

Physical education learning is based on a base project to improve student literacy and numeracy

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Abstract

Numerical literacy in early can be used as a tool for developing thinking skills in children, supporting children in developing various talents or intellectual potentials they have, and can be used as a means of cultivating a positive affective side in instilling basic personality. This study aims to describe numeracy literacy skills in early childhood students. This research aims to improve students' reading and numeracy skills through learning about physical education and health. The method used is quantitative. The approach used is an experimental pretest-posttest design. The simple random sampling technique was divided into 2 groups of 50 students in the experimental group and 50 in the control group. This type of research is population research. The data are analyzed by using paired sample t-test with a significance level ($p < 0.05$). Based on the analysis and discussion results, using the learning model using the project with a combination of mathematics and sports can improve literacy and numeracy skills in junior high school students in Bondowoso Regency, East Java. Based on data analysis, the following results were obtained: (1) There was a significance in literacy with sig 0.000 values; (2) There was a significance in numeracy with sig 0.002; (3) There was a significance in the control group with sig 0.000. So that through this research, the expected indicators in the implementation of literacy and numeracy in mathematics and sports can be achieved by students. Project-based learning is beneficial for students and provides motivation.

Keywords: project base learning, literacy, numeracy, mathematics, sports.

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INTRODUCTION

Science and technology are developing rapidly, therefore, the world of education must be able to adapt to improve quality of services or graduates. Education involves various interconnected components to achieve set educational goals (Widana & Septiari, 2021). Education is the

attempt to change the behavior of individuals or groups through the teaching process. Education is more than an apprenticeship or knowledge, values, and personality development process. Sport and Wellness Sport is one of the programs carried out at all levels of education (Sukarini, 2020). Physical Education and Wellness. Physical education is taught in schools and aims to provide students with systematic opportunities for different learning experiences through physical activity and wellness. Physical education is part of the educational process, and its main purpose is to develop physical fitness, motor skills, and critical thinking (Iswanto & Nanang, 2015).

Problem-based learning is a method used for real-life problems as content in learning critical thinking and problem-solving skills to gain knowledge (Rahayu & Fahmi, 2018). The basic feature of problem-based learning states that students must actively ask questions and find solutions in order for students to have their own learning experience (Purwaningsih & Widana, 2017). The role of the teacher in carrying out the learning process is to provide opportunities and encourages students to participate in problem-solving actively. In a problem-based learning approach, students will discover and develop thinking skills in small groups through direct learning (Utami & Astawan, 2020). PBL is a learning model that invites students to study and work in small groups (Sumandya, I Wayan dan Widana, 2019).

Six learning models can support student capacity in the 21st century, including problem-based, discovery, production, research, project, and factory learning. In the 21st century, the development of science and technology requires a high level of thinking, which includes critical, logical, and creative. (Abidin et al., 2020). From these data, it is clear how the condition of Indonesian education.

In mathematics, 28 percent of Indonesian students achieve second-level proficiency, of which the OECD average is 76 percent. The results obtained by TIMSS make it clear that the reading skills of elementary school students in Indonesia for science and mathematics still need to

improve, as are their skills in solving problems related to everyday life (Abidin et al., 2020). Students can interpret and recognize at that level without direct instruction, and know-how situations can be represented mathematically. The decline in PISA scores in 2018 is one of the reasons for the need to strengthen learning competencies for educators in the country. In addition, the problem is that students feel they need clarification when learning seems unimportant. This is because students feel they need to be helped in developing their reasoning skills, especially in terms of students' mathematical reasoning skills. These interdisciplinary approaches to physical education will help to foster the enjoyment of physical activity, an underlying component of physical literacy (Ennis, 2015). Interactive games developed specifically for this intervention supported the health-related objective of increasing PL by encouraging the development and creative use of FMS (Mandigo et al., 2018).

In the learning process, the teacher is important in advancing students. Instructions used by a teacher will not be separated from the learning model used. In line with learning development in the 21st century, teachers' learning model also develops. Teachers can use learning models to help students think critically, creatively, and innovatively. In striving for quality improvement learning can be done by selecting appropriate and innovative learning models. The learning model that can be used is a learning model using a project. In addition, education aims to prepare students with analytical skills, problem-solving, and critical thinking. Therefore, students can perform high-level thinking skills (Brierton et al., 2016).

In sports learning, for example, students can calculate the length of a running track, both short and long-distance running. Teaching numeracy and literacy skills in sports subjects requires modifications in learning strategies, so learning can require good numeracy skills. Although skills necessary to compete expertly in team sports will continue to be an important component of physical literacy, additional opportunities to explore a range of physical activities of interest to students will challenge

physical education educators through this decade and beyond ([Green, 2004](#)). This method can inspire sports teachers to develop learning that can strengthen numeracy and literacy skills in students. Fundamental physical literacy skills like throwing remain relatively unchanged across generations. Most agree that throwing with the opposition is essential for every child ([Society of Health and Physical Education, 2014](#)).

The stages of implementing literacy in sports and health physical education subjects are different from other subjects. At the habituation and development stage, this can be done by using various sources of information, from reference books, student handbooks, and other sources. However, physical education's subject learning stage differs from other subjects. The physical education lesson in the literacy movement has the task of literacy of students' movements and building students' active participation in learning movement to develop physical intelligence. It is hoped that it will impact spiritual, mental, social, and spiritual intelligence. Physical educators who aspire to instill physical literacy encourage students to make these decisions and choices in a teacher-supportive environment ([Wigfi, 2016](#)).

The knowledge can enrich the repertoire of students' knowledge about motion, games, or various other sports and can increase the development of reasoning power to form certain knowledge. The power to interpret or analyze movement patterns, position oneself when playing sports, and recognize space and time are characteristics of skill and intelligence in developing reasoning power resulting from motion literacy. Children's physical literacy is based on the idea of equipping children with confidence and motivation to be physically active ([Rihatno & Nuraini, 2021](#)).

As in critical thinking, creative thinking skills are a very important cognitive aspect to be needed in meaningful learning in all disciplines. ([Sumarni & Kadarwati, 2020](#)). [Swanson et al. \(2011\)](#) explained that learning to read and write improved students' reading skills while increasing students' understanding of the material being taught.

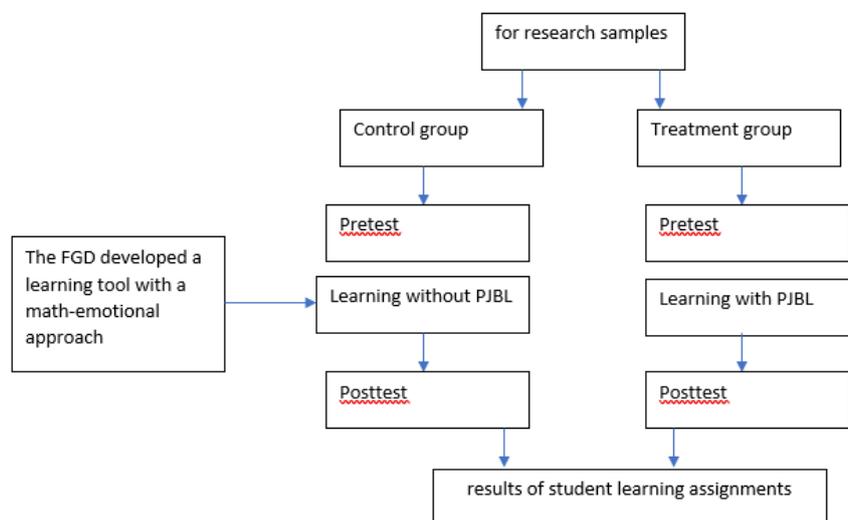
Independent students can successfully develop learning skills and abilities in the 20th century by applying PJBL literacy (Abidin et al., 2020). In using the PJBL learning model, literate students can think critically, have creativity or collaborate and communicate effectively. One way to strengthen learning competence or teacher pedagogy is to extract learning innovations in sports, movement, and health to improve students' reading. And writing and numeracy skills.

METHOD

The method used is quantitative. This research is an experimental pre-test post-test design emphasizing the application of the Sports Physical Education and Health learning model through a mathematics and sports approach based on Project base learning. The population in this study numbered 100 students, especially grade 7 junior high school students, therefore, this research was called population research. The sampling technique used simple random sampling, a sample of 50 treatment students, and 50 control groups of junior high school students. The data are analyzed by using paired sample t-test with a significance level ($p < 0.05$), by mathematics and PE approach addition in order to establish collaborative learning between mathematics teachers and Physical Education teachers in formulating learning to achieve the competencies of each subject that can be collaborated through Sports Physical Education and Health lessons. Based on the Higher Education Research Strategic Plan, this research has adjusted the focus on Social Human Resources in the field of Education through the development of learning tools. The cognitive test of this research used AKM (assessment of minimum competencies) for all students.

In a study with 7th-grade elementary school students divided into 2 group distribution treatment groups using ordinal pairing, group (X1) The treatment is in the form of math and sports training and workshops for three months and control group (X2). Each given group a pre-test (O1) before the treatment was applied to each group. The treatment was given

to the treatment group from Sports Physical education or health education based on Project base learning with a sports mathematics approach in the control group following the program given by the teacher.



Picture 1. Research flow chart

This research was carried out offline, with research procedures divided into stages, namely the first stage, the pre-implementation stage, which included activities to cooperate persuasively with all junior high schools in Bodowoso and instrument validation by experts before the instrument was used for research in schools.

The second stage of implementation examines the pre-test and post-test student work results by giving scores to gathering information about students' literacy abilities, collects documentation in the form of a list of physical education lesson scores for each school, analyzes the research results to see how far the relationship between numeracy literacy abilities and results learning physical education, and providing research conclusions about the relationship of numeracy literacy skills with physical education learning outcomes.

RESULT

The research results obtained description data, normality test results, homogeneity test results, paired samples test t-test results.

Descriptive Statistic

Table 1. Descriptive

Group	Mean
Pre_literacy	68.3200
Post_literacy	71.7000
Pre_numeracy	66.1600
Post_numeracy	67.5200
Control_Pre_numeracy	66.7600
Control_Post_numeracy	68.2800
Control_Post_literacy	66.6200
Control_Pre_literacy	65.3400
Valid N (listwise)	

Based on the descriptive data above, they have an average literacy pre-test result of 68.3200 or a literacy post-test result of 71.7000. the average result of the numeration pre-test is 66,1600, or the post-test numeration is 67,5200. The average result of the pre-test control for the numeracy group was 66,7600, and the post-test for the numerical control group was 68,2800. The average post-test result for the literacy control group was 66,6200, and the results obtained from the average pre-test control group were 65,3400.

Data Normality

Table 2. Data normality

	One-Sample Kolmogorov-Smirnov Testx							
	Pre_lite rasi	Post_Lite rasi	Pre_num erasi	Post_Nu merasi	Control_P re_Numer asi	Control_P ost_Num erasi	Control_P ost_Litera si	Control_P re_literasi
Kolmogorov-Smirnov Z	1.259	.873	1.758	.960	.896	1.143	1.245	1.431
Asymp. Sig. (2-tailed)	.084	.431	.134	.315	.398	.146	.090	.133

From the data group above, in literacy pre-test group was 0.084, the literacy post-test group was 0.431, the numeracy pre-test group was 0.134, and the post-test numeration group was 0.315. The numeric pre-test control group is 0.398, and the post-test is 0.146. In the control group, the literacy test post was 0.090 and the control group per literacy test was 0.133. So in the normality test above, the normal significance level is above 0.05.

Homogeneity

Table 3. Test of homogeneity of variances

Test	Sig (P)	Ket	Status
Pre_literacy	.732	P > 0,05	Homogen
Post_Literacy	.892	P > 0,05	Homogen
Pre_numeracy	.386	P > 0,05	Homogen
Post_Numeracy	.641	P > 0,05	Homogen
Control_Pre_Numeracy	.627	P > 0,05	Homogen
Control_Post_Numeracy	.501	P > 0,05	Homogen
Control_Post_Literacy	.839	P > 0,05	Homogen
Control_Pre_literacy	.569	P > 0,05	Homogen

In the homogeneity test, the literacy pre-test group was 0.732, and the post-literacy test group was 0.892. In the pre-test group, the numeration was 0.386, and the post-test numeration was 0.641. In the control group, the numeric pre-test was 0.627, and the post-test numeric control group was 0.501. In the control group, the literacy post-test was 0.839 and the literacy pre-test control group was 0.569. So the data above has a homogeneous significance level because all data groups are above 0.05.

Table 4. Paired samples test t-test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre_literacy - Post_Literacy	-3.38000	2.24872	.31802	-4.01908	-2.74092	-10.628	49	.000
Pair 2	Pre_numeracy - Post_Numeracy	-1.36000	2.45581	.34730	-2.05793	-.66207	-3.916	49	.000
Pair 3	Control_Pre_Numeracy - Control_Post_Numeracy	-1.52000	3.22769	.45646	-2.43730	-.60270	-3.330	49	.002
Pair 4	Control_Post_Literacy - Control_Pre_literacy	1.28000	2.01058	.28434	.70860	1.85140	4.502	49	.000

In the data group above the t-test in the pre-test and post-test literacy groups, there is a sig <0.05 and a very significant effect. The pre-test or post-test numeration groups have sig <0.05, which has meaning is a very significant effect. In the numerical control group data, there is sig < 0.002, meaning there is a significant influence between each variable.

While in the literacy control group, there was $\text{sig} < 0.000$, meaning there was a very significant effect.

DISCUSSION

Based on the analysis using the t-test there are the following results: (1) There is a very significant influence on the literacy group; (2) There is a very significant influence on the numeracy group; (3) There was a sign-in in the control group. So that through this research, the expected indicators in the implementation of literacy, and numeracy in mathematics, and sports can be achieved by students. There is debate over which particular interventions work best for improving literacy and numeracy outcomes, and more high-quality research is warranted in this area ([NSW Department of Education, 2016](#)). The results of the research above showed an increase made by junior high school students in Bondowoso Regency, East Java, with a project-based learning model on literacy and numeracy. Learning in the project-based learning model allows students to form their knowledge through the experience of students working on a project through discussion rather than memory. Therefore, learning models using a project can help students solve problems, especially real ones. so, in line with the application of Project Based Learning (PjBL) learning model has a positive influence. The novelty in the results of this study is that it can stimulate students to understand learning physical education topics through teacher project assignments, especially in junior high schools in Bondowoso. The approach of using matrices is the newest and most innovative approach.

Therefore, secondary schools in Bondowoso Regency, East Java can use a project-based learning model with a mathematical or sports approach in developing students' reading or numeracy skills, this is because the learning model has teaching pressure for students in developing modeling solutions or problems through discussion. Groups in project activities. Therefore, the PJBL literacy model can provide problems in everyday life that are aimed at learning contexts. This is based on

research findings (Zheng & Zhou, 2011) which explain that learning using the PJBL literacy model can make students think more deeply and make learning so useful for students in the future. Physical literacy is a highly pursued construct that values an individual's physical existence to improve physical movement to achieve a particular goal (Lundvall, 2015). The notion was that movement development was perceived to be inferior to language, numeracy, and social development within early childhood (Whitehead, 2010).

The difference between learning that uses projects and learning that uses literacy for skills in mathematical thinking or athletics. Then this is caused by several factors, one of which is the discussion process of learning projects that use reading, which requires students to use skills in higher-order thinking to improve healthy reasoning indirectly. This discussion activity will provide a difference between the ability of groups that receive learning using projects and classes that are able to receive other lessons. So besides that, learning uses projects based on literacy in order to explain mathematical or sports reasoning skills better, this is because students can gain skills in advanced thinking to plan or carry out projects. as for what distinguishes the increase in mathematical thinking skills among students who can learn using project-based or literacy-based learning and using calculus, therefore which can significantly improve students' mathematical reasoning abilities or sports.

Using the PJBL learning model, the maturity in students' thinking can be trained in four stages of learning. Work together in understanding each student through what is taught by each group. Each stage of the model then greatly affects the maturity in thinking that can improve students' mathematical reasoning abilities. This follows the research (Fery et al., 2017) who explained that literacy is very important for learning mathematics because it can improve students' skills or understanding to master mathematical concepts. Recent research has demonstrated that 'cognitive concept learning through cognitive map making and critical

thinking, is a viable outcome of the developmentally based physical education program (Dollman et al., 2006).

This suggests implementing programs that include content relating to various sports, games, and physical activities. These approaches will help to foster the enjoyment of physical activity, an underlying component of physical literacy (Ennis, 2015). Interactive games developed specifically for this intervention supported the health-related objective of increasing PL by encouraging the development and creative use of FMS (Mandigo et al., 2018). The PJBL Literacy model of student learning is also very satisfying because students have projects that need to be done.

The PJBL Literacy model of student learning is also very satisfying because students have projects that need to be done. There continues to be a pervasive argument for more time to be committed to the 'core academic' learning areas such as literacy, numeracy, and information technology (Sibley & Etnier, 2009). Students learning through the PJBL Literacy Model greatly facilitates their mathematical reasoning skills. Using a learning model in the form of a project influences students to communicate the results of constructs related to their experiences with literacy and numeracy, become better active in providing ideas that they have, and increase critical thinking. Research (Abidin et al., 2020) also revealed that literacy project-based Learning is good and effective learning that helps students improve their mathematical reasoning skills.

CONCLUSION

Results obtained from the analysis or discussion show that using the learning model that uses projects with a combination of mathematics and sports can improve literacy and numeracy skills in junior high school students in Bondowoso Regency, East Java. All of these groups have a very significant influence.

Related to this research, the researchers can provide suggestions to recognize better models related to PJBL (Project Based Learning) literacy. Researchers see the results obtained from the research, which

show that the model can make students more creative and satisfied. Learning using projects can provide benefits for students and provide motivation.

This research's implication is to contribute to junior high school physical education by implementing literacy and numeracy. The research results can be a reminder to the world of education about the importance of implementing projects based on physical education by applying literacy and numeracy. Apart from that, it can also motivate the results of the research for teachers and junior high school students in Bondowoso Regency, East Java.

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