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The Influence Of Learning Media And Learning Models On Learning Outcomes Through Mathematics Literacy Ability

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ABSTRACT
Learning outcomes are a measure of the success of the learning process. There are many factors involved in measuring learning outcomes. Learning media, learning models, and students' mathematical literacy abilities are important factors or variables in the learning process to achieve the best learning outcomes. This study aims to look at the direct and indirect effects of these three variables on learning outcomes with mathematical literacy skills as a mediating variable. This research was conducted on 122 students of the Mathematics Study Program at Pamulang University. The research method used is Structural Equation Modeling with the Smart-PLS 3.0 analysis tool. The results of the convergent validity test showed that the loading factor value was > 0.7 and the AVE value > 0.5 indicated that all indicators were valid. The reliability test shows a composite reliability value and Cronbach's alpha > 0.7 is said to be reliable. Learning media has a positive effect that is not significant on mathematical literacy skills. The learning model has a significant positive effect on mathematical literacy skills. Mathematical literacy ability has a significant positive effect on learning outcomes. Learning media has a significant positive effect on learning outcomes. Learning models have a positive but not significant effect on learning outcomes. Learning media has a positive influence that is not significant on learning outcomes through mathematical literacy skills.

Keywords:
Learning media, learning models, mathematical literacy ability, learning outcomes

INTRODUCTION

The Organization for Economic Co-operation and Development (OECD) through the Program for International Student Assessment (PISA) conducted a survey to determine students' mathematical literacy skills where mathematical iteration is defined as an individual's capacity to formulate, use and interpret mathematics in various contexts. Many aspects of mathematical literacy include mathematical logic and the use of mathematical concepts, procedures, facts, and devices to describe, describe, and predict phenomena. (OECD, 2019).

In the 2018 PISA ranking of 74 countries, Indonesia is ranked 64th for mathematical literacy with a score of 487 (OECD, 2019). This data is supported by several studies that have been conducted by researchers in Indonesia, one of which was the research conducted ('Ashri & Aini, 2021) which states that the mathematical literacy ability of junior high school students is still relatively low.

Pre-Service Teachers (PST) demonstrated that mathematical literacy involves communication, application, and knowledge of vocabulary specific to mathematics, they expressed mixed sentiments towards the usefulness of content area literacy (CAL) courses required by their teacher preparation program. The analysis shows a dichotomous perspective related to how Pre-Service Teachers' (PST) perceive content area literacy (CAL) in relation to mathematical literacy. (Colwell & Anderson, 2016).

This becomes a big question for the learning outcomes obtained for students. Learning outcomes are also a benchmark for students in achieving a learning process.

Students can be said to have mastered a learning process if the learning outcomes have reached a predetermined standard of value. According to Dimyati and Mudjiono (Ihsan, 2019), learning outcomes are the result of the learning process and learning that is produced after the completion of the lesson material.

Student learning outcomes are strongly influenced by their literacy skills. According to Mujiani (2016) the mathematics learning outcomes of students who use media models are higher than students who use print media, besides that the use of media models has an effect of 90.1% on learning outcomes. Meanwhile, according to Supardi et al (2015) there are differences in the learning outcomes of students who are taught Physics with the charm of Physics learning media and conventional learning media.

Literacy, numeracy, and character skills are still a problem in education in Indonesia. Various national and global achievements show that Indonesia needs to fundamentally improve learning to ensure students learn meaningfully, especially in-depth strengthen basic competencies, namely literacy, numeracy, and character. The low interest in reading students greatly impacts the quality and quality of education in Indonesia.

According to Utami et al (2020) Mathematical literacy is the knowledge to know and apply basic mathematics in our daily lives. According to Kuswidi (2015) mathematical literacy is a person's ability to formulate, apply and interpret mathematics in various contexts, including the ability to reason mathematically and use concepts, procedures and facts to describe, explain or predict phenomena/events.

Students' mathematical literacy abilities at the school level have an influence on their abilities at a higher education level as students. This is in line with what was disclosed in the study (Sukmawati, 2018), which indicates that there is connection significant relationship between mathematical literacy skills and students' critical thinking.

According to Yustitia & Juniarso (2020), the results showed that the student subject (S1) had capable complete mathematical literacy questions equivalent to levels 1 to 4, but have not been able to complete mathematical literacy questions equivalent to levels 5 and 6 according to indicators adapted from PISA. Visual learning style students have difficulty working on math problems if the questions do not present clear visual information. This is consistent with the results of the study (Chasanah et al., 2020) which shows that each different learning style has different mathematical literacy abilities.

Student success in learning can be influenced by factors from within the individual and outside the individual. Many things affect the teaching and learning process, both from outside the student or the environment and from within the student himself. The unpreparedness of external and internal factors will create obstacles in the student learning process which will then impact on their learning outcomes.

Learning media can be categorized into several groups. One of them, Briggs in (Sadiman, 2021) identified 13 types of media used in the teaching and learning process, namely: objects, models, direct sound, audio recordings, print media, programmed learning, blackboards, transparency media, film series, film frames, film, television and pictures. In this regard, the learning media that are often used in elementary schools are print and graphic media. This media belongs to the category of non-projection visual media, which functions to convey messages from teachers to students. Examples are: pictures/photos, diagrams, charts, posters, graphs, books,

modules, and independent teaching materials. According to Bulkani et al (2022), an innovative animation learning media based on local wisdom which includes competencies, indicators, materials, displays, button designs, and local potential of Kalimantan Indonesia.

In addition, the learning process is also known as the Online (In-Network) or online learning model and Offline (Out-of-Network) learning model. In online learning, students and teachers carry out the learning process through computer networks and the internet. Meanwhile, offline or offline is a model that is outside the network. Usually, this model is disconnected from computer networks and the internet. This learning is often referred to as face-to-face learning or offline learning.

In online learning, students are required to be independent in learning. On learning Online students are given learning materials and assignments through various media and in digital formats. With this in mind, students are required to spend more time using their gadgets or laptops. This is because learning activities currently use more technology. Learning activities are usually carried out via Zoom, Google Meet, WhatsApp or LMS (Learning Management System).

This study aims to determine the direct effect and indirect effect, namely as follows:

1. Knowing the effect of learning media on mathematical literacy skills.
2. Knowing the effect of learning models on mathematical literacy skills.
3. Knowing the effect of mathematical literacy skills on mathematics learning outcomes.
4. Knowing the direct effect of learning media on learning outcomes of mathematics.
5. Knowing the direct effect of learning models on mathematics learning outcomes.
6. Knowing the indirect effect of learning media on mathematics learning outcomes through mathematical literacy skills.
7. Knowing the indirect effect of learning models on mathematics learning outcomes through mathematical literacy skills.

METHOD

In this study using a type of quantitative research, because the results were obtained through calculations from samples or students who were asked for their responses to the questions posed by researchers through the questionnaire provided. Quantitative research is formal, objective, rigorous, a deductive approach, and a systematic strategy for generating and perfecting knowledge for problem solving (Mohajan, 2020).

This study uses path analysis (Path Analysis) and Structural Equation Modeling (SEM) which is a form of developing multi-regression regression analysis to determine the direct and indirect effects based on the results of exogenous variables, endogenous variables, and intervening variables. The data analysis process used Smart-PLS 3 software. The research was conducted on 122 students of the Mathematics Study Program at Pamulang University.

RESULTS AND DISCUSSION

Results

In this study, 2 analyzes were carried out, namely the outer model and the inner model.

1. Outer Model (Measurement Model)

   In the outer model analysis, 2 tests were used, namely to test the convergent validity and instrument reliability of the Reflective Second Order Construct.

Table 1. Convergent Validity Test

Indicator	Outer Loading	AVE
AUD1	0.951	0.809
AUD2	0.880	
AUD3	0.866	
VIS1	0.940	0.864
VIS2	0.886	
VIS3	0.961	
AUV1	0.850	0.754
AUV2	0.854	
AUV3	0900	
DAR1	0.929	0.848
DAR2	0912	
LUR1	0932	0.871
LUR2	0.935	
KLM1	0.787	0811
KLM2	0.954	
KLM3	0.942	
KLM4	0.888	
KLM5	0.922	
HB1	0.919	0.844
HB2	0.955	
HB3	0.919	
HB4	0.884	
HB5	0913	

In the Convergent Validity test, all indicators from the construct obtain an outer loading value of more than 0.7. The Average Variance Extract (AVE) value of all indicators from the construct obtains a value above 0.5. This measurement is considered sufficient if the Outer loading is above 0.7 and the Average Variance Extract (AVE) value is at least 0.5. (Ghozali, 2006). So, it can be concluded that all indicators are valid.

Table 2. Construct Reliability

Construct	*Composite Reliability*	*Cronbach's Alpha*
AUD	0.927	0.881
VIS	0.950	0921
AUD	0.902	0.838
DAR	0.918	0821
LUR	0931	0.852
MED	0.961	0.954
MOD	0.942	0917
KLM	0.955	0941
HB	0.964	0.953

In the Composite Relability and Cronbah's Alpha tests, all constructs were declared reliable with Composite Relability values greater than 0.7 and Cronbah's Alpha values greater than 0.7.

2. Structural Model Analysis (Inner Model)

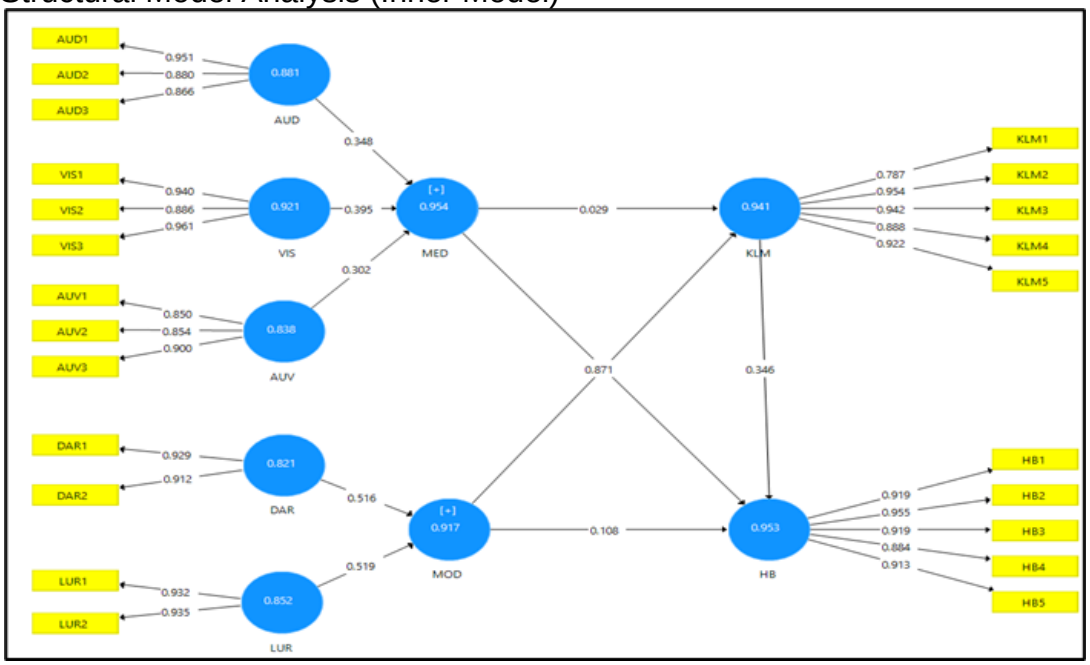

Figure 1. Structural Models

Direct Effects

Table 3. Path Coefficients

	Original Sample (O)	*Sample Means (M)*	*Standard Deviation (STDEV)*	*T Statistics (|O/STDEV|)*	*P Values*
AUD -> MED	0.348	0.351	0.022	15,782	0.000
VIS -> MED	0.395	0.394	0.015	27,087	0.000
AUV -> MED	0.302	0.299	0.02	15,082	0.000
DAR -> MOD	0.516	0.516	0.028	18,275	0.000
LUR -> MOD	0.519	0.518	0.027	19,075	0.000
MED -> HB	**0.382**	0.376	0.104	3,676	**0.000**
MED -> KLM	**0.029**	0.029	0.041	0.717	**0.474**
MOD -> HB	**0.108**	0.103	0.129	0.842	**0.400**
MOD -> KLM	**0.871**	0.876	0.037	23,827	**0.000**
KLM -> HB	**0.346**	0.361	0.125	2,779	**0.006**

Based on table 3, it can be concluded as follows:

- There is a direct positive influence between instructional media on mathematical literacy skills of 0.029, which means that if the learning media increases by one unit, the ability of mathematical literacy can increase by 2.9%. With a p value of 0.474 > 0.05 so reject H_1 which means the direct effect of learning media on mathematical literacy skills is not significant or statistically significant.

- There is a direct positive effect between the learning model on mathematical literacy skills which is equal to 0.871, which means that if the learning model increases by one unit, the ability of mathematical literacy can increase by 87.1%. With a p-value of 0.000 <0.05, accept H_1, which means that the direct effect of the learning model on mathematical literacy skills is statistically significant or significant.
- There is a direct positive influence between learning media on learning outcomes which is equal to 0.382, which means that if the learning media increases by one unit, learning outcomes can increase by 38.2%. With a p-value of 0.000 <0.05, accept H_1, which means that the direct influence of learning media on learning outcomes is statistically significant or significant.
- There is a direct positive influence between the learning model on learning outcomes which is equal to 0.108, which means that if the learning model increases by one unit, learning outcomes can increase by 10.8%. With a p-value of 0.400 > 0.05 so reject H_1 which means the direct effect of the learning model on learning outcomes is not significant or statistically significant.
- There is a direct positive influence between mathematical literacy skills on learning outcomes which is equal to 0.346, which means that if mathematical literacy skills increase by one unit, learning outcomes can increase by 34.6%. With a p-value of 0.006 <0.05, accept H_1, which means that the direct effect of mathematical literacy skills on learning outcomes is statistically significant or significant.

Indirect Effects

Table 4. *Indirect Effects*

	Original Sample (O)	Sample Means (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
AUD -> MED -> KLM	0.010	0.010	0.014	0.704	0.482
VIS -> MED -> KLM	0.012	0.012	0.016	0.712	0.477
AUV -> MED -> KLM	0.009	0.009	0.012	0.731	0.465
DAR -> MOD -> KLM	0.450	0.452	0.029	15.33	0.000
LUR -> MOD -> KLM	0.452	0.454	0.029	15,773	0.000
AUD -> MED -> HB	0.133	0.132	0.038	3,473	0.001
VIS -> MED -> HB	0.151	0.148	0.041	3,635	0.000
AUV -> MED -> HB	0.115	0.112	0.031	3,672	0.000
DAR -> MOD -> HB	0.056	0.053	0.066	0.848	0.397
LUR -> MOD -> HB	0.056	0.053	0.067	0.841	0.401
AUD -> MED -> KLM -> HB	0.004	0.004	0.006	0.582	0.561
VIS -> MED -> KLM -> HB	0.004	0.005	0.007	0.585	0.558
AUV -> MED -> KLM -> HB	0.003	0.004	0.005	0.607	0.544

	Original Sample (O)	Sample Means (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
DAR -> MOD -> KLM -> HB	0.156	0.163	0.057	2,747	0.006
LUR -> MOD -> KLM -> HB	0.157	0.163	0.057	2,740	0.006
MED -> KLM -> HB	**0.010**	0.012	0.017	0.591	**0.555**
MOD -> KLM -> HB	**0.302**	0.315	0.107	2,811	**0.005**

Based on table 4, it can be concluded that:

- There is an indirect positive effect of learning media on learning outcomes through mathematical literacy skills of 0.010, which means that if the learning media increases by one unit, learning outcomes can increase indirectly through mathematical literacy skills by 1%. With a p-value of 0.555 > 0.05 so reject H_1 which means the indirect effect of learning media on learning outcomes through mathematical literacy skills is not significant or statistically significant.
- There is an indirect positive effect of the learning model on learning outcomes through mathematical literacy skills of 0.302, which means that if the learning model increases by one unit, learning outcomes can increase indirectly through mathematical literacy skills by 30.2%. With a p-value of 0.005 > 0.05 so accept H_1 which means the indirect effect of the learning model on learning outcomes through mathematical literacy skills is statistically significant or significant.

Coefficient of Determination (R^2)

Table 5. Coefficient of Determination

Construct	*R Square*	*R Square Adjusted*
HB	0.451	0.437
KLM	0.776	0.773

The R square value is a value that describes how much the X variable affects the Y variable. An R square value of 0.67 is said to be Strong, 0.33 is said to be moderate, and 0.19 is said to be weak (Ghozali, 2006). Based on table 5, the R Square value of the joint or simultaneous influence of learning media and learning models on mathematical literacy skills is 0.776 with an adjusted r square value of 0.773 which means that all exogenous constructs (learning media and learning models) simultaneously affect literacy skills mathematics by 77.3%. The R Square value of the simultaneous influence of learning media, learning models and mathematical literacy skills on learning outcomes is 0.451 with an adjusted r square value of 0.437 which means that all constructs are exogenous (learning media, learning models and mathematical literacy skills) simultaneously affect learning outcomes by 43.7%.

Discussion

This study aims to investigate the effect of using instructional media and learning models on student learning outcomes, with a focus on mathematical literacy skills. Mathematical literacy is a student's ability to understand, apply, and communicate using mathematical concepts in various contexts. The results of the study show that the use of various learning media, such as interactive multimedia, visual simulations, and digital resources, has a positive impact on student learning outcomes. These media help students visualize mathematical concepts more concretely and sharpen their mathematical literacy skills. In addition, the learning model also has a significant influence on student learning outcomes through mathematical literacy skills. Student-centered learning models, such as project-based, collaborative, or inquiry-based learning, encourage students to be active in mathematical exploration, think critically, and relate concepts to real-world situations.

Furthermore, a combination of appropriate learning media with appropriate learning models can improve student learning outcomes more significantly. The use of media that supports student-centered learning models can increase student involvement in the learning process, thus encouraging the development of their mathematical literacy skills. In this context, it is important for educators to design learning experiences that combine a variety of learning media with learning models that promote active student participation. Thus, student learning outcomes in terms of mathematical literacy skills can be improved effectively. the results of this study are in line with research conducted by Supardi et al (2015) who found that there was an interaction effect of learning media and learning interest on physics learning outcomes

CONCLUSION

From the results of the analyze, it can be concluded that the direct and indirect effects of learning media, learning models on learning outcomes through mathematical literacy skills are as follows:

1. Learning media has a positive effect that is not significant on mathematical literacy skills.
2. The learning model has a significant positive effect on mathematical literacy skills.
3. Mathematical literacy ability has a significant positive effect on learning outcomes.
4. Learning media has a significant positive influence on learning outcomes
5. The learning model has a positive influence that is not significant on learning outcomes.
6. Learning media has a positive influence that is not significant on learning outcomes through mathematical literacy skills.
7. The learning model has a significant positive influence on learning outcomes through mathematical literacy skills.

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