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IMPROVING STUDENTS' SCIENCE ATTITUDES AND SKILLS THROUGH LEARNING SCIENCE VIDEO-BASED SKELETAL, MUSCLE AND JOINT MATERIAL WITH PROJECT BASED LEARNING METHOD (PJBL)

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ABSTRACT
The low interest of students in science subjects such as the skeleton, muscles, and joints requires innovative strategies to optimize learning activities. This study aims to improve students' attitudes and science skills through learning about the skeleton, muscles, and joints based on science videos using the project-based learning (PJBL) method. The research was conducted at SD Negeri 61 Banda Aceh with a population comprising all students at the school. The research sample consisted of 28 students selected using purposive sampling techniques. The type of research used was experimental with a one-group pretest-posttest design and a quantitative approach. Data collection techniques included questionnaires and tests, while data analysis techniques used paired t-tests. The results showed a significant increase in students' attitudes and science skills after project-based learning (PJBL) using science videos. The average attitude score increased from 60.18 to 74.91, with variance decreasing from 31.45 to 22.45, and a t-statistic value of -28.34. Science skills also increased from 72.09 to 93.56, with variance decreasing from 33.25 to 31.39, and a t-statistic value of -53.17. In conclusion, both variables showed a strong correlation between the pretest and posttest with a p-value much smaller than 0.05, indicating that the applied method is effective in improving students' attitudes and science skills.
Keywords: *Attitudes, Science Skills, Video, Learning*

ABSTRAK
Rendahnya minat siswa terhadap materi IPA seperti rangka, otot, dan sendi memerlukan strategi inovatif untuk mengoptimalkan kegiatan pembelajaran. Penelitian ini bertujuan untuk meningkatkan sikap dan keterampilan sains siswa melalui pembelajaran materi rangka, otot, dan sendi berbasis video IPA dengan metode pembelajaran berbasis proyek (PJBL). Penelitian ini dilakukan di SD Negeri 61 Banda Aceh dengan populasi seluruh siswa di sekolah tersebut. Sampel penelitian terdiri dari 28 siswa yang dipilih menggunakan teknik purposive sampling. Jenis penelitian yang digunakan adalah eksperimen dengan desain one group pretest-posttest dan pendekatan kuantitatif. Teknik pengumpulan data menggunakan kuesioner dan tes, sementara teknik analisis data menggunakan uji t berpasangan. Hasil penelitian menunjukkan peningkatan signifikan pada sikap dan keterampilan sains siswa setelah pembelajaran berbasis proyek (PJBL) menggunakan video IPA. Rata-rata nilai sikap meningkat dari 60,18 menjadi 74,91 dengan variansi menurun dari 31,45 menjadi 22,45, dan nilai t-statistik sebesar -28,34. Keterampilan sains juga meningkat dari 72,09 menjadi 93,56 dengan variansi menurun dari 33,25 menjadi 31,39, dan nilai t-statistik sebesar -53,17. Kesimpulannya, kedua variabel menunjukkan korelasi kuat antara pretest dan posttest dengan nilai p jauh lebih kecil dari 0,05, yang berarti bahwa metode yang diterapkan efektif dalam meningkatkan sikap dan keterampilan sains siswa.
Kata Kunci : *Sikap, Keterampilan Sains, Video, Pembelajaran*

INTRODUCTION

Improving students' science attitudes and skills is one of the goals of science education. In the curriculum, especially in science subjects, skeleton, muscle, and joint material is an important part of understanding the structure of the human body. However, in practice, this material is often considered a dry and uninteresting theme, so that students show low interest and motivation to learn. Therefore, innovative and interactive learning strategies are needed to improve students' skills and attitudes towards science material (Umami, 2021).

Social attitudes are one of the important aspects in the development of students, especially in elementary school. Social attitudes include the ability to work together, empathy, tolerance, mutual respect, and helping others. These values are an important foundation in forming good and civilized student characters. However, in reality, in SD Negeri 61 Banda Aceh, there are still many problems related to low social attitudes in the elementary school classroom environment. Phenomena such as lack of cooperation in groups, teasing each other between friends, reluctance to help friends who are having difficulties, and the lack of a sense of shared responsibility in maintaining classroom cleanliness are indications of low social attitudes in students. Such behavior is certainly a serious concern because it not only has an impact on a less conducive learning atmosphere but also hinders the development of students' character as a whole..

Social attitudes, such as empathy, cooperation, mutual respect, and helping each other, should start to grow and form early on through interactions in the school environment. However, in reality, at SD Negeri 61 Banda Aceh there are still many students who show individualistic behavior, are reluctant to work together in groups, are less concerned about friends who are having difficulties, and have no sense of responsibility for the cleanliness and comfort of the classroom. Some students even do not hesitate to mock or belittle their friends, which shows a lack of empathy and tolerance. This phenomenon can be caused by various factors, such as the lack of habituation of character values in the school environment, the dominance of learning approaches that are solely oriented towards academics, and the lack of role models and support from the family and community environment. If not addressed immediately, this low social attitude has the potential to hinder the process of forming children's character as a whole and disrupt the creation of a harmonious and positive learning environment in elementary schools.

Creating a harmonious and positive learning environment in elementary schools is essential for fostering well-rounded individuals. Schools need to implement programs that encourage social and emotional learning, engage families in the educational

process, and promote positive role models within the community. By doing so, schools can cultivate an atmosphere where children feel safe, valued, and motivated to learn. This supportive environment not only enhances academic achievement but also equips students with the necessary skills to navigate social interactions and build meaningful relationships throughout their lives. Building meaningful relationships throughout their lives, students will be better prepared to face challenges and contribute positively to society. By prioritizing holistic development, schools can help shape compassionate, resilient individuals who are equipped to thrive in an ever-changing world.

With the low social attitude, one of them also has an impact on students' social skills in the classroom. Low social skills in elementary schools can have various negative impacts, both for students' personal development and for the learning environment as a whole. Low social skills cause students to have difficulty interacting with peers, teachers, and the surrounding environment. They tend to withdraw, lack self-confidence, or even show aggressive and uncooperative behavior. This is what appeared in SD Negeri 61 Banda Aceh, namely the limited ability of students to work in groups, have healthy discussions, and resolve conflicts in a positive way. As a result, students with low social skills often lag behind in collaboration-based learning, have fewer friends, and feel isolated in the school environment. To address these challenges, it is essential to implement programs that focus on enhancing social skills through team-building activities, structured group discussions, and conflict resolution workshops. By fostering a supportive learning environment, educators can help students build confidence, improve their interactions, and ultimately feel more connected within the school community. This sense of connection not only benefits the students on a personal level but also enhances their academic performance and overall well-being. By prioritizing social skill development, schools can create a more inclusive atmosphere where all students feel valued and empowered to contribute.

Another impact is the decline in a healthy social climate in the classroom. When most students do not have good social skills, the classroom atmosphere becomes less harmonious, conflicts often occur, and students tend to be apathetic towards each other. This not only hinders learning, but also reduces motivation and learning comfort. In the long term, low social skills can affect the development of students' character, such as a sense of responsibility, empathy, and social concern. If not addressed immediately, this condition can lead to more serious behavioral problems at the next level of education and negatively affect students' ability to build social relationships in society. Therefore, strengthening social skills from an early age is very important to form individuals who have character, care, and are ready to live in a pluralistic society.

One step that can be taken is learning through science videos using the project-based learning method (PJBL) because it has shown its contribution to improving teaching and learning activities in schools. Juriah et al. (2016) said that video media can help students understand concepts more effectively. Meanwhile, PJBL can improve students' skills in critical thinking and working together (Ismanto et al., 2023).

Project-based learning is one of the constructive learning models that has the potential to strengthen advanced cognitive skills. Students design projects, work on complex tasks, and evaluate their performance and progress. Projects are planned based on problems, questions, or needs identified by students. Project-based learning is a learning model that applies a scientific approach by focusing on basic concepts and principles of a subject, allowing students to investigate, solve problems, and solve other meaningful tasks centered on students and producing real products.(Chofzah, 2024; Dewi, 2022; Kesumawati, 2025)

Some of the advantages of PJBL are that it can develop problem-solving skills. Research on the development of high-level cognitive capacity emphasizes the importance of student participation in problem-solving activities. In addition, students collaborate more optimally because when implementing a project, group work is key so that it requires students to learn and practice communication skills (Rindaningsih, 2024).

This was also expressed by (Chaniago & Febrina Dafit, 2024; Chofzah, 2024; Habibah, 2024) that the project-based learning model has several advantages, namely, it can increase student learning motivation, develop critical and creative thinking skills, and provide students with meaningful learning experiences. However, this model also has several disadvantages, namely, it takes a long time to implement and requires thorough preparation from the teacher. The project-based learning model is an effective learning model for developing 21st-century skills in students. This model has several advantages and disadvantages that teachers need to consider before implementing it in the classroom.

The results of the literature study show that science video-based learning can improve students' skills in understanding the material. Science videos are also able to help students understand learning topics more effectively because they can display clearer and more interactive visual images. Apart from that, science videos can also help students gain understanding easily because they can show concrete examples that are relevant to everyday life.

Mu'minah's research (2021) highlights that although video-based learning in science subjects can be an effective tool, the results are not optimal without the

application of appropriate learning methods. This emphasizes the importance of a planned and structured approach in utilizing video technology to support student learning. By using appropriate methods, such as PJBL, using videos as a complement to class discussions or as a means, it is hoped that the concepts that have been taught directly can be strengthened, and learning will become more interactive and effective.

Based on this understanding, the researcher intends to conduct further studies on how learning skeletal, muscle, and joint material in science subjects can improve the science attitudes and skills of fourth-grade students at SD Negeri 61 Banda Aceh. This research will integrate video-based learning with project-based learning (PJBL) methods. PJBL is expected to provide a more in-depth and practical learning experience so that students not only understand scientific concepts theoretically but are also able to apply them in real contexts. Thus, it is hoped that this approach will not only increase students' understanding of science material but will also strengthen positive attitudes and optimal science skills.

RESEARCH METHODS

This research is classified as an experimental study with a one-group design and applies a quantitative approach. The main aim of the research is to investigate the effectiveness of the Project-Based Learning Method (PJBL) supported by science video material in improving students' science attitudes and skills related to the skeletal, muscle, and joint material.

The experimental type was chosen because it allows researchers to control variables that influence research results so that it can provide stronger evidence regarding the impact of using learning methods. Meanwhile, a quantitative approach is used to objectively measure changes in students' science attitudes and skills through data that can be measured and analyzed statistically, allowing more accurate conclusions to be drawn and generalization of research findings (Suwanda, 2015).

The population in this study was all students at SD Negeri 61 Banda Aceh, totaling 336 people. Meanwhile, the research sample consisted of 28 class VI students, who were selected based on a purposive sampling technique, namely, determining the sample according to certain considerations (Swarjana, 2022). In this case, class VI students are considered the most suitable to answer the research objectives regarding improving science attitudes and skills through science video-based project-based learning (PJBL) methods. This selection was based on the consideration that class VI students had a fairly mature understanding and could participate in learning using the methods applied effectively.

The data collection techniques used in this research were questionnaires and skills tests.

a. Questionnaires can be used to measure students' attitudes towards science before and after implementing the science video-based PJBL method. This questionnaire allows structured data collection and can be analyzed quantitatively to see changes in attitudes.
b. The test is used to assess students' improvement in science skills in understanding skeleton, muscle, and joint material. This test provides empirical data regarding students' abilities before and after learning (Hartono, 2018).

The combination of these two techniques provides a comprehensive picture of the effects of learning on students' science attitudes and skills and allows analysis of statistically significant differences. Meanwhile, the data collected from questionnaires and tests will be analyzed using a paired t-test with the help of Ms. Excel. The aim of this analysis is to measure the average difference in students' science attitudes and skills before and after implementing the PJBL method based on science videos. This technique allows researchers to determine whether there is a significant improvement in students' science attitudes and skills after learning (Syahril, 2019).

RESULT AND DISCUSSION

Result

This research was conducted on fourth-grade students at State Elementary Schools in Banda Aceh using pretest and posttest methods. Data was collected through questionnaires to explore information about students' attitudes and using test instruments to measure students' science skills. The results of analysis using the t-test were demonstrated using MS Excel.

To obtain accurate results, t-test analysis is an important step in evaluating significant differences between pretest and posttest scores in each measured variable. Using MS Excel as an analysis tool makes it easy to calculate t-test statistics, including t-values and significance values (p-values), as well as in-depth interpretation of results. Through this approach, this research aims to identify the effectiveness of programs or interventions provided to fourth-grade students at SD Negeri Banda Aceh, with the hope of providing evidence-based recommendations for further improvements in the educational process at this level. The following describes the results of the t-test according to the research variables.

a. Student Attitude

The results of the t-test analysis can be seen in Table 1, which shows changes in students' attitudes before and after treatment.

Table 1 T Test Results for Attitude Variables

	Pretest	*Postest*
Mean	60,17857143	74,9107143
Variance	31,4484127	22,4454365
Observations	28	28
Pearson Correlation	0,871892536	
Hypothesized Mean Difference	0	
Df	27	
t Stat	-28,34361755	
P(T<=t) one-tail	6,32694E-22	
t Critical one-tail	1,703288446	
P(T<=t) two-tail	1,26539E-21	
t Critical two-tail	2,051830516	

The results of statistical analysis in table 1 show a significant increase in attitude variables after the intervention. The average pretest score was 60.18, while the average posttest score increased to 74.91. This increase illustrates a positive change in students' attitudes after being given the intervention. The pretest score variance is 31.45, while the posttest score variance is 22.45, which shows that the posttest data is more consistent.

A Pearson correlation of 0.87 shows a strong relationship between pretest and posttest scores, indicating that participants who have high pretest scores tend to also have high posttest scores. This strengthens the reliability of the attitude measurement used in this research.

The t-test was used to determine whether the difference in pretest and posttest means was statistically significant. In this test, the null hypothesis (H0) states that there is no average difference between the pretest and posttest scores. The statistical t value obtained was -28.34 with degrees of freedom (df) of 27. The p-value for the one-way test was 6.33E-22, and for the two-way test, it was 1.27E-21. The critical value for the one-way test is 1.70, and for the two-way test, it is 2.05.

The decision making criteria in this t test are comparing the statistical t value with the critical t value, as well as comparing the p value with the significance level which is generally set at 0.05. In this analysis, the statistical t value (-28.34) is much smaller

than the critical t (both one-tail and two-tail), and the p value is much smaller than 0.05. Therefore, the null hypothesis (H0) is rejected.

Rejection of this null hypothesis shows that there is a significant difference between the pretest and posttest scores, so it can be concluded that the intervention carried out has a positive effect on improving student attitudes. These results support that the program or treatment provided is effective in improving student attitudes.

b. Science Skills

Analysis of the results shown in Table 2 shows the level of science skills, both before and after treatment.

Table 2 T Test Results for Student Science Skills Variables

	Pretest	*Postes*
Mean	72,09285714	93,56071429
Variance	33,25253968	31,39136243
Observations	28	28
Pearson Correlation	0,929775779	
Hypothesized Mean Difference	0	
Df	27	
t Stat	-53,1706368	
P(T<=t) one-tail	3,61137E-29	
t Critical one-tail	1,703288446	
P(T<=t) two-tail	7,22273E-29	
t Critical two-tail	2,051830516	

The results of statistical analysis in Table 2 show a significant increase in students' science skills after the intervention. The average pretest score was 72.09, while the average posttest score increased to 93.56. This increase shows a significant positive change in students' science skills after receiving certain treatment or intervention. The pretest score variance was 33.25, while the posttest score variance was 31.39, indicating that the score consistency on the posttest was slightly higher than the pretest.

A Pearson correlation of 0.93 shows a very strong relationship between pretest and posttest scores. This shows that students who have high pretest scores tend to also have high posttest scores, which indicates the reliability of the science skills measurements used in this study.

The t-test was used to determine whether the difference in pretest and posttest means was statistically significant. In this test, the null hypothesis (H0) states that there

is no average difference between the pretest and posttest scores. The statistical t value obtained was -53.17 with degrees of freedom (df) of 27. The p-value for the one-way test was 3.61E-29, and for the two-way test, it was 7.22E-29. The critical value for the one-way test is 1.70, and for the two-way test, it is 2.05.

The decision-making criteria in this t-test are comparing the statistical t-value with the critical t-value, as well as comparing the p-value with the significance level, which is generally set at 0.05. In this analysis, the statistical t value (-53.17) is much smaller than the critical t (both one-tail and two-tail), and the p value is much smaller than 0.05. Therefore, the null hypothesis (H0) is rejected.

Rejection of this null hypothesis indicates that there is a significant difference between the pretest and posttest scores. This shows that the intervention provided has a very positive effect on improving students' science skills. In other words, the program or treatment implemented is effective in significantly improving students' science skills.

Discussion

Based on the results of the T-test analysis, it is proven that learning material about skeletons, muscles, and joints based on science videos using the project-based learning method (PJBL) is effective in improving students' science attitudes and skills. This approach not only provides a deep understanding of body anatomy concepts but also encourages students to actively engage in the exploration and application of their knowledge in the context of real projects. In this way, students not only learn theoretically but also develop practical skills that can be applied in everyday life as well as advanced studies in the field of science.

The use of science videos in learning body anatomy material using the Project Based Learning (PJBL) method has been proven effective in improving students' science attitudes and skills. This research shows that this approach not only facilitates deep understanding of skeletal, muscle, and joint concepts, but also encourages active student participation in the exploration of these concepts through real projects. This is in line with the findings of Youssef et al. (2023) that through videos, students can clearly visualize complex anatomical structures, facilitating better understanding visually and auditively.

The application of the PJBL method in the context of anatomy learning provides opportunities for students to engage in active and collaborative learning. They not only learn theory, but also apply their knowledge in contexts that are relevant to everyday life. This is in line with constructivist learning theory which emphasizes the importance of direct experience in building deep understanding (Ilham et al, 2023). Through working

on projects, students can develop practical skills such as data analysis, problem solving, and scientific communication, which are invaluable in the context of modern science education.

Fatmawati's research (2018) also concluded that video-based learning allows easier repetition of material that is difficult to understand because students can access it anytime and anywhere. This facilitates more flexible study time arrangements, which can support different learning styles among students. In this way, science videos are not only effective learning tools but also promote inclusivity in science education by considering the needs of diverse students.

Overall, this research confirms that the combination of science videos and PJBL methods in teaching body anatomy not only improves students' conceptual understanding but also develops practical skills necessary for their future success in science. These results provide a strong basis for considering implementing this strategy in a broader educational context, with the hope of improving the quality of science learning at primary and secondary education levels.

CONCLUSION

Research on "Improving Students' Science Attitudes and Skills through Science Video-Based Learning of Skeletal, Muscle, and Joint Material with Project-Based Learning Methods (PJBL)" shows positive and significant results on the two variables studied. First, Attitude. The results of the t-test analysis showed a significant increase in student attitudes after the intervention. The average pretest score increased from 60.18 to 74.91 on the posttest. The variance of the pretest score was 31.45 and decreased to 22.45 in the posttest, indicating smaller variations after treatment. With 28 students observed, the Pearson correlation was 0.871, indicating a strong relationship between pretest and posttest scores. The t-statistic value is -28.34, and the p-value is much smaller than the significance level of 0.05, so the null hypothesis is rejected. In conclusion, there was a significant improvement in attitudes after students participated in project-based learning. Two, Science Skills. The results of the t-test analysis also showed a very significant increase in students' science skills. The average pretest score increased from 72.09 to 93.56 in the posttest. The pretest score variance was 33.25 and decreased slightly to 31.39 at posttest, indicating smaller score variation after the intervention. With 28 observations, a Pearson correlation of 0.930 shows a very strong relationship between pretest and posttest scores. The t-statistic value is -53.17, and the p-value is much smaller than the significance level of 0.05, so the null hypothesis is rejected. In conclusion, there was a substantial increase in students' science skills after participating in project-based learning. Overall, this research succeeded in showing that

science video-based learning of skeletal, muscle, and joint material using the project-based learning (PJBL) method was effective in significantly improving students' science attitudes and skills.

Based on the research results, which show a significant increase in students' science attitudes and skills through learning science video-based skeletal, muscle, and joint material using the project-based learning method (PJBL), several suggestions can be given to related parties to increase learning effectiveness. It is recommended that the project-based learning method (PJBL) be applied more widely in various subjects. This method has proven to be effective in improving students' attitudes and skills, so it can provide great benefits if implemented in various learning contexts. Implementing PJBL can motivate students to be more active in learning, improve critical thinking skills, and improve their practical skills. The development and use of video-based learning materials needs to be improved. Video media has proven to be effective in helping students understand the material better and attracting their interest. Using video as a learning tool can provide a clearer visualization of concepts that are difficult to understand through text alone.

Therefore, teachers and curriculum developers need to integrate more videos into learning materials. It is important for teachers to receive adequate training in the use of PJBL methods and instructional video technology. This training will ensure that teachers have the skills and knowledge necessary to implement the method effectively. In this way, teachers can design and implement relevant and interesting projects, and utilize video as an effective learning tool. Providing facilities and infrastructure that support project-based learning and the use of video media is also very important. Schools need to ensure the availability of adequate computer equipment, projectors and internet access so that the learning process can run smoothly. The availability of these tools will enable students to actively engage in projects and utilize the digital resources available. Regular evaluation and monitoring of the implementation of the PJBL method and the use of video media is also recommended. This evaluation aims to ensure continuity and continuous improvement in the learning process. By conducting evaluations, schools can identify the obstacles and challenges they face, and find appropriate solutions to overcome them. Monitoring is also important to ensure that the PJBL method and video media really have a positive impact on student learning outcomes.

Encouraging collaboration between teachers and schools in sharing best practices regarding the implementation of PJBL and the use of video media can improve the overall quality of learning. By sharing experiences and successful strategies, teachers can learn from each other and adopt approaches that have been proven effective. This

collaboration can also create a supportive and innovative learning community. By implementing these suggestions, it is hoped that we can further improve the effectiveness of learning and student learning outcomes in various subjects. Learning that is more interactive, relevant and interesting will motivate students to be more actively involved in the learning process and achieve better achievements.

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