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The Effect of Project-Based Flipped Learning Model on Early Childhood Learning Motivation

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study aims to analyze the effect of project-based flipped learning model on early childhood learning motivation.
Study Design: This study uses quantitative research methods with quasi-experimental research types.
Place and Duration of Study: The research subjects were 40 children in the experimental class and 40 children in the control class. The experimental class carried out learning activities using a project-based flipped learning model and the control class carried out learning as usual. Questionnaire data analysis technique to measure children's learning motivation.
Methodology: Data analysis used homogeneity test with Levene Statistic test, normality test with Kolmogorov-Smirnov test and hypothesis testing using Independent Sample T Test.

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Results: Based on the results of data analysis found that the mean of the posttest results explain the difference in the results of the 83.50 experimental group higher than the 79.00 control group. The significance value of the posttest is 0.003 < 0.050, thus there is an effect of project-based flipped learning in increasing early childhood learning motivation.
Conclusion: the application of project-based flipped learning model affects the motivation of early childhood learning. It is also expected that further research can examine more deeply the application of project-based flipped learning models in various subjects as well as in analyzing or improving the abilities or skills of students at other levels of education, the main thing is to improve the quality of education.

Keywords: Project based flipped learning; early childhood; learning motivation.

1. INTRODUCTION

Early childhood education is crucial since it's during this time that kids start interacting with their parents and getting to know their peers and teachers. However, they also encounter a novel setting that will serve as the initial basis for their education based on their preferred method of learning. As a result, this early childhood schooling period must be given careful consideration. To create the best future generations, human resources must be ready from an early age. Children go through a golden period between birth and age six, during which they start to become responsive to different stimulus. Children are easily stimulated by their surroundings during this delicate time. Children start to become responsive to different forms of stimulation and educational initiatives from their surroundings, both purposefully and inadvertently, during the golden period of child development. Each child has a unique sensitive time as well as a unique overall growth and development rate. Children's physical and psychological development matures throughout this golden age, preparing them to respond to and complete all developmental goals that should manifest in their everyday behavioral patterns. Early childhood or childhood is a period that demands extra attention because it is a period that is fast and easy to see and measure. If there are developmental obstacles, it will be easy to intervene so that perfect maturity is achieved [1]. Often referred to as the "golden age," early infancy (0–6 years) is the most advantageous time in a person's developmental trajectory. A child's physical, motor, emotional, cognitive, and psychosocial development all flourish throughout this period [2]. According to a different theory, infants start to become receptive to different stimuli during the "golden years," which span from birth to age six. When a child reaches the sensitive period, their physical and psychological development is mature, and they are prepared to react to environmental stimulus [3]. Preschool age is an important period because it determines the success of children's development in the future [4].

“Early childhood education creates an environment in which children's development is well-supported in all facets, with integrated collaboration between educators and parents in a learning setting. The purpose of Early Childhood Education according to Law number 20 of 2003 concerning the national education system states that early childhood education is a coaching effort aimed at children from birth to six years of age which is carried out through providing educational stimuli to help physical and spiritual growth and development so that children have readiness to enter further education” [5]. “At this time it is interpreted as the right time to develop the potential of children, so that children must get more and special attention related to the development of educational curriculum through assistance from parents and educators in early childhood education institutions” [6]. The concepts of learning, playing, and singing are used in early childhood education [7]. “Early childhood education is developmental guidance for children from birth to age six. It is implemented holistically, addressing all facets of development by offering physical and spiritual stimulation to promote the best possible growth and development” [8]. “Early childhood education focuses on the individual figure that is developing quickly and is essential to the child's future existence” [9]. “Early learning should be approached with the goal of giving young children foundational ideas that make sense to them through authentic experiences that best support their curiosity and let them demonstrate their activities” [10].

“Early childhood education is implemented in a way that promotes children's happiness, activity, and freedom of choice. Children learn through

interacting with people, play materials, and equipment. Kids pick up knowledge while having pleasure while playing. When learning exercises involve all of the senses, children learn more effectively" [11]. "Early childhood education is a coaching program designed for kids ages one to six with the goal of assisting with their growth and development on both a physical and spiritual level so they can proceed with additional education" [12]. "Play is enjoyable, and it's a necessity for kids that needs to be met. Children's drive to learn is very strongly correlated with the fulfillment of their play demands. If the requirements of the children are satisfied, the learning process will be successful" [13]. "A variety of factors can impact how kids express their enthusiasm in learning. In order to prevent children from experiencing boredom, tension, or other forms of discomfort, the classroom can be made more comfortable while also promoting learning" [14]. "For a child, the world is one of play. Children get a lot of knowledge through play, which is also crucial to their development as fully formed human beings. Children play with their friends and with themselves during the majority of their waking hours. The foundation of fostering children's development is play. It develops social-emotional, cognitive, linguistic, moral, and ethical facets in addition to physical motor skills" [11].

"Early childhood learning objectives and visions are comparable in the Merdeka curriculum for early childhood education and the project-based learning model. Both stress the significance of play-based, holistic integrative, child-centered, meaningful, and contextual learning as well as the use of technology in education. Instructors can customize lessons based on students' needs, interests, and skill levels with the flexibility offered by the Merdeka Curriculum. Teachers facilitate learning and development in order to support children's best interests. Among the learning approaches that work well for learning with the finished result is project-based learning, such as creating educational media. From elementary school through college, this concept is appropriate for pupils [15]. Project-based learning enables students to work together to develop conceptual understanding, apply past knowledge, acquire new abilities, and integrate several disciplines to produce a project. Project-based learning is a pedagogical strategy that centers learning around a well-defined project and is led by students with assistance from teachers" [16]. "Simple project-based learning that can be implemented in ECD include Making innovative products from used items: Students can be invited to make innovative products from used items, such as toys or wall hangings. In this project, students can learn about creativity, innovation, and how to recycle used items" [17]. The application of Project-based Learning will trigger children's enthusiasm to search and find solutions to what they learn independently so that it can build children's enthusiasm [18].

Project-based learning is an inquiry-based teaching approach that involves students in the production of knowledge by having them finish worthwhile tasks and create useful products [19]. "It is based on constructivist learning theory, which holds that learning is context-specific, students actively build their understanding by working on pertinent problems in the real world, and they accomplish their objectives by interacting with others and exchanging information" [20]. "Children are tasked with addressing real-world, contextualized problems as part of the project-based learning approach. Kids can use what they've learned and experienced, work together with classmates, and acquire a variety of skills that are necessary for the twenty-first century through PjBL. Based on constructivist concepts, problem solving, research inquiry, integrated studies, and reflection, project-based learning is an instructional style that prioritizes theoretical study and application. Children can work individually or in groups to construct a project to generate a product when they use the project-based learning technique. We can therefore conclude that project-based learning is a child-centered approach to education" [19].

"Flipped learning or flipped classroom model is an innovative learning approach that can provide significant benefits for holistic early childhood learning. In a flipped classroom, the information-transmission phase of a conventional in-person lecture henceforth referred to as the "traditional lecture" is scheduled outside of class time. It is replaced by collaborative, active duties. The materials that students use to prepare for class cover the material that would have been covered in a regular lecture. Following class, they continue to study and solidify their understanding" [21]. "Flipped learning in the delivery of learning by flipping, lectures in class and working on questions and at home everything is flipped" [22]. "Flipped learning is one of the types of blended learning model that belongs to the rotation model category. Because this type of model rotates learning activities that

were originally in the classroom and learning activities anywhere, with the help of information and communication technology that is developing today will greatly help the learning process to be even better. Flipped learning is a new innovation, a type of high-level blended learning model" [23]. It is a high-level fusion of different teaching concepts, learning concepts, and teaching modes, as well as a high-level integration of traditional classroom instruction and online learning in form, method, and content. Through reading assignments, films, recordings, and other instructional resources from teachers, students can have a deeper comprehension of the subject matter.

Flipped learning the learning process homework is done at home in addition to in class. While the teacher utilizes the teaching materials to organize learning objectives or projects in class, students use them to work on assignments at home [24]. Davies, Dean & Dall's opinion in [25] which illustrates how flipped learning works. Rather than having teachers provide synchronous or in-person group instruction in the classroom, students are expected to use video resources along with other materials to learn concepts and complete assignments independently at their own pace and in a location of their choosing. By concentrating on their unique learning requirements, each student can avoid falling behind in class discussions or getting disinterested from spending too much time reviewing content they already understand.

"Children can participate more actively and artistically in class when they are encouraged to learn independently prior to class. The following justifies the flipped learning model's necessity for comprehensive education in early childhood settings: Flipped learning allows kids to learn independently by giving them access to resources before class, which fosters creativity and independent thinking. It also helps kids become more independent, responsible, and capable of learning things on their own. Additionally, kids can concentrate on subjects they are interested in and study at their own pace using flipped learning. This motivates children to actively engage with teachers and classmates and raises their level of involvement in learning activities. Giving kids the chance to use their knowledge and abilities to solve problems and complete projects can help them develop critical and creative thinking abilities. Children's ability to think critically, be creative, and solve problems is aided by this. both using technology to help and improve education for kids. Kids have access to a variety of internet learning resources, including instructional apps, webpages, and videos. Under the flipped learning paradigm, kids watch movies, complete modules, or engage in other interactive activities at home to acquire fundamental ideas. More in-depth and participatory activities, such discussions, problem solving, and group projects, take up more time in the classroom. Advantages of PjBL and flipped learning for young children raises kids' motivation and interest in learning. enhances one's capacity for critical thought, problem solving, and teamwork. enhances the capacity for self-learning and concept comprehension. develops in kids a strong sense of morality and character" [26].

"Based on observations made at Aisyiyah 66 Surabaya Kindergarten, most of the students of Aisyiyah 66 Surabaya Kindergarten are still low in children's learning motivation. This occurs because of misconceptions in communication between children and teachers, in addition to educators still conducting conventional learning that makes students as objects not subjects. Educators become the centre of the role in learning or children's play activities and seem to be the only source of knowledge. Educators are still reluctant to move from their comfort zone. Learning in the classroom is more about mastering knowledge about reading and writing to fulfil the demands of parents and society. It is still not optimal to provide child-centred, interesting, meaningful and fun learning that can improve children's literacy and numeracy skills. The facts on the ground are that the learning carried out by educators is still less inspiring, tends to be monotonous and not varied. One of the learning models that is considered relevant to the world of education, seen in line with the development of learning, and can overcome the problems that arise today is the project-based flipped learning model. This model is expected to increase early childhood learning motivation as an innovation for a new classroom atmosphere that is effective and efficient" [26].

"Previous research shows that the results showed that there is an effect of project-based learning model on children's learning motivation, creativity, critical thinking skills, and cognitive abilities" [27]. "Research results show that project-based learning is effective on learning motivation and science process skills" [28]. Research result showed the effect of project-based learning model on children's learning motivation [29]. "The results of other studies

show that the project-based learning model has an influence on increasing students' learning motivation as well as cooperation between students and their parents" [30]. The results showed that the effect of student learning motivation was better by using the project-based learning model [31]. Based on the description of the research results regarding project-based learning, there are many benefits and positive things that are effective in increasing children's learning motivation, this is also considered to support the growth and development of early childhood during the learning process because their motivation is maintained during their learning.

Previous research shows that the results showed that flipped classroom learning is effective on learning achievement and learning motivation [32,33]. Results of the research show there was an effect of flipped classroom learning on improving mathematical critical thinking skills and learning motivation of students [34]. Results of the research show there is an effect of blended learning flipped classroom model on students' learning motivation [35]. Results of the research show that the flipped classroom learning model assisted by google classroom affects the motivation and learning outcomes of students [36]. Another results of the research show there is an there is an effect of the flipped classroom model assisted by gamification on learning motivation. Based on the description of the research results on the flipped classroom, it shows various benefits and things that can be taken to be applied to early childhood education, by increasing learning that integrates the internet will greatly help in innovating learning and certainly increase children's learning motivation.

By reviewing the background of the problems described above, this study aims to determine whether there is an effect of the project-based flipped learning model on early childhood learning motivation.

2. METHODS

2.1 Research Design

This research design uses quantitative research with quasi-experimental research and using nonequivalent pretest-posttest group design. In this design, two groups are given a pretest to determine if there is a difference between the experimental group and the control group in their initial conditions. The results of the posttest provide a decision on the answer to the hypothesis that there is a significant. In the nonequivalent pretest-posttest control group design, there is no randomisation of the control group, but it is adjusted to the group given the intervention (e.g. with regard to type, number, etc.). So the only difference is that there is treatment in the experimental group and the control group has no treatment. This is very helpful for this research so that the research process steps can be faster and obtain more maximum data. The following is a Table 1 of nonequivalent pretest-posttest control group design:

Table 1. Research design

	Pretest		Posttest
Experiment	01	X	02
Control	03	_	04

Table 1 explains that the experimental (01) and control (03) groups before being given treatment (X) were given a pretest, then given treatment for the experimental group and the control group was not, then the experimental (02) and control (04) groups before after being given treatment (X) were given a posttest.

2.2 Research Subject

Research subjects were kindergarten students at Aisyiyah 66 Surabaya with a total of 80 children. 40 children were in the experimental group and 40 others were in the control group. The experimental group applied project-based flipped learning, while the control group carried out learning activities as usual.

2.3 Data Collection and Data Analysis Techniques

The data collection technique used is a questionnaire to measure children's learning motivation with the help of the child's teacher and guardian for the filling process. With the guidance of the questionnaire item instrument as follows: Desire to succeed, encouragement and needs in learning, hope for future goals, appreciation in learning, interesting activities in learning, conducive learning situation. Data analysis techniques used homogeneity test with Levene Statistic test, normality test with Kolmogorov-Smirnov test and hypothesis testing using Independent Sample T Test.

3. RESULTS

Research data test results were collected from both groups through the posttest process, the next stage is data analysis. The initial analysis is the homogeneity test on the number of research subjects using Kolmogorov-Smirnov, the following results:

Table 2 shows the results of the Kolmogorov-Spirnov test in the experimental group obtained a pretest significance value of 0.149 and a posttest significance value of 0.362. As for the control group, the pretest significance value is 0.113 and the posttest significance value is 0.122. This means that the values of the experimental group and control group are statistically normally distributed.

Next is the homogeneity test on the number of research subjects using Levene Statistic, the following results shows in the Table 3.

Table 3 shows that the results of the Levene Statistic test show that the pretest value obtained a significance of 0.415 and the posttest value obtained a significance of 0.733, both of which exceeded 0.05, which means that the data of the experimental group and control group are statistically homogeneous.

Next is the hypothesis test on the number of research subjects using the Independent Samples Test, the following results shows in the Table 4.

Based on Table 4, it shows that the mean pretest value of the two groups is not much different, namely the experimental group 33.25 and the control group 33.38. The posttest results explain the difference in the results of the 83.50 experimental group higher than the 79.00 control group.

Table 5 explains that the pretest significance value is 0.939 > 0.050, it can be said that children's learning motivation in the two groups is not much different. The significance value of the posttest is 0.003 < 0.050, thus there is an effect of project-based flipped learning in increasing early childhood learning motivation.

Table 2. Normality test result

One-Sample Kolmogorov-Smirnov Test					
		Pretest Experiment	**Posttest Experiment**	**Pretest Control**	**Posttest Control**
N		40	40	40	40
Normal Parameters[a,,b]	Mean	33.25	83.50	33.38	79.00
	Std. Deviation	6.938	6.622	7.628	6.425
Most Extreme Differences	Absolute	.180	.190	.146	.187
	Positive	.180	.113	.146	.163
	Negative	-.120	-.190	-.111	-.187
Kolmogorov-Smirnov Z		1.140	1.199	.923	1.182
Asymp. Sig. (2-tailed)		.149	.113	.362	.122

a. Test distribution is Normal.
b. Calculated from data.

Table 3. Homogeneity test results

Test of Homogeneity of Variances				
	Levene Statistic	**df1**	**df2**	**Sig.**
Pretest	.672	1	78	.415
Posttest	.117	1	78	.733

Table 4. Group statistics

Group Statistics					
	Group	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Pretest	Experiment	40	33.25	6.938	1.097
	Control	40	33.38	7.628	1.206
Posttest	Experiment	40	83.50	6.622	1.047
	Control	40	79.00	6.425	1.016

Table 5. Independent samples test output

Independent Samples Test						
			Pretest		Posttest	
			Equal variances assumed	Equal variances not assumed	Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances		F	.672		.117	
		Sig.	.415		.733	
t-test for Equality of Means		t	-.077	-.077	3.085	3.085
		df	78	77.310	78	77.929
		Sig. (2-tailed)	.939	.939	.003	.003
		Mean Difference	-.125	-.125	4.500	4.500
		Std. Error Difference	1.630	1.630	1.459	1.459
	95% Confidence Interval of the Difference	Lower	-3.371	-3.371	1.596	1.596
		Upper	3.121	3.121	7.404	7.404

4. DISCUSSION

Based on the results of data analysis found that the mean of the posttest results explain the difference in the results of the 83.50 experimental group higher than the 79.00 control group. The significance value of the posttest is 0.003 < 0.050, thus there is an effect of project-based flipped learning in increasing early childhood learning motivation. This has similarities with previous research showed project-based learning not only could enhance vocational school students' learning motivation, but facilitate their problem-solving ability [37]. Another research results show project-based flipped learning model significantly affects learning motivation and learning achievement [38]. And the results that an effective combination of project-based learning and flipped classroom methods can improve motivation and learning outcomes. [39]. Another research results show that project-based learning has a positive influence in students' motivation [40]. Another research results show that flipped learning improves learning motivation and attitudes [41]. "Another research results show that project flipped learning significantly impacts student learning outcomes, motivation, and creativity in science education. These findings contribute to the existing literature on project flipped learning and its influence on learning outcomes, creativity, and student motivation in science learning" [42]. "Another research results show there is the impact of the project-based learning (PBL) on the motivation of first-year students" [43].

Other research results also show the many benefits of the project flipped learning model, including show that the flipped learning model showed improvement on the self-direction, the self-leadership, and the learning competency [44]. Another research results show that the combination of Flipped Classroom and Project Based Learning Model gives the effect on student's critical thinking ability [45]. "Another research results show that the flipped project-based learning approach has significantly enhanced students' self-regulated learning skills" [46]. Another research results show the influence of flipped classroom-based project assessment on critical thinking skills and physics learning outcomes [47]. "Another research results show that the project-based flipped learning approach had an impact on prospective teachers' ability to comprehend technological pedagogical content" [48]. The research results above reveal that the implementation of a combination of project flipped learning is very good and recommended to be applied in learning because so many benefits are obtained after implementing a combination of these learning models.

"The positive outcome of this study can only be attributed to the war-related combination of project-based flipped learning and learning. If we dissect the learning, each offers a distinct benefit. Project-based learning has the following benefits: it challenges students to solve real-world problems and be good collaborators; it improves content knowledge; it meets the needs of students with different skills and learning styles; it allows students to collaborate in conceptual understanding, applying prior knowledge, and higher-order thinking skills; and it allows students to demonstrate higher abilities" [49], Its benefits are also mentioned in other study findings, which include fostering creativity and innovation, critical thinking and problem solving, individual communication, information and media literacy, cooperation, teamwork, and leadership abilities [50]. PjBL encourages interdisciplinary collaboration among students. PjBL brings together students from diverse backgrounds, allowing them to collaborate, share perspectives, and develop effective communication and teamwork skills [51]. Other advantages: trains students in expanding their thinking about problems in life that must be accepted; provides direct training to students by honing and familiar ising them with critical thinking and skills in everyday life, adjusting to modern principles whose implementation must be carried out by honing students' skills, both through practice, theory and application [52]. T"hrough this collaboration, children gain a deeper understanding of a wealth of information and acquire the ability to work effectively in diverse teams-skills that are essential in today's interconnected world even if they are small because early childhood abilities differ from those of older levels. In PjBL, students are free to learn by integrating various scientific fields to explore. With this freedom, students are expected to be more motivated to explore themselves through project activities because there are no rigid rules like conventional learning" [53].

"Flipped learning offers the benefit of allowing students to study the material at home before the teacher presents it in class, fostering greater independence in the learners. With the capacity to acquire material, students can study the subject matter in a comfortable setting. Teachers give students their undivided attention when they

are having trouble understanding assignments or activities. A variety of learning resources are available to students via websites, books, and videos. Unlike traditional learning, which is less effective since students must repeat explanations from the teacher until they fully comprehend, learners can watch the video again until they truly get the content. As long as they have a strong enough internet connection, students can view the video from wherever" [54]. "Flipped model offers learners the chance to learn at their own pace, as well as re-access the content. In the studies, students rated this element of flipped learning favourably" [55]. "Students can easily access all information sources from anywhere they are with this flipped learning approach. When using a flipped learning model, students can now access all of the references they previously had to locate through books, literature, and other printed materials that were difficult to obtain" [56]. "Another benefits is development of interaction between teachers and students, opportunities for real-time feedback, learning at individual pace, meaningful assignments, formative and flexible assessment, changing classroom management" [57].

When project-based flipped learning is implemented in teaching and learning activities, it can result in significant improvements in learning outcomes related to cognitive, emotional and psychomotor domains. On the other hand, the advantages of both models provide new innovations in the learning process that can increase children's interest and motivation to learn. It is important to be careful in using learning models in early childhood education, as not all learning models suit the needs and uniqueness of students and subjects [58].

5. CONCLUSION

Based on the research results and discussion, it can be concluded that there is an effect of project-based flipped learning model on early childhood learning motivation. This result is also supported by previous research related to the effect of the project-based flipped learning model which shows positive results in supporting learning. The results of this study prove that at the early childhood education level does not have to use a game-based learning model, but can be designed using a learning model that has been integrated with information and communication technology. The results of this study also provide important information that teachers in early childhood education do not need to worry about applying learning models that are difficult to apply to early childhood, but can innovate with other learning models while still paying attention to learning needs, material characteristics and students and adjusting the learning objectives that have been set. It is hoped that further research can examine more deeply the application of project-based flipped learning models in various subjects as well as in analysing or improving the abilities or skills of students, the main thing is to improve the quality of education.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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