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The Influence of the Problem-Based Learning Model Assisted with Learning Videos on Learning Motivation, Critical Thinking Ability and Learning Outcomes

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ABSTRACT

Parallel with the progress of technology, the discourse on developing learning models has become a focus that attracts the attention of both practitioners and researchers. Explicitly, this requires an adaptive and accelerated attitude from education practitioners. This research aims to test the effect of the Problem-Based Learning model assisted by learning videos on learning motivation, critical thinking skills and student learning outcomes. Statistical accuracy is relied upon to ensure the quality of the results obtained as empirical evidence using a quasi-experimental approach and a non-equivalent control group design. Data was collected through observation, learning outcomes tests and questionnaires, as well as documentation from a total of 56 samples with details of 27 students from the experiment class and 29 students from the Control class. Results show significant improvements in the experimental group, with p-values < 0.05 for all variables. Notably, 85% of students achieved "Very Good" motivation levels, 78% demonstrated high critical thinking skills, and average learning outcomes increased from 53.70 to 88.15. These results suggest that the Problem-Based Learning model with video support effectively enhances student engagement and comprehension. The study provides evidence for the model's effectiveness in improving key educational outcomes, potentially influencing future teaching approaches and educational quality in primary schools.

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1. INTRODUCTION

On the Social Sciences focus as one of the subjects integrated into learning at school is not always common. Apart from having to enable the acquisition of knowledge and abilities as stated by Wu & Sung (2021); In certain contexts, and especially basic education, according to Shin et al (2019), it must also be specifically directed at efforts to develop students' social awareness. This is based on two main principles in social science, namely constructionism and reflexivity (Lockyer & Weaver, 2022; Scharp & Thomas, 2019). The first (constructionism) will relate to cognitive power in forming social awareness and sensitivity, while the second (reflexivity), tends to relate to students' responses to things they experience in everyday social life. This will be a basic consideration for educators as learning facilitators, where they must focus on two important domains of Social Sciences, namely the conceptual and practical domains.

In developed countries, for example China, social sciences have a practical-empirical accentuation, or if you borrow the terminology used by Zhang et al (2018), namely knowledge based on 'evidence-based practice'. In the best scenario for the development of social sciences as well as the phase of advanced technological progress, of course, there are gradual and simultaneous demands on teachers' pedagogical abilities (d'Alessio, 2018); This also includes the way the teacher delivers learning material (Henschel, 2021). In other words, the ability to understand the complexity of material comprehensively by articulating it through communicative learning instruments - by educators, is very necessary. This always opens up opportunities for the development and use of certain learning models in classroom practice. One of the goals according to Webb et al (2017) analysis is to generate diverse ideas. Therefore, Ulya & Rahayu (2021) emphasize that teachers must be able to design a learning model that can be adapted to the level of students' abilities.

One of the goals of thus explicit emphasis that is students are expected to be able to understand the learning material well. However, the prerequisite for this is that the teacher or educator must also understand the condition of the students before implementing a particular learning model so that the model that is then applied among other things, can effectively increase learning motivation, critical thinking abilities and furthermore, student learning outcomes. Problem-based learning as a learning model can be one that can be considered. This is based on the view that the model is designed with the ability to balance assessment procedures and learning outcomes in the concept of education (Zwaal, 2019).

To stimulate motivation and critical thinking skills and furthermore, produce better student output (learning outcomes), at least one appropriate and supportive learning tool is needed so that learning material can be delivered in accordance with learning objectives. Belland et al (2019) in their study have shown that the problem-based learning model will be able to have a significant effect – and especially, on aspects of students' knowledge and epistemic beliefs. This model also allows for another condition in learning practice, as stated by Malmia (2021), that problem-based learning can change learning activities that were originally teacher oriented to learning oriented. Apart from that, the application of this model is also considered to be able to shape students into what Xu et al (2022) called resources. Going a little further, Houghton (2023) even positions the Problem-based learning model as one of three independent theories, namely Blended learning also at a certain stage - Flipping the classroom. Not only can it increase students' motivation and abilities, this model, analytically in the observations of Connolly et al (2022), also has the potential to develop teachers' competence in articulating the various materials they will teach. Apart from that, the application of the problem-based learning model will really enable students to construct collaborative knowledge (Lestari et al., 2023).

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Although these various opinions will at least be carefully considered. But however, researchers still pay attention to the context and of course, case differentiation which is the focus of the research. This is a benchmark for the variation and development of related studies which also explicitly provide the same focus to the model being tested. Thus, as an adaptive effort, and especially in this context, towards the practice of implementing a particular model for learning activities. This article is a contribution intended to examine the effect of the problem-based learning model assisted by learning videos on students' motivation, critical thinking skills and learning outcomes.

2. METHODS

2.1. Research Design and Type

Relying on statistical accuracy and precision, this paper is an experimental-type quantitative study in which certain treatments are applied to test the influence between variables. The Quasi experimental design approach is used according to the design and interpretation of controlled experiments in a context that tends to be different from what has been practiced by Widiana et al (2023); also at a certain stage, by Schwichow et al (2022) where two different treatments will be given to two different groups. Meanwhile, the Non-equivalent control group design was also applied based on the consideration that this research involved two different groups as intended, namely the first group, where the Quantum Teaching model was applied, would be referred to as the Experimental group, while the second class, which on the other hand did not apply the model, was then identified as the Control class. The description of the research design is then annotated in table 1.

Tabel 1. Research Design

Classes	*Pre-test*	*Treatment*	*Post-test*
Exsperiment	O_1	X	O_2
Control	O_3		O_4

Information:

- O_1 = Pre-test in the Experiment class;
- O_2 = Post-test in the Experiment class;
- O_3 = Pre-test in Control class;
- O_4 = Post-test in the Control class, and;
- X = Treatment (*Application of a problem-based learning model assisted by learning videos*)

2.2. Population and Research Sample

Taking place from May to August 2023, this research was carried out in class V - Elementary School Cluster 1, Panakkukang District, Makassar City, South Sulawesi and was carried out in the even semester - 2022/2023 academic year.

The population is all class V students of Cluster 1 Panakkukang District which consists of 4 schools. A random sampling technique was then used to determine the sample - so that in the end, 27 students from SD Inpres Tamamaung I became the Experiment class, while the Control class consisted of 29 students from SD Inpres Tamamaung III, so there was a total of 56 samples. Next, data collection was carried out through direct observation in the field using the: A list of questions; written tests and documentation. The first involves researchers as the core instrument for primary data, while the other is used to collect secondary data.

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2.3. Tools and Materials

Next, the research instrument is translated based on the required data requirements. To obtain information and measure student Learning Motivation (see: table 2); Critical Thinking Ability (see: table 3), and; Learning Outcomes (see: table 4), Instruments used are as detailed as follows:

Table 2. Learning Motivation Category

Interval	Category
0-59	Very less
60-69	Not Enough
70-79	Medium
80-89	Good
90-100	Very Good

Table 3. Student Critical Thinking Ability Category

Score (%)	Category
81-100	Very Good
61-80	Good
41-60	Enough
21-40	Not Enough
0-20	Very Less

Table 4. Learning Outcomes Category

Interval	Category
0-59	Very less
60-69	Not Enough
70-79	Medium
80-89	Good
90-100	Very Good

Data was then analyzed using descriptive and inferential statistical techniques, where all analyzes were carried out with the help of the Statistical Program for Social Science (SPSS) 25 as a standard tool for statistical analysis (Mansoor et al., 2023); for more comparative usage practices (Trong et al., 2023).

The first stage of analysis (descriptive statistics) is used in this research to describe the results obtained which indicate whether or not there is an influence of the model on all dependent variables (Learning Motivation, Critical Thinking Ability and Learning Outcomes). Some of these analysis techniques have been adopted based on operational practices carried out by Chen et al (2023) but on an explicitly different scale and context, and; in general, see also the practice of applying this tool by Yin et al (2023). Meanwhile, the subsequent analysis (inferential statistics) is intended to re-testing the effect of the model and test research assumptions with several prerequisites, including: Data Normality and Homogeneity Tests.

2.4. Normality and Homogeneity Testing Criteria

The normality test in this research is used to test the distribution of data on learning motivation, critical thinking skills and student learning outcomes with the assumption that: if the probability value (Sig.) is > 0.05 then the research data is normally distributed. On the other hand, if the probability value (Sig.) < 0.05 then the research data is not normally distributed.

The same assumption also applies to the homogeneity test: If the probability value (Sig.) > 0.05 then the research data is said to be homogeneous. On the other hand, if the probability value (Sig.) < 0.05 then the research data is not homogeneous.

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2.5. Hypothesis Testing Criteria

Test of between subjects-effects or what is called the F test is used to measure the influence of the independent variable on the dependent variable partially. While One Way Multivariate Analysis of Variance (One Way MANOVA) is used to test effects simultaneously and in general, this paper focuses on the first analysis. The next research hypothesis is denoted as follows:

- H_0: There is no effect of the Problem-Based Learning Model;
- H_1: There is an effect of the Problem-Based Learning Model;

Meanwhile, the Hypothesis testing criteria are:

- If the probability value (Sig.) > 0.05 then H_0 is accepted and H_1 is rejected.
- If the probability value (Sig.) < 0.05 then H_1 is accepted and H_0 is rejected.

3. RESULTS AND DISCUSSION

The average Pretest score for Learning Motivation in the Control class based on the results of statistical analysis (see: table 5) is 63,79 with a minimum range of 40 and a maximum of 78. Meanwhile for the Posttest for the same variable (Learning Motivation) it is 68,86 and the minimum range is 45 and the maximum is 79. As an indication of the size of the distribution of the data obtained, standard deviation value for the Pretest was 10,297 and the Posttest was 8,634. Thus, the overall score for the Control class Learning Motivation Pretest was 1,850 and the Posttest 1,997.

Table 5. Descriptive Statistics of Learning Motivation for Control and Experiment Classes

Data	Control Class (Conventional Model)		Experiment Class (PBL Model)	
	Pretest	Posttest	Pretest	Posttest
N	29	29	27	27
Range	38	34	35	16
Minimum	40	45	50	80
Maximum	78	79	85	96
Mean	63,79	68,86	69,30	92,41
Median	65,00	69,00	68,00	95,00
Modus	55	69	65	95
Standard Deviation	10,297	8,634	9,059	4,822
Variance	106,027	74,553	82,063	23,251
Sum	1085	1997	1871	2595

Based on the obtained scores as well as the standard of learning motivation assessment criteria (see again: table 2), 8 students were identified with a percentage of 26% were in the 'Medium' learning motivation criteria. There were 13 students with the 'Not Enough' criteria with a percentage of 44% - while there were 8 students with the 'Very Less' criteria with a presentation of 28%. In the Posttest there were at least 11 students with the 'Medium' Learning Motivation category - where the presentation was 38%; 16 people were in the 'Not Enough' criteria with a percentage of 55% - and, there were 2 students who were in the 'Very Less' category with a percentage of 7%. Thus, students' learning motivation in the Control class, can be said to be in the medium - and partly, criteria still in the Not Enough criteria. In contrast to the Control class posttest, the Experiment class posttest or after the Problem-based learning model assisted by learning videos was applied. Significant enhancement occurred; 23 students were identified in the 'Very good' category with a percentage of 85%. 4 other people got a percentage of 15% in the 'Good' category - and this result directly indicates the influence of the use of the problem-based learning model assisted by learning videos on students' learning motivation.

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Practically, the results obtained both in the Control class and especially in the Experiment class allow discussion regarding the effectiveness and significance of implementing the Problem-based learning model. Because results that are similar or even implicitly tend to be the same can be found, for example in the research of Syarifudin et al (2021) which found that the application of the Problem-based learning model has been confirmed to positively improve student learning outcomes. In several similar cases with various variations and levels of differentiation, seems to positively confirm the results obtained in this research (Swiyadnya et al., 2021; Masruroh & Arif, 2021; Setyaningsih, & Rahman, 2022; Siregar, 2022) that the use of the Problem-model Based learning stimulates motivation, critical thinking, and learning outcomes.

On the Pretest for the Experimental class (see: table 6) - for students' Critical thinking Abilities, based on the predetermined categories (see again: table 3); 9 students with a percentage of 34% were in the 'Good' category and 12 of them were 'Enough' with a percentage score of 44%. A total of 6 people were in the 'Not Enough' category with a total percentage of 22%. However, after being given treatment and then applying the Problem-Based Learning model assisted by learning videos, only two categories were visible, namely 'Good' and 'Very Good'. Specifically, this was divided into details where 21 students were identified as being in the 'Very Good' critical thinking ability category with a percentage of 78%. Meanwhile, the remaining 6 students are classified as 'Good' with a percentage of 22%. These results match several previous findings which have shown the effectiveness of applying the problem-based learning model in improving students' critical thinking abilities. Sitompul (2021) said that students' critical thinking skills can be improved by using this model according to the students' conditions and level of knowledge. In addition, students' critical thinking abilities can be triggered by an interactive and interesting learning process, including through the use of problem-based learning models (Inayah et al., 2021).

Table 6. Descriptive Statistics of Critical Thinking Ability for Control and Experiment Classes

Data	Control Class (Conventional Model)		Experiment Class (PBL Model)	
	Pretest	Posttest	Pretest	Posttest
N	29	29	27	27
Range	40	35	50	20
Minimum	25	50	25	80
Maximum	65	85	75	100
Mean	51,21	69,48	56,11	88,89
Median	50,00	70,00	60,00	90,00
Modus	65	75	60	90
Standard Deviation	13,736	8,696	13,960	6,405
Variance	188,670	75,616	194,872	41,026
Sum	1,485	2,015	1,515	2,400

In almost all case studies that focused on testing the Problem-based learning model, learning outcomes are the dependent variable most often tested with this model apart from other variables, for example, interest in learning by Irmawati et al., (2022). The simultaneous influence of this model on student motivation and learning outcomes was demonstrated by Kirwelakubun et al (2023) in an experiment conducted on class V students at SD Gugus 1 Kei Kecil District, Southeast Maluku Regency. In his meta-analysis, Anatasya (2023) also shows the same results but of course, in a different case context and geographical setting. The relatively significant influence of problem-based learning on student learning outcomes, was also demonstrated by Sulastry et al (2023) in their experiment; for different designs and contexts, see also Ramadhan et al (2023).

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Furthermore, the results of the descriptive statistical analysis (see: table 7) - for Learning Outcomes show that the average score in the Pre-test for the Experiment class is 53,70 while the average score in the Post-test is 88,15. In the Pre-test for the Experimental class, based on the assessment criteria (see again: table 4), 27 students were stated to still need guidance and the percentage was 97%. 1 student was in the 'Not Enough' category with a percentage of 3%. After being given the Post-test, 12 students got a 'Good' score with a percentage of 44% and 5 students got a 'Very good' score with a percentage of 19%. These results explicitly show an increase in the experimental class.

Table 7. Descriptive Statistics of Learning Outcomes for Control and Experiment Classes

Data	Control Class (Conventional Model)		Experiment Class (PBL Model)	
	Pretest	Posttest	Pretest	Posttest
N	29	29	27	27
Range	40	30	50	20
Minimum	30	50	30	80
Maximum	70	80	80	100
Mean	52,07	66,21	53,70	88,15
Median	50,00	70,00	50,00	90,00
Modus	50	70	60	90
Standard Deviation	10,816	7,752	13,344	7,357
Variance	116,995	60,099	178,063	54,131
Sum	1,510	1,920	1,450	2,380

Without the aim of ignoring potential 'dependent errors' as pointed out by Douma & Shipley (2023); normality feasibility testing is required as an initial procedure in quantitative data analysis and usually, data is assumed to be normally distributed in statistical inference (Uhm & Yi, 2023); the strength of each normality test in the Ag-Yi & Aidoo (2022) analysis also varies and is potentially influenced by different sample sizes. The results of normality test (furthermore see: table 8) showing that the significance value obtained is greater than 0.05 for all dependent variables in both the Experimental and Control classes. All of these values unequivocally indicate that all data is normally distributed (see again: Normality and Homogeneity Testing Criteria). Likewise with the results of the homogeneity test (see also: table 9), where the significance value for all variables > 0.05.

Table 8. Normality Test of Motivation, Critical Thinking and Learning Outcomes

	Learning Model	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Motivation	Pre-Experiment	.138	27	.200*	.937	27	.187
	Post-Experiment	.165	27	.137	.934	27	.164
	Pre-Control	.136	29	.200*	.960	29	.506
	Post-Control	.122	29	.200*	.930	29	.137
Critical Thinking	Pre-Experiment	.106	27	.200*	.961	27	.540
	Post-Experiment	.185	27	.058	.923	27	.098
	Pre-Control	.130	29	.200*	.971	29	.754
	Post-Control	.169	29	.123	.914	29	.067
Learning Outcomes	Pre-Experiment	.114	27	.200*	.971	27	.762
	Post-Experiment	.131	27	.200*	.935	27	.171
	Pre-Control	.171	29	.109	.949	29	.322
	Post-Control	.129	29	.200*	.947	29	.294

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

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Table 9. Homogeneity Test of Motivation, Critical Thinking and Learning Outcomes

		Levene Statistic	df1	df2	Sig.
Motivation	Based on Mean	.690	3	80	.561
	Based on Median	.602	3	80	.615
	Based on Median and with adjusted df	.602	3	75.730	.615
	Based on trimmed mean	.682	3	80	.566
Critical Thinking	Based on Mean	1.326	3	80	.272
	Based on Median	1.175	3	80	.324
	Based on Median and with adjusted df	1.175	3	70.627	.325
	Based on trimmed mean	1.346	3	80	.265
Learning Outcomes	Based on Mean	.346	3	80	.792
	Based on Median	.315	3	80	.815
	Based on Median and with adjusted df	.315	3	72.165	.815
	Based on trimmed mean	.350	3	80	.789

Final stage of our analysis; the results of hypothesis testing (see: table 10) show quite positive results for each variable based on previously determined hypothesis testing criteria (see: Hypothesis testing criteria), where the significance value shown by all variables is 0.001 or < 0 .05, which means there is a significant influence of the Problem-Based Learning model assisted by learning videos on the Motivation, Critical Thinking Ability and Social Studies Learning Outcomes of class V Cluster I students in Panakkukang District, Makassar City. In quantitative research, criteria are briefly proposed for final conclusions, including according to Lund (2022) research problems and hypotheses. For a certain level of research complexity, what we carry out is a standard procedure (or it could be said that way) for experimental research which according to McDonald et al (2020), observational research and at certain stages experimental research has also characteristics that need to be taken into account.

Table 10. Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Motivation	5021.655[a]	3	1673.885	47.374	,001
	Thinking	5063.810[b]	3	1687.937	13.412	,001
	Outcomes	25324.036[c]	3	8441.345	76.964	,001
Intercept	Motivation	474752.679	1	474752.679	13436.397	,001
	Thinking	378685.714	1	378685.714	3008.882	,001
	Outcomes	329000.583	1	329000.583	2999.647	,001
Model	Motivation	5021.655	3	1673.885	47.374	,001
	Thinking	5063.810	3	1687.937	13.412	,001
	Outcomes	25324.036	3	8441.345	76.964	,001
Error	Motivation	2826.667	80	35.333		
	Thinking	10068.476	80	125.856		
	Outcomes	8774.381	80	109.680		
Total	Motivation	482601,000	84			
	Thinking	518736,000	84			
	Outcomes	363099,000	84			
Corrected Total	Motivation	7848.321	83			
	Thinking	15132.286	83			
	Outcomes	34098.417	83			

a. R Squared = ,640 (Adjusted R Squared = ,626)
b. R Squared = ,775 (Adjusted R Squared = ,766)
c. R Squared = ,743 (Adjusted R Squared = ,733)

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4. CONCLUSION

This research generally provides empirical justification regarding the significance of the influence of the problem-based learning model on learning motivation; Critical thinking skills, and; Social Sciences (IPS) learning outcomes of students - in particular, elementary school students in class V, Cluster I, Panakkukang District, Makassar City.

More specifically, the influence of this model on student learning motivation is shown by the increase in the number of students who received the 'Very good' category by 23 people with a percentage of 85%. Meanwhile, the influence of the model on critical thinking skills can be seen in the increase in the number of students who obtained the high critical thinking category, as many as 21 people with a percentage of 78%. Furthermore, the influence of the problem-based learning model on student learning outcomes can be seen in the increasing average value of student learning outcomes, where the experimental class pre-test results which were originally 53.70 increased to 88.15 in the post-test.

Hypothesis testing also strengthens the results of descriptive analysis, where the significance value of the Test of between-subjects effect results is good for the dependent variable: Learning motivation; Critical thinking skills, too; The students' learning results - all of them obtained a score of < 0.05 (or less than 0.05) - which means that all Ho were rejected. These results confirm the significance of the influence of the problem-based learning model assisted by learning videos on learning motivation; Critical thinking skills, too; Learning outcomes of class V elementary school students in Cluster I, Panakkukang District, Makassar City.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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