathematics teaching methods, and in the light of the experts' opinions, some were modified paragraphs The test in its final form includes 20 items, and each item has four answers, one of which is correct.

- 4 - Preparing test instructions by setting the objective of the test, and the method for answering it.
- Validity and Reliability of the Critical Thinking Test: To ensure the validity of the test, it was presented to a group of specialized referees (n=11), of faculty members in the Department of Curricula and Teaching Methods (Arabic language) at the University of Jordan, Al-Bayt University, and Mu'tah University. Each was handed a copy of the test in its initial form consisting of 20 questions. The necessary amendments were made; represented in deleting 5 items, and making some linguistic and typographical amendments in some items. The final form consisted of 15 items.

As for the reliability of the test, it was ascertained by applying it to another sample ($n=20$) from outside the research sample using the Test-Retest method. After two weeks, the test was re-applied to the same sample. The Pearson correlation coefficient was calculated between the two applications and reached 0.78, which means that the tool has a statistically acceptable reliability value.

Research Application Procedures

The following steps were taken in carrying out the research procedures:

- 1 - Designing research tools (achievement test, critical thinking test, and educational material) and securing their validity and reliability.
- 2 - The application of the pre-test and the critical thinking test before starting the experiment in order to ensure the equivalence of the two groups, and their equivalence has been proven as mentioned above.
- 3 - Selecting two colleagues specialized in teaching “Children’s Literature” courses in the education major. The research idea and their roles are explained to them.
- 4 - Continuous follow-up of the two colleagues who taught the course during the implementation of the experiment, in order to provide assistance to it and answer any inquiries that may come from it.
- 5 - Applying the academic achievement test and the critical thinking test immediately after the completion of the teaching unit.
- 6 - Carrying out data collection, analysis and interpretation.

Variables

The current research includes one independent variable, which is the method of teaching, and it includes teaching using the flipped classroom and the conventional method. As for the dependent variables, they are represented in two variables: the academic achievement and the critical thinking level.

Statistical Treatment

Means standard deviations, and t-test were used to verify the equivalence of the two research groups and to examine the two hypotheses stemming from their questions. Cronbach's alpha value is 0.8 which indicates high internal consistency, and the Kuder-Richardson equation was also calculated to secure the test reliability.

Research Results and Discussion

The results of the first question: To answer this question, the t-test was used for two independent samples, and Table 3 illustrates that.

Table 3

The t-value of Collected Test Scores for the Two Research Groups

Group	No.	Mean	SD	df	T value		Level of significance ($\alpha = 0.05$)
					Calculated	Critical	
Control	20	26.85	4.562	38	2.713	1.69	Statistically sign.
Experimental	20	22.12	3.420				

The above table indicates that there are differences between the female students of the two research groups in the concept acquisition test and in favor of the experimental group female students who were taught using the FC strategy. Because the calculated T value 2.713 is greater than the critical T value 1.69. This means rejecting the first hypothesis. This result is consistent with the results of the study of (Al-Rusaa, 2018), (Al-Zabn, 2015), (Al-Muatairi, 2015), (Qeshta, 2016), (Al-Shalabi, 2017), (Haroun & Sarhan, 2015), (Al-Muaiter & Al-Qahtani, 2015), (Al-Dossari & Massad, 2017). The reason for this may be attributed to the following:

The use of flipped classroom has contributed to the enrichment of the learning process by providing female students with educational materials in the pre-class learning stage in a way that enabled them to master the practical content due to the diversity of information sources such as videos, text files

and presentations. The control of female students to watch the clips at the right time and place, in addition to the ability to repeat the clips for several times, is positively reflected in their level of information empowerment.

In the flipped classroom strategy, the student turns into a researcher who uses technology effectively, reinforcing critical thinking and self-learning in achieving the goals of the established subject.

The opportunity for female students to access informational resources in their various forms, whether paper from the learning resource room and neighboring libraries, or electronic, is expanded to achieve the female students' enjoyment of learning effectively.

The results of the second question: To answer this question, the t-test was used for two independent samples, and Table 4 shows that.

Table 4

The t-value of Critical Thinking Test Scores for the Two Research Groups

Group	No.	Mean	SD	df	T value		Level of significance ($\alpha = 0.05$)
					Calculated	Critical	
Control	20	30.28	5.451	48	3.287	1.69	Statistically sign.
Experimental	20	25.12	4.915				

The above table indicates statistically significant differences between the two research groups in scores of critical thinking; in favor of the experimental group who were taught according to the flipped classroom. The calculated T value 3.287 is greater than the critical T value 1.69. This means rejecting the second hypothesis.

This result can be explained through understanding the role of the technological innovations used in the study or getting feedback quickly at all times to know the extent of their progress and what they have reached, which increased their motivation to deal with the material through the reflex class and broke the fear barrier of new subject, and the formation of a constructive

cognitive structure among the female students that does not contain only what they understood, but also how they reached such understanding, which led to an increase in their level of critical thinking. Such result may also be attributed to the fact that learning in the flipped classroom is active learning that transform the student's role from a recipient to an active interactive learner; while carrying out various activities and different exercises. It also helped her to recall previous knowledge, and use it in new situations, Consequently, her own levels of thinking, including critical thinking, were enhanced, and her application processes improved in different situations, and this matter may have led female students to rely on themselves in searching for information and constructing it instead of just receiving it. This would develop other skills, such as analysis and classification. On the other hand, the organization of the educational material may have aroused the interest of the students and matched their psychological experiences more than others; giving them enough time and an easier access to the targeted material. This may have a positive effect on promoting thinking in general, and critical thinking in particular. The results of this study are in agreement with those of other studies; (Alnamrat et al., 2020), (Sirakaya & Ozdemir, 2018), (Al-Rusaa, 2018), (Al-Shalabi, 2017), (Al-Dossary & Massad, 2017), (Qeshta, 2016), and confirm them.

Finally, education reforms around the world draw from constructivist views of teaching and learning. These reforms explicitly require teachers to change their teaching strategies and shift the focus from traditional textbook-based learning to constructivist learning, where inquiry-based learning is real in Real-world phenomena. We may attribute causes of low capacity of students in solving non-routine problems, to low-focusing on developing critical thinking skills in learning children's literature. Critical thinking skills are closely related to children's literature problems, as these skills are important for students to interpret situations and generate solutions in a problem situation, and free students to use their minds So that they can be creative and analytical, which is more interesting, creative and thought-provoking, and can be applied in all curricular contents to increase academic achievement.

Recommendations

In light of the study results, a number of recommendations can be cited. These are:

- Designing curricula with exercises and models inspired by the flipped classes, and expanding the application of such programs.
- Training faculty members on strategies and programs for developing habits of mind, assessment competencies, and flipped classroom strategies.
- Conducting research on the effectiveness of a program based on flipped classes in developing skills such as: self-learning, problem-solving, investigation, self-organized learning, and metacognitive and creative thinking.
- Conducting more studies that compare this strategy with other strategies, and in other courses within the same program.

فاعلية طريقة الصف المقلوب في التحصيل الأكاديمي وتنمية مهارات التفكير الناقد لدى طالبات الجامعة العربية المفتوحة

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المملكة الأردنية الهاشمية

الملخص

استهدف البحث التعرف على فاعلية طريقة الصف المقلوب في التحصيل الأكاديمي وتنمية مهارات التفكير الناقد لدى طالبات الجامعة العربية المفتوحة-الأردن. وللإجابة عن أسئلة البحث والتحقيق من فرضياته تم استخدام المنهج التجريبي. تكونت عينة البحث من 40 طالبة من طالبات مقرر أدب الأطفال، تم تقسيمهن إلى مجموعتين متكافئتين: الأولى تجريبية تكونت من 20 طالبة درسن المقرر باستخدام الصف المقلوب، والثانية مجموعة ضابطة تكونت من 20 طالبة درسن المقرر بالطريقة التقليدية، وتكونت أدوات البحث من اختبار للتحصيل الأكاديمي واختبار التفكير الناقد تم تطبيقهما قبلًا وبعديًا على المجموعتين التجريبية والضابطة. أشارت النتائج إلى وجود فروق ذات دلالة إحصائية $\alpha=0.05$ بين متوسطي المجموعة التجريبية والمجموعة الضابطة في درجات التطبيق البعدي لاختبار التحصيل الأكاديمي لصالح المجموعة التجريبية؛ تأييداً لفاعلية الصف المقلوب في التحصيل الأكاديمي. كما أظهرت النتائج عدم وجود فروق ذات دلالة إحصائية $\alpha=0.05$ بين متوسطي المجموعة التجريبية والمجموعة الضابطة في درجات التطبيق البعدي لاختبار التفكير الناقد. الكلمات المفتاحية: الصف المقلوب، التحصيل الأكاديمي، التفكير الناقد.

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