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Research Article

PROJECT-BASED VERSUS TRADITIONAL LECTURE TEACHING METHODS

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ABSTRACT

To compete the world in 21st century, it is necessary to adopt the modern learning strategies like inquiry-based, project-based, problem-based. The traditional learning strategies are no viable now to improve the learning skills of the learners. A review of previous studies on traditional lecture-based and project-based learning strategies has been conducted to evaluate the effectiveness of both learning strategies. The learning outcomes and statistical results of 15 previous published articles have selected for this review study. The learning outcomes and statistical results of previous literature indicated that all the studies showed the significant improvement in the learning and cognitive skills of the learners. The effectiveness of project-based teaching strategy in various educational levels are also described in the study.

Keywords: Critical thinking skills; Effective teaching; Engagement; Instructors; Learning strategies.

Introduction

Learning is a fundamental element of education and plays a vital role in the development of a state (Hafeez et al., 2020). The most important challenge in the educational process is the selection of suitable and effective teaching methods to make the learning process useful and to develop the critical thinking skills in the learners (Senthamarai, 2018; Tavoosy & Jelveh, 2019). Two important factors to develop the critical thinking skills among the learners are (i) strategy adopted by the instructor (ii) dynamic engagement of learners in learning process (Nelson, 2017). In the teaching-learning process, the instructor must act as a guider instead of knowledge transfer (Molbaek, 2018). According to (Palis & Quiros, 2014) some important principles for useful learning are (i) learning becomes useful when new knowledge is connected with previous knowledge (ii) The students apply previous knowledge to construct new knowledge (iii) The learning must consist of the strategies to increase the cognitive skills of the learners (iv) All the learners must be engaged in the learning process (v) The learning process must increase the motivation and confidence of the learners.

Various teaching methods like traditional lecture, discussion, project based are discussed in the literature (Farashahi & Tajeddin, 2018; Usarov, 2019; Yusupov, 2020). The most useful teaching strategy to increase the critical thinking is the small group discussion teaching method as concluded by the various studies (Bidabadi, et al., 2016; Yli-Panula et al., 2018; Sivarajah et al., 2019; Strubbe et al., 2020). The traditional lecture method is a one-way conversation in which an instructor delivers the

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information before the audience (Gholami et al., 2016). After the lecture, the instructor gives notes and assign some tasks as homework (Gregorius, 2017). In traditional lecture teaching methods, no feedback session for the learners is conducted (Almanasef et al., 2020). Generally, very little conversation happens between the learners and instructors (Sarıhan et al., 2016). The learners receive passive strategy of learning (Maqbool et al., 2018). The Pictorial view of Traditional learning is shown in Figure 1.

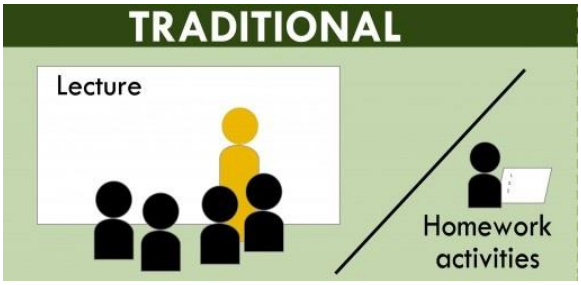

Figure 1. Pictorial Concept of Traditional Learning Method

The Project-Based teaching- learning strategy is a learner-centred instructional approach that is based on three constructivist learning principles (i) learners are engaged actively (ii) learning process is context specific (iii) Goals are achieved by sharing the knowledge between the learners (Kubiatko & Vaculová, 2011). The project-based learning is also called the inquiry-based learning where the course content is provided by questions and problems related to the real-world context (Al-Balushi & Al-Aamri, 2014) that leads to useful learning practices (Kwon et al., 2014). The project-based learning strategy has connections with other learning strategies like inquiry-based and problem-based. The main focus in these learning strategies are to share the knowledge in the group (Anazifa & Djukri, 2017). The freedom of work and challenges that the learners face in the project-based learning are the key elements for the active involvement of the learners and to develop the higher order thinking skills (Kolmos & Graaff, 2014). In project-based learning strategy, higher order thinking skills and cognitive skills are judged by solving the real-life problems (Brassler & Dettmers, 2017). The essential elements in project-based learning are shown in Figure 2.

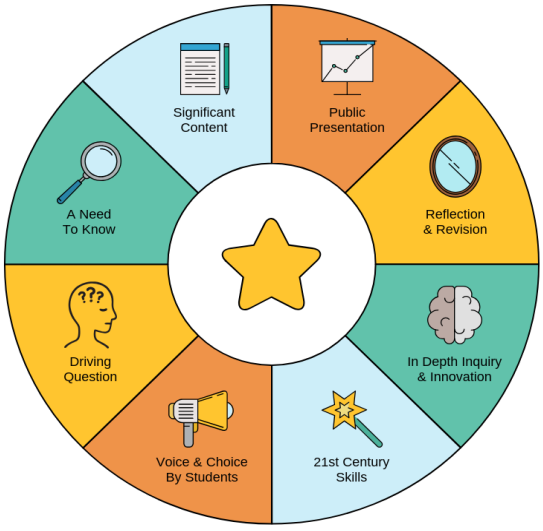

Figure 2. Essential Elements in Project-Based Learning

Affandi & Sukyadi, (2016) argued that project-based learning helps in promoting the self-regulated learning and conceptual learning. The knowledge is acquired in a systematic way by integration of 21st century digital tools. The whole learning process is documented in project-based learning (Barak, 2012). The learners become intrinsically confident and motivated by setting their goals through a proper planning and collaboration skills in project-based learning. This learning strategy has been applied in various educational context ranging

from primary and secondary schools up to higher education (Sari, 2018; Naji et al., 2020).

Purpose of the Study

The 21st learning requirements have been changed from the 20th century. Now the students have to compete with different real-life problems in the society. Various problems-solved learning strategies have been applied in various disciplines in different educational context (De-Graaff et al., 2007; English & Kitsantas, 2013; Desnylasari et al., 2016; Pinter & Cisar, 2018; Mann et al., 2020). The purpose of this study is to review the traditional lecture and project-based learning strategies in various educational context.

Review of Literature

For many decades, the teachers have applied traditional learning strategy in classrooms and the learners followed it with homework. The traditional learning strategy makes the students passive and the project-based learning strategy makes the students active and creators. The information becomes valuable when the learners actively participate in learning process. Many instructors and researchers including (Kizkapan & Bektas, 2017; Nainggolan et al., 2020) concluded that most of the teachers had moved away from the traditional learning strategy as this learning strategy proved to be ineffective for the students in present learning scenario (Saira et al., 2020). The project-based learning strategy was an important phase in the learning process. It is one of the most effective learning strategies. The project-based leaning strategy involves the problem-solving contents to work on the project. The results of the knowledge obtained by working on the project are then shared to resolve the target problem (Chen & Yang, 2019). The differences between traditional learning strategy and project-based learning strategy is illustrated in Table 1.

Table 1. Differences between traditional and project-based learning strategies

Sr.No.	Traditional Learning Strategy	Project-based learning strategy
1	Face to face learning	Learning may be online
2	Usually, large group of learners	Small group of learners
3	Instructors delivers all the information	Instructor guided and Self-regulated Learning
4	No feedback session	Feedback and Presentation session
5	Passive Learning	Active Learning

The project-based learning must be concentrated on the solution of the driving questions and solution is closely related to the reality. The characteristics of Project-Based learning are shown in Figure 3.

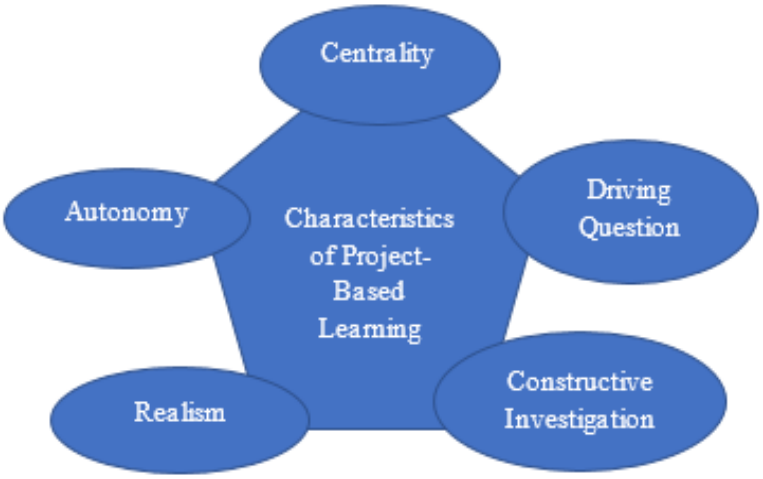

Figure 3. Characteristics of Project-Based Strategy

Effectiveness of Project-Based Strategy in Various Educational Level

A lot of studies have been conducted to evaluate the effectiveness of Project-Based teaching- learning strategy in various educational levels from primary to higher education (Chu et al., 2017; Balemen & Keskin, 2018; Ulya et al., 2020). The effectiveness of project-based teaching- learning strategy in various disciplines and educational levels is discussed in the following lines:

Primary Educational Level

Habok, (2015) conducted a research to evaluate the effectiveness of Project-Based teaching- learning strategy on the learners of a primary school. Two groups (Experimental and Control) were made for the study. The learners of control group were taught with project-based and experimental group with traditional lecture based. The results of the study concluded that project-based learning strategy significantly improved the critical thinking and confidence skills of the learners. Moreover, the learner's engagement was also improved significantly. Kaldi et al., (2011) directed a quasi-experimental research to indicate the effectiveness of project-based strategy in a primary school of Greece. The results of research indicated that project-based learning strategy improved the learning and knowledge development skills of the learners.

The study also revealed that project-based learning strategy also increases the motivation and attitudes towards the group learning environment. Karaçalli and Korur, (2014) conducted a study in Turkey to evaluate the effectiveness on 4th grade science learners. The results of the study indicated a significantly improvement in the academic achievement and retention of information for the learners learned by project-based learning strategy. So, from the literature it can be determined that the project-based learning strategy is an effective way of learning.

Secondary Educational Level

In a quasi-experimental research conducted by (Al-Balushi and Al-Aamri ,2014) on 11th grade female learners in Oman, the researchers determined that project-based teaching-learning strategy significantly improved the knowledge of the learners in Environmental Science course. Hernández-Ramos & Paz, (2009) proposed a research to evaluate the effectiveness of project-based teaching-learning strategy on the 8th grade learners in United States of America in History course. The consequences of the study indicated the project-based learning strategy improved the learner's engagement and academic achievements as compared to the learners learned by traditional learning strategy. The project-based learning strategy also improved the student's knowledge level.

Hsu et al., (2016) carried out a quasi-experimental research in United States of America to explored the effectiveness of project-based teaching-learning strategy on 7th grade learners in graph-oriented course. The results of the study indicated that there was an improvement in the knowledge content and student's participation levels by project-based learning strategy. Geier et al., (2008) described in another study in United States of America on 7th and 8th grade leaners that the learners that involved in project-based learning strategy in Science course has successfully improved the engagement and information level of the learners as compared to the traditional learning approach.

Higher Educational Level

A lot of researches have been done to evaluate the usefulness of project-based teaching-learning strategy in higher education in various countries (Bell, 2010; Lee et al., 2014; Balemen & Keskin, 2018; Tang et al., 2020).

Demian et al., (2016) directed a research to evaluate the effectiveness of project-based teaching-learning strategy in engineering in UK. The consequences of research indicated that project-based teaching learning strategy significantly improved the problem-solving abilities of the learners. Fernandes et al., (2014) directed a study to evaluate the usefulness of project-based learning by following Powell and Weenk, (2003) model in a Portugal university. The results indicated that project-based learning significantly improved the learner's engagement in the learning process. Gibbes & Carson, (2014) investigated in a study that project-based teaching-learning strategy is

an effective method of learning in higher education especially in Engineering.

The outcomes of the studies reviewed in this article are shown in Table 2. The review shows that all the studies selected for the review indicated significant improvement in engagement and learning process of the learners.

Table 2. The Outcomes of the Studies Reviewed in this Article

Reference	Class	Subject	Outcomes
Johnson & Ulseth, (2014)	Undergraduate Engineering	Miscellaneous	The Project-Based teaching-learning strategy has a positive impact on the student academic achievement.
Johnson et al., (2015)	Undergraduate students	Physics, statistics, professionalism	Significant improvement in academic grades of different subjects has been shown by the learners by project-based learning
Sultana & Zaki, (2015)	College Students	English	The project-based learning strategy successfully improved the English learning skills of the learners
Lisa et al., (2018)	College Students	Statistics course	The students achieved better critical thinking and confident skills by following project-based learning strategy.
Carter, (2016)	Undergraduate Students	Mathematics	The outcomes of study showed that Project-Based teaching-learning strategy is an effective learning strategy to increase the problem-solving and critical thinking abilities of learners.
Chidthachack et al., (2013)	Undergraduate Students	Engineering course	The learners engaged more in Project-Based learning as compared to the traditional learning.
Jaeger et al., (2020)	Undergraduate Students	Engineering Courses	Project-based learning strategy improved the critical thinking skills of the learners in the engineering courses.
Worry, (2011)	10th Grade Students	Geometry course	The consequences of the study showed that Project-Based learning strategy was a best strategy for active learning.
Sawyer, (2013)	Elementary Students	English Course	Project-based learning improved the comprehension and language skills of the learners.
Deitering, (2016)	4th Grade Students	General Science	Project-based learning is an effective and significant way of learning.
Overholt, (2017)	6th Grade	Social Sciences	The leaners taught through Project-Based strategy scored higher grades as compared to the traditional lecture strategy.
Yao et al., (2019)	Middle School Students	Inheritance and Genetics course	The learners in Project-Based learning group secured higher scores than the group learned by traditional learning strategy.
Somani & Rizvi, (2018)	8th Grade Students	English	The research indicated a significant improvement in the learning process by Project-Based learning.

Reference	Class	Subject	Outcomes
Armstrong-Grodzicki, (2013)	High School	English Language Course	The Project-Based learning strategy improved the English language reading and writing skills of the learners.
Tortorella & Cauchick-Miguel, (2018)	Postgraduate Students	Engineering Manufacturing course	Project-Based learning approach significantly improved the problem-solving abilities of the learners.

In Table 2, most of the studies shown that project-based learning is an effective and useful learning strategy in all the disciplines and in all educational levels.

Advantages in Implementing Project-Based Learning

According to (Stanescu, 2017), some of the advantages in implementing Project-Based learning strategy are (i) Increases learner's motivation level (ii) Improves learner's academic achievements (iii) Increases student's engagement in the learning process (iv) Increases communication skills (v) Improves research skills (vi) Project-Based learning looks like a fun learning (vii) improves creativity level of the learners (viii) Improves critical thinking skills.

Challenges in Implementing Project-Based Teaching- Learning Strategy

According to (Zafirov, 2013), the challenges in implementing project-based teaching-learning strategy are (i) Project-Based learning strategy is difficult to apply in a large group of class (ii) The instructors face difficulty in improving the motivational level by implementing project-based learning in large class as it becomes difficult to concentrate on all the learners (iii) It becomes difficult for cooperative learning in a large group of class.

Solutions for Challenges

According to (Harris, 2015) the possible solutions of the challenges in implementing project-based teaching-learning strategy are (i) For implementing the project-based learning, the class must be kept small up to 30 learners (ii) Learners have the ability to understand the project requirements (iii) Learners should cooperate with each other for cooperative learning. The statistical outcomes of various studies revised in this article are illustrated in Table 3.

Table 3: Descriptive Statistical Outcomes of Various Studies Reviewed in this Article

References	Teaching Method	Mean	SD	p	Remarks
Johnson & Ulseth, (2014)	Lecture	5.34	1.32	0.0001	Significant
	Project	7.26	1.09		
Johnson et al., 2015	Lecture	3.92	0.54	0.0003	Significant
	Project	4.23	0.31		
Sultana & Zaki, (2015)	Lecture	17.31	5.21	0.00001	Significant
	Project	19.20	4.72		
Lisa et al., (2018)	Lecture	2.79	0.42	0.0004	Significant
	Project	3.12	0.21		
Carter, (2016)	Lecture	7.30	1.93	0.0005	Significant
	Project	8.19	1.29		
Chidthachack et al., (2013)	Lecture	7.32	1.87	0.0003	Significant
	Project	8.91	1.23		
Jaeger et al., (2020)	Lecture	3.57	1.71	0.0002	Significant
	Project	4.21	1.12		

References	Teaching Method	Mean	SD	p	Remarks
Worry, (2011)	Lecture	2.76	0.89	0.0006	Significant
	Project	3.10	0.72		
Sawyer, (2013)	Lecture	2.47	0.92	0.0001	Significant
	Project	3.11	0.54		
Deitering, (2016)	Lecture	67.34	10.39	0.0023	Significant
	Project	71.82	9.20		
Overholt, (2017)	Lecture	16.30	3.45	0.0003	Significant
	Project	18.21	3.02		
Yao et al., (2019)	Lecture	6.30	1.65	0.0009	Significant
	Project	7.69	1.08		
Somani & Rizvi, (2018)	Lecture	2.90	0.61	0.0001	Significant
	Project	3.17	0.45		
Armstrong-Grodzicki, (2013)	Lecture	23.98	4.76	0.007	Significant
	Project	26.73	3.98		
Tortorella & Cauchick-Miguel, (2018)	Lecture	78.43	9.23	0.0009	Significant
	Project	86.30	8.97		

The statistical results of Table 3 shows that in comparison of project and traditional lecture-based learning strategies, all the studies have shown that project-based teaching learning strategy is more effective and significant way of learning for the learners.

Discussion

In previous many decades, a lot of learning strategies have been applied to improve the learning procedure according to the requirements of learners. Various learning strategies have developed to improve the cognitive skills of the learners (Billing, 2007; Sun, 2013; Nisbet & Shucksmith, 2017). Many teaching-learning strategies like inquiry-based, project-based, problem-based have proved to be very effective in various disciplines and in different educational level under changing classroom environments (Panasan & Nuangchalerm, 2010; Silm et al., 2017; Laudano et al., 2020). In this article, a review study has been conducted to compare the project-based and traditional lecture-based learning strategies in various educational levels. The learning outcomes and descriptive statistics of the selected studies are also stated. The review of literature of selected studies indicated that project-based learning strategy is an effective and useful learning strategy to improve the critical and communication skills of the learners.

Conclusion

A review study comprised of project-based and traditional lecture-based learning strategies has been conducted to evaluate the effectiveness of both learning strategies in various disciplines under different educational levels. The learning outcomes and their statistical results are also highlighted. The review of the literature showed that the project-based teaching-learning strategy is one of the most effective learning approaches as compared to other traditional learning strategies in which the learners actively participate in the learning process to improve their academic achievements and cognitive skills.

Conflict of Interest

No conflict of interest has been found between the authors.

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