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Application of Local Wisdom-Based Discovery Learning Model to Improve Students' Learning Motivation

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Abstract: In the field of education, an individual's success in achieving learning competencies is influenced not only by intellectual factors but also by equally significant non-intellectual factors, such as self-motivation. The purpose of this study is to demonstrate that using a discovery learning model grounded in local wisdom improves students' learning motivation. This research measures the following characteristics of learning motivation: Attention, Relevance, Confidence, and Satisfaction (ARCS). Thirty-five kids from State Junior High School 1, Jetis Ponorogo's class VIII-B, served as the research subjects. As part of a quantitative research design, the study employed a pre-experimental type with a one-group pretest-posttest. Motivation levels were measured using a questionnaire, and learning implementation was observed using an observation sheet. N-Gain analysis and the Wilcoxon test were used to analyze the data. learning motivation. Analysis of learning implementation data using Likert scale analysis. Learning motivation had improved, as indicated by an N-Gain score of 0.67, which is categorized as a medium gain. Furthermore, the Wilcoxon test yielded an asymptotic significance value (2-tailed) of <0.001, showing a significant difference between students' learning motivation before and after the local wisdom-based discovery learning was implemented. The percentage of learning implementation from the three meetings reached 92%, categorised as excellent. Based on the results of the research, using a local wisdom-based discovery learning successfully raises students' motivation to learn. Among the motivation aspects, 'Confidence' showed the greatest improvement, whereas 'Satisfaction' recorded the lowest. Consequently, the application of this model should be integrated with reflection and meaning reinforcement to further improve students' learning satisfaction.

Keywords: Discovery Learning; Learning Motivation; Local Wisdom.

Introduction

Because exceptional human resources are produced by high-quality education, education is essential to the growth of a thriving nation [1], [2]. In keeping with scientific and technological advances, adjustments in educational frameworks, particularly in science, are essential to empower the younger generation to navigate and overcome future challenges. Educational success is significantly influenced by the learning processes that occur during instruction [3]. In the field of education, an individual's achievement of these competencies is determined not only by intellectual factors but also by equally critical non-intellectual factors, such as self-motivation.

Intellectual intelligence (IQ) accounts for only 20% of success, while the remaining 80% is determined by other factors, primarily emotional intelligence (EQ), including the ability to self-motivate [4]. Learning motivation is a critical variable that cannot be overlooked in the instructional process. It can be defined as an internal drive within students that develops during the learning process, ensuring the continuity of learning [5].

In practice, it is well noted that students' learning motivation during instruction remains low. Based on preliminary research data on learning motivation conducted at SMP Negeri 1 Jetis Ponorogo, the average student motivation was 44%. The highest percentage was 48% for the 'attention' aspect, followed by 38% for the 'satisfaction' aspect, 46% for the 'relevance' aspect, and 42% for the 'confidence' aspect. These findings suggest that students' motivation to learn at the school remains low.

Interviews with the eighth-grade science teacher at State Junior High School 1, Jetis, Ponorogo, revealed that this issue is driven by internal factors, specifically a lack of student interest in science. Most students exhibit low interest because they have pre-existing perceptions that science is a difficult subject. Consequently, this mindset leads to low motivation to learn science. Based on interviews with eighth-grade students at State Junior High School 1, Jetis, Ponorogo, students perceive science learning as tedious, with material that is abstract, complex, and difficult to comprehend. Consequently, science education is often viewed as lacking relevance to their socio-cultural lives. Therefore, it is imperative to implement instructional strategies or learning models that can enhance student motivation, which in turn, may positively impact their cognitive abilities

Engaging, active learning approaches, such as the discovery learning model, can improve student motivation. The discovery learning model, integrated with local wisdom, helps students apply their knowledge to daily life, thereby making the learning process more meaningful and increasing their desire to learn [6], [7], [8]. Research on the local wisdom-based discovery learning model is informed by several relevant studies. Notably, scientific concepts are

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embedded in the musical instruments accompanying Dongkrek art, which can be used to teach vibration and wave topics [9]. It has been demonstrated that using local wisdom-based discovery learning improves learning outcomes and student motivation [10], [11]. Research on the discovery learning approach has shown that it can improve learning outcomes and student motivation [12]. Through the discovery learning model, students become active, creative, and motivated, enabling them to independently discover the knowledge concepts they are studying.

The application of learning based on local wisdom is also considered effective in improving student motivation. Local wisdom-based learning models significantly enhance student motivation compared to conventional methods [13]. In accordance with the Self-Determination Theory of motivation, Oszwa and Knopik state that individuals are more motivated to learn when they feel a sense of relatedness to the material being taught [14]. Research on culture-based approaches can foster a sense of pride in students' local heritage, thereby improving their desire to learn [15].

Based on several previous studies, it can be concluded that discovery learning models and local wisdom are effective in improving student motivation. There has also been research on learning about wave vibrations based on local wisdom, which has been proven to improve student motivation. However, each region has different potential for local wisdom. No research has yet integrated the local wisdom of Reog Ponorogo into science learning. Existing research focuses on local wisdom-based learning activities using virtual laboratories; none has directly incorporated local wisdom into learning practices.

To improve student motivation for learning, research must incorporate local wisdom into discovery learning. The learning materials on vibrations and waves are suitable for applying the discovery model based on local wisdom, according to interviews with several students at a junior high school in Ponorogo. The physics content is hard to understand, which may lead to low student motivation for science learning. Abstract vibration and wave content can be learned contextually through the implementation of a discovery-learning model grounded in local wisdom to improve student motivation. Furthermore, relevant research has already examined wave vibrations and their relationship to local wisdom.

Research Methods

This section describes in detail how the research was conducted to address each research objective. The primary components of this section include the research location, data sources, research design, research subjects, data collection techniques, instrument development, data analysis, and the testing of result accuracy.

This research employs quantitative methods and a one-group pretest-posttest design. In this design, measurements are taken using a pretest before the treatment and a posttest after the treatment. The researcher plans to investigate whether the local wisdom-based discovery learning model affects student interest in science learning. The research subjects were one class of 35 students, namely class VIII B from SMPN 1 Jetis Ponorogo, based on pre-research results indicating a low level of learning motivation. The tools utilized in this research consist of a survey on learning motivation modified from [16]. This checklist-style instrument comprises 20 items, consisting of both positive and negative statements categorized under the Attention, Relevance, Confidence, and Satisfaction (ARCS) dimensions. The survey. employs a Likert scale. Additionally, a learning observation sheet was utilized to evaluate the teacher's instructional activities, categorized into three phases: preliminary, core, and closing activities. These phases align with the specific syntax of the discovery learning model to assess the fidelity of its implementation. This research used validated learning tools and research instruments. The results were valid and reliable, making them suitable for further research.

Methods for gathering data in this research included a questionnaire to evaluate learning motivation before and after the intervention, and classroom observations conducted by three unbiased observers. Specifically, the analysis of N-gain was utilized to determine the enhancement of learning motivation after the intervention. The N-Gain scores were interpreted according to the categories established by [17] as shown in Table 1 below.

Table 1. Normalized N-Gain Score Criteria

N-Gain Score	Category
$0.70 \leq g \leq 100$	High
$0.30 \leq g < 0.70$	Medium
$0.00 < g < 0.30$	Low

[17]

The quantitative analysis of learning implementation was conducted by calculating the scores for each aspect based on the criteria of very good, good, sufficient, less than good. The calculated mean scores were subsequently converted into learning implementation criteria scores. The standards for assessing the execution of the learning process are outlined as follows:

Table 2. Evaluation Criteria for Learning Implementation

Percentage (%)	Average Score Criteria
1-20	Very Poor
21-40	Poor
41-60	Fair
61-80	Good
81-100	Excellent

[18]

The student motivation questionnaire data, collected before and after the learning process, were subjected to hypothesis testing. To decide whether to employ parametric or non-parametric statistical analysis, a normality test was conducted before the hypothesis test. The normality test is a statistical test used to determine whether a data set follows a normal distribution. To guarantee the validity of the findings, SPSS 27 was used for the analysis. The normality of the data distribution was evaluated using a significant value (p-value); if $p > 0.05$, the data are normally distributed; if $p < 0.05$, they are not [19]. If the results of the normality test indicate a normal distribution, a Paired Sample T-Test is performed. Conversely, if the data are not normally distributed, a non-parametric alternative, specifically the Wilcoxon signed-rank test, is employed.

Results and Discussion

At SMP Negeri 1 Jetis Ponorogo, the application of the local wisdom-based discovery learning for the subject of vibrations and waves took place over three sessions. The results of a motivation questionnaire administered both before and after the study were used to determine students' motivation to learn. This questionnaire consisted of 20 statements covering the four aspects of the ARCS motivation model: attention, relevance, confidence, and satisfaction. Based on the research, student learning motivation was examined; Table 3 displays the findings.

Table 3. Student Learning Motivation Before and After Instruction

Description	Pre-test Motivation	Post-test Motivation
Minimum score	30	71
Maximum score	59	96
Average	46	82

Table 2 shows that students' initial and end motivation has improved. The N-Gain analysis was used to further examine this increase in learning motivation, as shown in Table 4.

Table 4. N-Gain Results of Student Learning Motivation

N-Gain Range	Category	Number of Students	Percentage (%)
$0.70 \leq g \leq 100$	High	20	57
$0.30 \leq g < 0.70$	Medium	15	43
$0.00 < g < 0.30$	Low	0	0
Average N-Gain			0.67 (Medium)

According to the N-Gain analysis in Table 4, every student in class VIII-B showed an increase in learning motivation following the application of the local wisdom-based discovery learning application. The average N-Gain score was 0.67, placing it in the moderate range. Because 35 students in the sample completed the learning motivation questionnaire both before and after the classes, data normality was examined using SPSS's Shapiro-Wilk test. Table 5 below displays the normalcy test results.

Table 5. Normality Test Results

	Shapiro-Wilk		
	Statistic	df	Sig
Pre-test Learning Motivation	.886	35	.002
Post-test Learning Motivation	.935	35	.041

a. Liliefors Significance Correction

The normality test results for learning motivation before the session indicate a p-value of 0.002 ($p < 0.05$). The normality test results for learning motivation after the lesson also show a significant value of 0.041 ($p < 0.05$). Both before and after the lesson, the learning motivation data do not fit the normalcy assumption. Thus, the hypothesis was assessed using the non-parametric Wilcoxon signed-rank test. The results of the Wilcoxon test are shown in Table 6.

Table 6. Wilcoxon Signed-Rank Test Results

	Post-test Learning Motivation – Pre-test Learning Motivation
Z	-5 163[b]
Asymp. Sig. (2-tailed)	<.001

The Wilcoxon test results, conducted using SPSS software, yielded an asymptotic significance (2-tailed) value of < 0.001. Student learning motivation after instruction was significantly higher than before, as indicated by a p-value below the established significance threshold ($p < 0.05$). These results demonstrate that the study's treatment significantly raised students' motivation to learn. As a result, the first hypothesis (H1), which claims that using the local wisdom-based discovery learning model improves student learning motivation, is accepted.

The improvement in student learning motivation is supported by data on learning implementation, which consistently improve at each meeting, as shown in Table 7.

Table 7. Percentage of Learning Implementation per Meeting

Meeting	Learning Implementation	Category
1	90%	Excellent
2	92%	Excellent
3	94%	Excellent
Average	92%	Excellent

Figure 4.1 below shows data from the research on learning motivation for class VIII B before and after the use of the Discovery Learning model based on the wisdom of each local aspect.

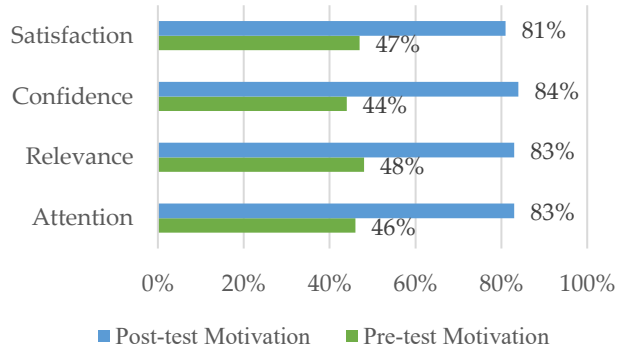

Figure 1. Average Student Learning Motivation Across Each Aspect

The average learning motivation scores before and after the instruction for each aspect were compared to determine the improvement. Based on the average motivation scores shown in Figure 1, the N-Gain for each component was calculated to measure this improvement.

Table 8. Results of Pre-test and Post-test N-Gain Analysis

Aspect	Pretest	Posttest	N-Gain	Category
Attention	46	83	0,68	Medium
Relevance	48	83	0,67	Medium
Confidence	44	84	0,71	High
Satisfaction	47	81	0,64	Medium

Table 8 shows that the percentage of learning motivation has improved in all areas, falling into the moderate and high categories. The confidence component has the largest percentage of learning motivation. This occurs because discovery learning provides students with space to explore and discover concepts independently; consequently, students feel capable of understanding the material and completing learning tasks, which ultimately improves their self-confidence [20], [21]. Furthermore, students' active involvement in observations, discussions, and presentations triggers a strong sense of self-efficacy, thereby enhancing confidence during the learning process [22], [23]. Learning that is relevant to the student's cultural environment can improve self-confidence in learning through authentic learning experiences [24], [25]. Supported by data on the implementation of the Discovery Learning model for each phase in Figure 2.

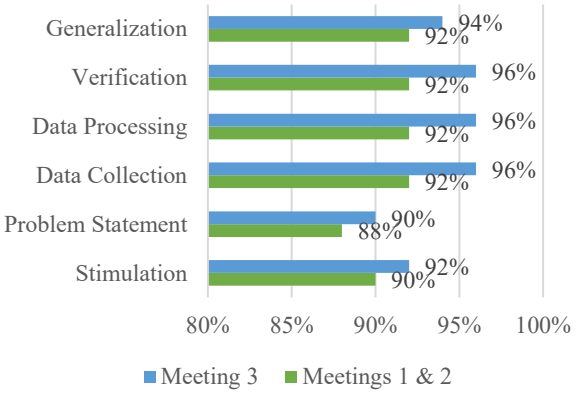

Figure 2. Percentage Graph of Learning Implementation

Based on Figure 2, the data collection, data processing, and verification phases experienced the greatest improvement in learning implementation among the other six phases. This was because, during these stages, students were directly and actively involved in the process of concept discovery, making the learning experience more meaningful and memorable [9]. This aligns with the constructivist theory of learning, which holds that active, collaborative, and contextual learning enables students to better understand concepts and remain motivated to learn, as they feel directly involved in the process of knowledge construction [26].

Furthermore, students' active involvement in observations, discussions, and presentations fosters a strong sense of self-efficacy, thereby enhancing confidence during the learning process [23]. As evidenced by the data on the implementation of the discovery learning model, in the generalization phase, the learning implementation category was excellent and improved with each meeting. This was evident as several groups presented their findings, with students enthusiastically exchanging ideas with one another. Furthermore, when a presenting group was unable to answer questions, the teacher intervened to provide the correct explanation and clarification. Consequently, a highly positive interaction occurred during this phase. The high levels of student motivation and cognitive ability were also influenced by the well-executed treatment during the learning process [27]. During the lessons, the teacher encouraged students to engage with their group members through discussion, thereby making them more active and better able to comprehend the material.

This aligns with research by [21], which reveals that the generalization phase in discovery learning reaches an optimal point when the teacher serves as a dialogic bridge, capable of transforming student debates into a constructive concept validation process through reinforcement. Furthermore, [28] emphasizes that an appreciative classroom atmosphere during the presentation of local wisdom outcomes (such as the vibrations of the *Gong Reog*) makes students feel personally and culturally valued. This self-confidence leads to increased active participation, reflected in high implementation scores. Multi-directional interaction (student-student-teacher) at the final stage of learning is highly effective for anchoring abstract conceptual understanding, ensuring that the transition from local experiences to universal physical laws is well received by all students [29].

Meanwhile, the lowest percentage for the learning motivation aspect was satisfaction. This condition indicates that active involvement in learning is not always directly proportional to the emergence of learning satisfaction, particularly when students' conceptual understanding remains diverse [30]. Student learning satisfaction is influenced by the level of understanding of the material, rather than by merely active participation during the learning process [31].

Satisfaction is defined as the ultimate outcome of students' subjective evaluations regarding their success [32]. The low level of this aspect is rationally attributed to the cognitive adaptation process, specifically the transition from conventional instruction to discovery learning, which necessitates a high degree of learner autonomy. When students exert substantial effort to comprehend complex concepts, satisfaction emerges incrementally rather than instantaneously [33]. This indicates that students require reflective reinforcement to effectively internalize the significance of their learning experiences. Integrating local contexts into learning must be accompanied by reflection and the reinforcement of meaning to enhance student learning satisfaction [34].

Conclusion

The results of the research suggest that applying the local wisdom-based discovery learning model improves student motivation to learn, with an average N-Gain score of 0.67, which falls within the medium range. The improvement in every facet of learning motivation is directly correlated with this improvement. As a result, the local wisdom-based discovery learning approach successfully increases students' motivation to study across all four examined aspects of motivation. The implementation of the local wisdom-based discovery learning model across three meetings achieved an average of 92%, placing it in the excellent category. However, this study has several limitations, as it employed a pre-experimental design without a control group; thus, the findings may not accurately establish a causal link between students' motivation or cognitive abilities and the use of the learning model. Thus, it is recommended that more reliable research methodologies, including true experimental or quasi-experimental designs, be used in future studies, and

that local wisdom-based discovery learning be integrated by considering various supporting variables. Such an approach is anticipated to yield a more thorough understanding of how effectively contextual learning enhances students' long-term motivation for learning.

Author's Contribution

N.N. Kamila: contributed to the conceptualization, data collection, and analysis of the study. She also made significant contributions to the writing and revision of the manuscript. B. Setiawan: esponsible for the research design, literature review, and interpretation of results. He also assisted in the drafting and reviewing of the manuscript

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