

# The Effect of Using Project Based Learning on Improving the Critical Thinking among Upper Basic Students from Teachers' Perspectives

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## ABSTRACT

Project-based learning is a modern teaching method aimed at students, connecting students' experiences with school life and stimulating serious thinking as students gain new knowledge. So that, this study aimed at investigating the impact of a teaching strategy adopting project-based learning on improving the critical thinking among upper basic Stage Students from male and female Science teachers' perspectives. The researcher used the descriptive-analytical method, through a questionnaire which applied to (111) male and female Science teachers teaching upper basic schools in Al-Kourah District, Irbid, Jordan. The results show that there is a significant statistical difference ( $\alpha = 0.05$ ) attributed between the conventional method and the project-based learning strategy. Thus, the differences came in favor of the project-based learning strategy. In addition, it is recommended that the project-based learning strategy should be adopted, and the textbook content and activities should be organized to commensurate with the project-based learning. In other words, this action requires the rehabilitation of the teachers to prepare learning situations by using a project-based learning strategy. Moreover, conducting further studies on other subjects in the method of learning thinking skills, such as creative thinking, reflective thinking, communication, and cooperation skills.

**Keywords:** Project-Based Learning, Critical Thinking Skills, Upper Basic Student's, Science Teachers.

## 1. INTRODUCTION

In general, the twenty-first century is characterized by the revolution of the knowledge explosion in science and technology, which is the driving force behind innovations and speed up changes in social, political, economic, and cultural systems. Therefore, education in this century is experiencing a real change, which has contributed to highlighting the imperatives of this century for humanity to meet changing needs and expectations. In addition, it created a basis for predicting the skills to be acquired for students, such as critical thinking. Thus, requires educators to focus on their efforts in addressing educational curricula and using their most effective teaching strategies to make science more useful for students' lives.

From this standpoint, teachers form a pivotal role in education by sharing the educational system in reform responsibility. Apparently, they should have the knowledge, the theoretical and practical capabilities in teaching and learning science. In other words, they should be familiar with modern and productive teaching methods to achieve the vision of science education. As well, explaining Students' attitudes in educational studies are positive towards sciences that are related to the science teachers, and to the number of their experience (Al-Huwaidi, 2008).

Accordingly, the skills that should be studied by teachers and that should be mastered by students, are aimed at solving problems in society. In other words, the competencies that should be mastered include critical thinking skills, the ability to communicate effectively, creativity, and problem-solving through negotiation and cooperation. Moreover, the students

should refine learning skills to be able to overcome global challenges. Here, the strategies that should be developed enable the assimilation of these skills. And, among the strategies that can achieve this project-based learning (PBL) help the students enrich their knowledge and develop various mental skills (Kembara, Rozak, & Hadian, 2019).

Project-Based Learning (PBL) is one of the most prominent strategies that have encroached on the traditional systems and their negative routine activities that kill the spirit of creativity. As well, the students' passive role lies in that. Moreover, they receive the information provided by the teacher, record a set of notes, and complete homework assignments. Also, they perform tests, reduce their participation and classroom interaction. The spirit of competition is low so that the routine character prevails over these classrooms. Thus, an urgent need for the project-based learning strategy to provide students

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with active and varied cognitive patterns such as motivation, curiosity, inquisitive, tendencies, attitudes, and self-reliance (Ambosaidi & Al Balushi, 2011).

Project-based learning (PBL) is one of the constructivist teaching strategies in teaching science (Frank & Barzilai, 2004) which has been considered as an important classroom strategy in recent years. Students are expected to construct and interpret their new knowledge rather than memorize it. On the other hand, the researchers emphasized these strategies eliminate students' misconceptions and encourage them to learn meaningfully (Kizkapan & Bektas, 2017).

According to Filippatou and Kaldi (Filippatou & Stavroula, 2010), project-based learning is one of the most frequently used strategies in science classes. (Frank & Barzilai, 2004) who comment on the rapid increase in its use confirms that. As well, the benefit of students' active participation in project-based learning lies in working collaboratively to solve problems, then discuss what they have learned (Doppelt, 2003; Krajcik, Blumenfeld, Marx & Soloway, 1994).

Chiu (2020) notes that project-based learning (PBL) is a group-work approach in teaching and learning, through which students are exposed to situations regarding real-life issues and practices. Moreover, this learning process includes a series of complex tasks that occupy students' minds by working on projects. In other words, open-ended, problem-solving, decision-making, or investigative activities, are used to achieve desired goals and evaluate their performance and progress. Projects are designed based on issues and needs that students define.

Project-based learning (PBL) improves the students' skills are needed to meet the global community. It supports student learning outcomes and develops students' abilities especially for communication, cooperation, creativity, and especially critical thinking. As students take part in the learning process, this develops a deeper understanding of the content and the required skills in schools, universities, work, and life in general (Bell, 2010).

Niu, Behar-Hornstein, and Garvan (2013) showed that critical thinking skills refer to the ability to analyze and test information and to apply these capabilities as a high-level cognitive ability. In addition, students should be able to decide their professional and personal life.

The National Council for Excellence in Critical Thinking (2020) noted that it is an intellectually disciplined process of conceptualizing and applying information resulting from observation, experience, reasoning, inference, or communication, as a piece of evidence for belief and action.

Critical thinking helps students to self-control, adhere to accuracy, reliability, and clarity towards the topics and issues they are exposed to. It enables them to form appropriate and deliberate judgments and decisions away from prejudice. Additionally, the process of critical thinking requires

training students in cognitive activities (Abu Jada & Nofal, 2017).

Apparently, students who can think critically have important basic skills in the learning and teaching process. They can critically investigate problems, produce and test relevant ideas, theories, and hypotheses. They are able to make logical decisions considering evidence and arguments for solving problems (Kilbane & Milman, 2017).

In this regard, students need skills that focus mainly on critical thinking, which Kim and Han (2016) described as one of the most important features of success in the twenty-first century.

Also, they are essential to the practice of learning, and as a criterion for distinguishes between students. Thus, helps in acquiring a set of skills, abilities, and personal characteristics that make them qualified for professional success by focusing on scientific knowledge, and employing it in real-world situations. In the past few decades, the need for educational methods that facilitate the development of skills increases, especially in the education of sciences in all its branches and stages (Shurman & Khataibeh, 2015; AL-Zboun, 2020). These skills are adapted to the new requirements and to the change of the world.

Therefore, this study aimed to investigate the impact of using project-based learning, its usefulness, and its impact on improving some skills for students such as critical thinking among Upper Basic Students from Teachers' Perspectives.

### 1.1 Study Questions:

Do teachers' perspectives differ regarding the acquisition of critical thinking by the upper basic stage students at the Al-Kourah District, Irbid City, Jordan , according to the teaching strategy (Project-based learning, Conventional Method)?

## 2. METHOD

### 2.1 Research Design

The selected sample is the male and female schools are affiliated to the Directorate of Education in the Koura District, Irbid, Jordan, which teaching the upper basic stage for the academic year 2020-2021. The descriptive-analytical method was followed, one independent variable is teaching strategy, and it has two levels: project based learning (PBL) and conventional method. The dependent variable is critical thinking skills.

### 2.2 Population and Sample

The sample in this study are all male and female science teachers who teaching upper basic stage in schools affiliated with the Directorate of Education in the Koura District, Irbid, Jordan, as many as (111) teachers. The study sample

distribution In light of educational qualification, years of experience, and gender is shown in Table 1.

**Table 1:** Frequencies and percentages in light of educational qualification, years of experience, and gender.

The Ratio	Repetition	Categories	
69.4	77	Bachelor	Qualification
30.6	34	Graduate Studies	
21.6	24	Less than 5 years	years of experience
36.9	41	From 5-10 years	
41.4	46	More than 10 years	
35.1	39	Male	Gender
64.9	72	Female	
100.0	111	Total	

The data was taken by using critical thinking skills' questionnaire. The Critical Thinking Questionnaire was created with the help of the Watson-Glaser Classification (1980) of Critical Thinking (19,20), including 5 skills, namely, assumptions, interpretation, deduction, inference and evaluation of arguments, which consisting of 15 items using a Five-level Likert Scale 1-5. Was adopted to correct the instrument by giving each of its items one of the (Strongly Agree, Agree, neither agree nor disagree, Disagree, Strongly Disagree), represented digitally (5, 4, 3, 2, 1), respectively. The following scale has been adopted for the purposes of analyzing the results:

- From 1.00 - 2.33 is few
- From 2.34 - 3.67 is medium
- From 3.68 - 5.00 is great
- And so on
- The scale was calculated by using the following equation:
- $[Upper\ limit\ of\ scale\ (5) - lower\ limit\ of\ scale\ (1)] / Number\ of\ required\ classes\ (3)$
- $[5 - 1] / 3 = 1.33$
- Then add the answer (1.33) to the end of each category.

The instrument was validated through a panel of judges. The paragraph correlation coefficients with the total score of the scale (the axis to which it belongs) ranged between (0.40-0.63). It should be noted that all the correlation coefficients have acceptable scores and statistically significant. Therefore, none of these paragraphs was omitted as shown in Table 2 below. Apparently, the reliability for the questionnaire was tested by alpha Cronbach, reaching (0.78). These values were considered appropriate for the purposes of this study. The final questionnaire is attached as in appendix (1).

### 2.3 Research Procedure

The first stage of the procedures starts with specifying the schools are intended for research, preparing the research

**Table 2.** Correlation coefficients between the paragraph and the overall score of the scale.

Paragraph number	Correlation coefficient	Paragraph number	Correlation coefficient	Paragraph number	Correlation coefficient
	.51**	6.	.63**	11.	.44*
	.59**	7.	.59**	12.	.43*
	.61**	8.	.45*	13.	.52**
	.55**	9.	.54**	14.	.49**
	.62**	10.	.51**	15.	.40*

\* Statistical function at the significance level (0.05).

\*\* Statistical significance at the significance level (0.01).

instruments such as the questionnaire. As well, the impact of the teaching strategy adopts project-based learning on improving critical thinking from Science teachers' perspectives, testing the validity and reliability of the instrument. The second stage is collecting the questionnaire data answered by the selected science teachers' schools. Then the data were analyzed using SPSS statistics software.

### 2.4 Data Analyzing Technique

The data were analyzed through the use of the SPSS. The calculation was done of frequencies and percentages, arithmetic averages, and standard deviations. The costs calculation is associated to the paragraph score of the scale for extracting the indications of the scale construct validity. Also, the reliability coefficient is calculated by the method of the consistency coefficient according to the Cronbach alpha equation to ensure the stability of the factor.

## 3. RESULTS AND DISCUSSIONS

### 3.1 Study Questions:

Do teachers' perspectives differ regarding the acquisition of critical thinking by the upper basic stage students at the Al-Kourah District, Irbid City, Jordan, according to the teaching strategy (Project-based learning, Conventional Method)?

This study used a questionnaire about the impact of a teaching strategy that adopts the project based learning on improving the science teachers' perspectives, which will be described as follows. Based on the results of the questionnaire, there is a significant statistical difference ( $\alpha = 0.05$ ) attributed between the conventional method and the project-based learning strategy. As well, the differences came in favor of the project based learning strategy, as shown in Table 3.

It was shown that PBL model affected on the students' critical thinking ability in science. Then the students in the PBL classes have the highest average value of critical thinking skills compared to students who are learning through Conventional Method from teacher's perspective. In accordance with the previous studies, it is stated that PBL model can give positive results to the students' results of improving the critical

**Table3.** Means, Standard deviations, and T-test for correlative data for critical thinking for project-based and Conventional learning.

Sig.	DF	F	Standard Deviation	Mean	N	Learning method	Critical Thinking
.000	110	-8.065	.436	3.86	111	Conventional Method	
			.442	4.03	111	project-based learning	

thinking compared to the traditional classes (Desouki, 2012; Anazifa & D Djukri, 2017; Priyatni & Abdur Rahman, 2019; Al-Mutawa, 2018; Al-Rawi & Zaytoon, 2016).

The results of the current study were in agreement with the study of Al-Mutawa (2018), which showed the effectiveness of project-based learning in developing critical thinking skills and academic achievement, as project learning stages contributed to the development of critical thinking skills. Also, Al-Rawi and Zaytoon’s study (2016) confirmed that the use of project-based learning as a teaching strategy contributes to developing students’ scientific thinking skills, raises the level of performance and improves it, and provides students with new knowledge and skills.

As well as, the study of Yunus and Ahmed (2011), which revealed the effect of the project method on students’ achievement in biology and the development of their critical thinking. In addition, Ahmad’s study (2000), investigates the impact of the students’ scientific thinking development and it improved their cognitive beliefs. As well, the study of Scott (1994), where the researcher noticed an improvement in the critical thinking of project strategy students and improvement in their superiority in social skills.

This result may be attributed to the possibility of upgrading and developing students’ critical skills through project strategy teaching. Basically, the project-based learning strategy is an inquiry-based approach in which the student is the researcher who acquires experience while the teacher is the supervisor and instructor (Zaytoon, 2007).

The learning context is provided by real questions and problems in real-world practices (Al-Yamani & Askar, 2010) that play a role in meaningful learning experiences.

AL-Ali (2010) added that the use of inquiry in all the project stages led to an increase in the students’ ability and stimulated their thinking. Additionally, it contributes in obtaining information from various sources in the traditional methods, and it helps to find solutions to problems increased the skill of constructing explanations. And it helps them to be free and responsible to make the appropriate decisions on their own.

Whereas, all the project learning stages contributed in improving the critical thinking skills, starting with the project selection stage in a way that suits the students, their desires and needs. This is followed by the planning stage,

which begins with the students’ previous knowledge, setting and formulating questions allows students to expand their perceptions and thinking upon the activities are built in the project-based learning strategy. As well as practicing the skill of recognizing assumptions, evaluation of arguments through class discussions of the project stages and implementation steps of data collection and analysis, followed by the evaluation stage and presenting the students’ findings (Bell, 2010).

Accordingly, students learn by linking their previous knowledge with new knowledge, and meaningful understanding is achieved. Students are allowed to build knowledge independently, and to decide what to learn and how to learn. The PBL model has stages that invite students to build knowledge independently and also make students active to have a role not only in the classroom, also outside the classroom in searching for answers to the given problems (Rini & Diana, 2020).

The PBL is an educational curriculum that satisfies the independence of the students’ learning and helps to encourage the learners’ academic excellence through using what they know to explore and find alternatives. Moreover, it meets the needs of learners with different levels of skills and learning styles, through positive communication and cooperative relationships between groups (Al-Rawi & Zaytoon, 2016).

In addition, the activities that students have done during the learning process based on investigation and exploration, could stimulate students to think more critically. Thus, project based learning can be defined as the activities carried out by an individual or group to achieve clear and specific goals in a social setting, with all desire and enthusiasm (Al-Halfi & Al-Mousawi, 2019). So project based learning will certainly provide students with the ability to think better.

#### 4. CONCLUSIONS

Considering these results, the researcher recommended the necessity of adopting a project-based learning strategy and organizing textbook content and activities in line with the project-based teaching strategy. This procedure requires qualified teachers to prepare educational activities using project-based learning, besides conducting more studies on other topics to identify their impact on the degree of their effectiveness in bringing changes in the style of learning such as creative thinking, reflective thinking, communication, and cooperation in different stages of the study. And conducting more studies on developing variables such as conceptual comprehension, decision-making ability, and self-learning skills.

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Appendix 1: Study Questionnaire											
No.	Paragraph	Convention-al Method					Project-based learning				
		1 1	2 2	3 3	4 4	5 5	1 1	2 2	3 3	4 4	5 5
1.	It develops students' ability to distinguish between scientific fact and personal opinion.										
2.	It develops students' ability to distinguish between assumption and generalization.										
3.	It develops students' ability to determine the purpose of the information given.										
4.	It improves students' ability to derive a specific conclusion from assumed facts.										
5.	It develops students' ability to identify and examine the problem.										
6.	It helps students to identify logical and illogical explanations.										
7.	It develops students' ability to evaluate ideas and accept or reject them.										
8.	It helps students distinguish between primary and secondary sources.										
9.	It helps students distinguish between strong and weak arguments.										
10.	It provides an opportunity for students to make a judgment about the information.										
11.	It develops students' ability to make better decisions.										
12.	It develops students' ability to access new information from previous information.										
13.	It improves students' ability to derive conclusions from certain facts or phenomena.										
14.	It develops students' ability to perceive the correctness or error of their conclusions in the light of facts given.										
15.	It improves students' ability to relate their observations to their previous information.										