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An Identification of Learning Motivation and Learning Outcomes in Vibration, Wave, and Light Materials

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Abstract

The research aims to identify the learning motivation and learning outcomes of SMPN 7 Padang students in terms of vibration, wave, and light materials. The research was conducted after the learning occurred. The subjects in this study were 128 students from 4 classes, namely classes VIII.1, VIII.2, VIII.3, and VIII.8. To determine students' learning motivation, researchers distributed questionnaires using a Likert scale, while student learning outcomes were taken from daily assessments at the end of the chapter on vibrations, waves, and light. The results obtained from this research are student learning motivation is classified as moderate, and the category of student learning outcomes is also classified as moderate. Indicators of student learning motivation are (1) the desire and desire to succeed in learning, (2) the existence of encouragement and needs in learning, (3) the existence of hopes and ideals for the future, (4) the existence of interesting activities in learning and (5) the existence of a conducive learning environment while learning outcomes were calculated using the completeness criteria for science lessons on vibration and wave material. Based on the research results conducted at SMPN 7 Padang, the most influential indicator is interesting learning activities. Teachers can increase student learning motivation from moderate to high if they carry out interesting activities. Students with high learning motivation have a greater chance of obtaining better learning outcomes than those with low motivation.

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INTRODUCTION

Science education is an effort to advance and improve human resources (HR) and life within the scope of personal, community, and nation. Education is a very important aspect for maturing individuals to acquire knowledge, understand, and behave according to their needs (Azizah & Rahmi, 2019). Therefore, education management must be oriented towards creating better changes (Kurningsih, 2014). However, these changes require high child learning motivation to maximize the improvement of human resources (Marsila et al., 2019).

In the teaching and learning process, success and failure cannot be seen from one factor alone; they must look at various aspects or influencing factors. One of the factors that comes from within students is learning motivation. Motivation to learn is a psychological condition that encourages students to learn. Research findings show that learning outcomes

generally improve if the learning motivation increases. Many children's talents do not develop because they do not get the right motivation. If someone gets the right motivation, extraordinary energy is released to achieve unexpected results (Mukhtar, 2015).

For a student, to get good learning results is a matter of pride. Students who get good learning results will always try to maintain and improve the learning results they have obtained (Awe & Benge, 2017). According to Dalyono (2012), the success or failure of a person in learning is due to several factors that influence the achievement of learning outcomes, namely coming from within the person who learns (internal), including health, intelligence, and talent, interest and motivation, and how to learn and some from outside himself (external) including the family environment, school, community, and the surrounding environment. Learning motivation is an internal factor affecting student learning outcomes (Prasetyo & Dasari, 2023; Yu et al., 2023). Learning outcomes will be optimal if there is motivation; the more appropriate the motivation, the more successful the lesson will be (Rosyadi, 2016).

Students with high motivation will carry out their learning activities more confidently and responsibly than those with low motivation to achieve optimal learning outcomes. This high level of student motivation in achieving the goals of each student means that they will try to learn the material to the maximum extent possible, try to get high grades, be able to solve challenging problems, and when their ideas are accepted by their peers and their teachers (Sabanal et al., 2023). This motivates students to learn science (Close, 2009; Sulthon, 2016).

SMP N 7 Padang is accredited by A and uses the Merdeka curriculum. Based on the results of observations made by the researchers while teaching in class 8 SMP N 7 Padang, it was found that the motivation to learn science was still low compared to other subjects. Therefore, the researchers conducted further research on how student motivation affects student learning outcomes and what can affect student motivation. Low learning motivation is seen when the learning process takes place, students scribble books or do other things besides focusing on learning, lack of student concentration, chat with their classmates, daydream when the teacher explains the material, and learning seems monotonous so that students have difficulty understanding the material and have an impact on low student learning outcomes.

Previous research states an attachment between student learning motivation and student learning outcomes. Project-based learning is needed to increase motivation in learning (Anis, 2020; Marsila et al., 2019). Therefore, it is hoped that selecting learning models that use interesting learning media will affect learning outcomes in the knowledge aspect (Anis, 2020). Previous research has not identified how student learning motivation and learning outcomes are related to vibration, wave, and light materials. Therefore, the researchers are interested in describing how student learning motivation is based on the indicators analyzed and related to student learning outcomes at SMP N 7 Padang.

Based on the above background, the research was conducted on "Identification of Learning Motivation and Learning Outcomes of Students on Vibration, Wave and Light Materials." This study aims to describe the motivation and learning outcomes of 8th-grade students of SMP N 7 Padang.

METHODS

The researchers used descriptive research. They distributed questionnaires to determine student motivation and took the results of students' daily exams in vibration, wave, and light materials. This research was conducted at SMPN 7 Padang. The subjects in this study were 128 students from four classes, namely classes VIII.1, VIII.2, VIII.3, and VIII.8.

The analysis used in this study was carried out descriptively in accordance with the data collected from several instruments that have been used. The data collection method used questionnaires and observations. The main instruments in this study were questionnaires

and observation sheets. The questionnaire used is valid and standardized in accordance with the instrument developed by Krismony et al. (2020). The observation carried out here is direct observation through direct observation of student learning activities to explore data regarding teacher and student activities and student learning motivation. Then, the questionnaire is distributed to 4 classes in science lessons.

The questionnaire distributed has four answer scales: strongly agree, agree, disagree, and strongly disagree. Respondents can only answer using the answers provided by the researchers. The answer to each item in the questionnaire has a weighted score as seen in Table 1.

Table 1 Answer criteria

Answer scale	Value
Strongly Agree	1
Agree	2
Disagree	3
Strongly disagree	4

The use of questionnaires in this study aims to determine student learning motivation in learning science. Data analysis techniques are carried out using qualitative and quantitative analysis.

Calculation of Percentage of Student Learning Motivation

Guidelines for assessing motivation instruments after obtaining scores are calculated using the formula:

$$\text{Percentage of motivation level} = \frac{\text{Total score achieved}}{\text{Maximum number of scores}} \times 100\% \quad \ldots (1)$$

The above formula classically obtains the percentage data of each descriptor's motivation level. The percentage data are presented in tabular form, as in Table 2 (Kamila, 2014).

Table 2 Motivation level score criteria

No.	Percentage of learning motivation results (%)	Category
1	74 < X	High
2	47 < X < 74	Medium
3	X < 47	Low

The calculation of the percentage of students who fall into the High, Medium, and Low motivation criteria is:

$$\text{Percentage of student motivation} = \frac{\text{Number of students per category}}{\text{Number of all students}} \times 100\% \quad \ldots (2)$$

Calculation of the percentage of student learning outcomes

Data on student learning outcomes were calculated using the completeness criteria for science lessons on vibration and wave material. Learning outcomes are categorized into high, medium, and low (Azwar, 2018). Then, the categories can be detailed, as shown in Table 3.

Table 3 Student learning outcome score criteria

No.	PH score of vibration and wave material	Category
1	80 < X	High
2	50 < X < 80	Medium
3	X < 50	Low

The calculation of the percentage of students who fall into high, medium, and low criteria is:

$$\text{Percentage of student learning outcomes} = \frac{\text{Number of students per category}}{\text{Number of all students}} \times 100\% \quad \ldots (3)$$

RESULTS AND DISCUSSION

The results of research on aspects of learning motivation in learning IPA Class VIII SMPN 7 Padang obtained results from distributing questionnaires. The student learning motivation questionnaire consists of 28 statements and five indicators, namely: (1) the desire and desire to succeed in learning, (2) the existence of encouragement and needs in learning, (3) the existence of hopes and aspirations for the future, (4) the existence of interesting activities in learning, and (5) the existence of a conducive learning environment (Anis, 2020; Awe & Benge, 2017). The questionnaire provided four answer choices: strongly agree, agree, disagree, and strongly disagree. Meanwhile, student learning outcomes are obtained from daily assessments conducted by teachers on vibration and wave material. Data on learning motivation and learning outcomes of students in class VIII SMPN 7 Padang obtained from the analysis of the following questionnaire sheet is described from the data description in Table 4.

Table 4 Description of data on learning motivation and learning outcomes

Data Description	**Learning Motivation**				**Learning Outcomes**			
Class	**8.1**	**8.2**	**8.3**	**8.8**	**8.1**	**8.2**	**8.3**	**8.8**
Mean	63	59	60	57	63	60	74	61
St Dev	8	8	6	1	18	18	16	19
Minimum Score	44	38	50	21	40	33	35	25
Maximum Score	77	73	78	79	100	98	95	98
Ideal Scores	70				80			

From the results of Table 4, the lowest minimum score among the four classes is in class 8.8, which is in line with learning motivation and student learning outcomes. Class 8.8 also has the lowest average score among other classes in terms of both learning motivation and learning outcomes. The maximum score results from learning motivation and learning outcomes are also comparable. This is in line with the results of the study by Sirait (2016), which states that the higher the motivation of students to learn, the higher the learning outcomes. The higher the motivation of students to learn, the higher the learning outcomes obtained by students.

Indicators of student learning motivation are (1) the desire and desire to succeed in learning, (2) the existence of encouragement and needs in learning, (3) the existence of hopes and ideals for the future, (4) the existence of interesting activities in learning (5) the existence of a conducive learning environment. This motivation can be improved with interesting learning activities, as described in Table 5.

Table 5 Each indicator of students' learning motivation

	Class	**81**	**82**	**83**	**88**
Indicator 1	Maximum Value	59	58	73	59
	Minimum Value	35	35	39	15
	Mean	47.2	46.9	46.03	44.22
	SD	5.58	5.17	6.606	11.60
	%	78.76	78.27	76.72	73.70
	Average			76.86 %	
Indicator 2	Maximum Value	20	18	20	20
	Minimum Value	8	10	11	5
	Mean	14.96	13.66	13.59	13.40
	SD	2.45	1.92	1.88	3.93
	%	74.81	68.33	67.96	67.03
	Average			69.53 %	
Indicator 3	Maximum Value	8	8	8	8
	Minimum Value	3	4	3	2
	Mean	6	5.88	5.74	5.29
	SD	1.074	0.89	1.19	1.72

	Class	81	82	83	88
	%	75	73.61	71.75	66.20
	Average			71.64 %	
Indicator 4	Maximum Value	16	15	16	16
	Minimum Value	7	9	9	4
	Mean	13.44	12.40	12.14	11.5
	SD	2.006	1.67	1.51	3.62
	%	84.02	77.54	75.92	71.99
	Average			77.36 %	
Indicator 5	Maximum Value	8	8	8	8
	Minimum Value	3	4	4	2
	Mean	5.96	5.77	5.62	5.55
	SD	1.15	0.93	1.11	1.57
	%	74.53	72.22	70.37	69.44
	Average			71.64 %	

Based on the results of the analysis of Table 5, it can be seen that the average child who feels motivated in Indicator 1 is 76.86%, indicator 2 is 69.53%, indicator 3 is 71.64%, indicator 4 is 77.36%, and indicator 5 is 71.64%. So, children's motivation to learn increases with interesting learning activities. Teachers should pay attention to students' learning methods and not just stick to delivering material; teachers can motivate them to participate in learning and interesting activities according to students (Sunarti, 2021).

Table 6 Categories of student learning motivation

Category	Class				Total	Percentage (%)
	81	82	83	88		
High	2	0	2	3	7	5.9
Medium	26	29	28	17	100	84
Low	2	3	0	7	12	10.1

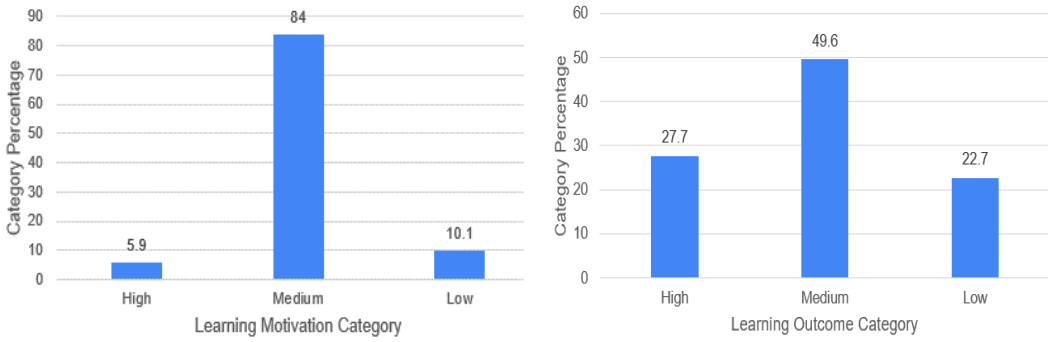
Based on Table 6, students at SMPN 7 Padang have a moderate learning motivation of 84%. The researchers made observations and asked students what causes the loss of motivation, and students stated that many formulas can make students lazy in learning more deeply. This can be overcome by giving activities or games that make students memorize formulas unconsciously. Teachers must be able to teach concepts related to the formulas, not to confuse students. According to a study conducted by Adiputra and Mujiyati (2017), learning motivation can be continuous with one's own learning experience because how fun the learning was before can make students feel interested even though there are many new challenges in the future. The results of learning outcomes are listed in Table 6.

Table 7 Learning outcomes

Category	Class				Total	Percentage (%)
	81	82	83	88		
High	7	6	15	5	33	27.7
Medium	16	16	13	14	59	49.6
Low	7	10	2	8	27	22.7

Based on Table 7, students at SMPN 7 Padang have moderate learning outcomes of 49.6%. This is proportional to student learning motivation. Student learning outcomes can change if learning motivation also changes. Therefore, teachers must be able to increase student motivation, and learning outcomes will also increase. This close relationship between motivation and learning outcomes refers to the conditions of experience, challenge, and comfort in an activity. Thus, it is very noticeable that when students feel satisfied with what they get from the learning process, their behavior can be "autotelic" (auto = self, telos = goal) or done for their own benefit (Di Domenico & Ryan, 2017). Learning outcomes are changes in a person's behavior, including cognitive, affective, and

psychomotor abilities, after a teaching and learning process (Chang et al., 2024; Sari et al., 2020). Disclosure of learning outcomes is a process pursued through programs and activities well-designed and implemented by teachers (An et al., 2022; Yandi et al., 2023). The percentage category of learning outcomes and learning motivation of the average SMP N 7 Padang student is moderate, as shown in Figures 1.



(a) (b)

Figure 1 (a) Learning motivation graph and (b) Graph of learning outcomes

The same category is obtained based on analyzing student learning motivation and student learning outcomes, namely moderate. This is because high learning motivation is reflected in perseverance, which is not easily achieved in achieving success despite various difficulties (Syakroni et al., 2019). High motivation can activate student learning activities. Students with high motivation will carry out their learning activities more confidently and responsibly than those with low motivation to achieve optimal learning outcomes. Thus, it can be concluded that students who have high learning motivation have a greater chance of obtaining better learning outcomes than students who have low learning motivation. This is also in line with the study conducted by Sunarti (2021). Learning utilized to its fullest will make understanding meaningful for students and make the school environment, teacher competence, teacher communication, learning materials, and classroom management from teachers factors that can improve learning outcomes and student motivation.

CONCLUSION

From the results of the research and discussion that has been carried out, it can be concluded that the most influential indicator of learning motivation for students is the existence of interesting activities for students in learning. Teachers must be able to increase children's learning motivation because if learning motivation increases, student learning outcomes will also increase. Learning motivation and learning outcomes at SMPN 7, Padang, are classified as moderate. Therefore, it is recommended that learning strategies be carried out in accordance with the things that have the most influence on student learning motivation to improve student learning outcomes.

CONFLICTS OF INTEREST

We have no conflicts of interest to disclose.

AUTHOR CONTRIBUTIONS STATEMENT

DM: Conceptualization, KW and LM: methodology, IS: formal analysis, DM: writing—preparation of the original draft.

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