 ISSN 2776-5229

The Utilization of Multimodal Media with the *Project Based Learning Model* on the Learning Achievement

Dita Yunilasari[1*], Sriyanto[2]
[12]Universitas Muhammadiyah Purwokerto
*ditayunilasari@gmail.com

ARTICLE INFO

Article history
Received March 3, 2026
Revisied April 17, 2026
Accepted April 21, 2026

Keywords: Multimodal Media, Project-Based Learning, Learning Achievement, IPAS, Independent Curriculum

ABSTRACT

This research is motivated by the low learning achievement of Natural and Social Sciences (IPAS) of grade IV students at SD Negeri 1 Bodaskarangjati which is not optimal due to the use of conventional learning methods that are not in accordance with the diversity of students' learning styles. This study aims to analyze the effectiveness of the use of multimodal media in the Project-Based Learning (PjBL) model on improving student learning achievement. The method used was a pre-experiment with a One-Group Pretest-Posttest design on 22 students. Data was collected through multiple-choice tests that had been tested for validity and reliability, then analyzed using N-Gain tests, t-tests, and effect size tests. The results showed a significant increase in the average score from 68.53 to 83.22 with an N-Gain value of 0.47 (medium category) and an effect size of 1.39 (very large). In addition, there is a decrease in the ability gap between students. In conclusion, the application of multimodal media in the PjBL model is effective in increasing social studies learning achievement and being able to accommodate the diversity of students' learning styles in a more inclusive and adaptive manner.

1. INTRODUCTION

Learning in elementary school has an important role in shaping the basis of students' conceptual understanding. At this stage, the success of learning is not only measured by the delivery of the material, but by the extent to which students are able to understand and apply the concepts learned. Learning achievement is one of the indicators that shows the effectiveness of the learning process that takes place in the classroom. The essence of education is not just the transfer of knowledge, but an effort to facilitate children's intellectual, emotional, and social development holistically to face future challenges (Hidayat et al., 2025; Wardana & Djamaluddin, 2020). However, the effectiveness of education depends heavily on how information is conveyed and received by students in the classroom. An effective learning process will only be achieved if it is designed according to the needs of students and continuously evaluated so that learning outcomes are optimal (Mustika et al., 2025). Serious challenges were found in SD Negeri 1 Bodaskarangjati, especially in the Natural and Social Sciences (IPAS) grade IV subject, where based on initial observations, students' learning achievement was still lower than the average daily score of other subjects (Ambarsari et al., 2025). (Pratiwi et al., 2018) in their research it was found that the study showed that in grade V students there was a significant relationship between motivation and learning achievement. Although the strength of the relationship found was relatively low, these findings still indicate that motivation has a contribution to students' academic achievement. This shows that the better the learning motivation that students have, the tendency to achieve optimal learning outcomes also increases. Thus, learning motivation can be seen as one of the important factors that need to be considered in an effort to improve the academic achievement of elementary school students. These findings are in line with research (Sari, 2021) which shows that in grade V students, motivation has a strong relationship with learning outcomes, while learning style has a relationship at a moderate

level, thus showing that motivation contributes more to academic achievement than learning style even though both still play an important role in supporting student achievement; Therefore, motivation and learning styles need to be considered simultaneously in an effort to improve learning achievement in elementary schools, with SD Negeri 1 Bodaskarangjati chosen as the research location because it represents the condition of public elementary schools in the rural area of Purbalingga which is transitioning to the Independent Curriculum (Kurikulum Merdeka), which is an initiative of the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia that was developed to overcome various obstacles In the national education system through replacing the old approach that tends to be rigid to be more flexible, oriented towards competency-based learning, providing space for exploring students' interests and potential, and encouraging the application of more personalized differentiated learning according to the needs of students (Syafriani et al., 2025).

The philosophy of differentiation emphasizes that each student has different uniqueness, needs, and learning readiness so learning needs to be tailored to optimize individual potential, in line with the demands of the Independent Curriculum that encourages teachers to shift from a uniform method to a more personalized, adaptive, and responsive approach to student diversity (Kemendikbudristek, 2024). This concept promises a significant increase in learning achievement, its implementation in the field still faces various challenges, especially related to the readiness and competence of teachers in designing truly personalized learning (Tomlinson, 2017) However, many teachers still have difficulty in implementing differentiation systematically, especially in understanding and implementing concepts according to student needs, limited facilities, and difficulties in designing the right learning method for each individual. In addition, teachers also face obstacles in managing class diversity, limitations in professional training, difficulty in conducting objective assessments, and lack of support from schools (Lailiyah & Mas'ud, 2024). As an effort to improve the achievement of IPAS studies learning achievements, a learning strategy is needed that is able to reach the learning characteristics of students more comprehensively. One alternative that can be used is multimodal media, which is a learning media that integrates visual, audio, and kinesthetic elements in a single material presentation unit (Fauziyah & Yuniarti, 2024). Mayer, (2021) the selection of multimodal media is based on the Cognitive Theory of Multimedia Learning, which states that the combination of various sensory modes can reduce cognitive load, strengthen long-term memory, and improve concept understanding. Other research by (Meylani et al., 2025a; Pangestu et al., 2024a) stated that the implementation of Project Based Learning (PjBL) is able to increase student involvement, concept understanding, learning outcomes, motivation, and creativity, especially for visual and kinesthetic learners. Through real projects and problem-solving activities, students become more enthusiastic, have a sense of ownership of learning, and are able to think critically and creatively. However, its implementation still faces challenges such as teacher readiness, curriculum integration, and assessment, so differentiated learning strategies and technological support are needed so that PjBL is more effective for various student characteristics.

This research only focuses on measuring the improvement of student learning achievement in the cognitive realm through pretest and posttest results. Other aspects such as motivation, interests, and attitudes were not studied, while the material was adjusted to the competencies of the current semester.The results of various previous studies show that the Project Based Learning (PjBL) model is generally effective in improving the quality of student learning. (Maulidawati, 2024b) research found an increase in concept understanding with the average N-gain in the medium and highest categories in the classification aspect, while (Meylani et al., 2025b) emphasized that the effectiveness of PjBL is more optimal when combined with differentiated learning and technology that is adaptive to learning styles. Furthermore, (Pangestu et al., 2024b) and (Tangke et al., 2025a) prove that PjBL is able to significantly increase learning outcomes, creativity, motivation, and student involvement

compared to conventional learning. As for (Muchsinan et al., 2024), it shows that PjBL is superior in improving critical thinking and learning outcomes, even though there is no significant interaction with learning style. In contrast, (Kalsum, 2025) found that there is an influence of interaction between PjBL and learning styles, so that this model has been proven to be more effective in various types of learning styles than conventional learning. Based on the 6 previous studies above, the gap in this study lies in the lack of optimal integration between the Project Based Learning (PjBL) model, student learning style, and the use of multimodal media in one systematic learning design. Previous research has generally only tested the effectiveness of PjBL or the relationship between learning style and motivation separately, and has not been based on learning style mapping such as VARK. In addition, the implementation of differentiated learning in the context of the Independent Curriculum, especially in science subjects in rural elementary schools, is still limited and has not been studied empirically. So that the novelty of this research lies in the combination of PjBL with multimodal media designed based on the results of VARK learning style mapping, so as to produce more personalized and contextual learning to improve the learning outcomes of social studies students. This research is expected to enrich theoretical studies on the integration of multimodal media in the Project Based Learning (PjBL) model, especially in IPAS learning in elementary schools, as well as provide conceptual contributions related to improving student learning achievement. Practically, the results of this research can be a source of empirical data and reference for academics, as well as provide alternative learning strategies that are more varied and integrated for teachers and schools according to the needs of students. In addition, this study also provides experience for researchers and can be used as a reference for future research in developing similar studies in different contexts, materials, or educational levels.Based on the background described above, the problem in this study is as follows: is there a difference in the learning achievement of science science students in grade IV before and after the application of multimodal media in the Project based learning (PjBL) model? And is the application of multimodal media in the Project based learning (PjBL) model effective in improving the learning achievement of IPAS grade IV students at SD Negeri 1 Bodaskarangjati?

2. METHODS

This study uses a pre-experimental method with a One-Group Pretest-Posttest Design design to test the effectiveness of the use of video-based multimodal media Virtual Field Trip (VFT) in the Project Based Learning (PJBL) learning model on student learning achievement. The study was carried out in one group without a control class, with stages in the form of a pretest to measure students' initial ability, treatment through learning using VFT media, and a posttest to measure learning outcomes after intervention. Comparison of pretest and posttest scores was used to determine the increase in student learning achievement as a result of the treatment given. The research was conducted at SD Negeri 1 Bodaskarangjati in semester 2 of the 2025/2026 school year with the subjects of all grade IV students totaling 22 people. The sampling technique uses saturated sampling, so that the entire population is used as a research sample. The independent variable in this study is the use of VFT video-based multimodal media in PJBL learning, while the bound variable is student learning achievement in science science subjects measured through cognitive aspects. Data collection was carried out using test techniques in the form of multiple-choice questions given during the pretest and posttest, with instruments that have been tested for validity and reliability. Research design is a procedural guideline that regulates the stages of data collection and analysis. This study included an experiment with a pre-experimental approach, using a pretest–posttest group design. The stages include a pretest to measure students' initial abilities, the provision of treatment in the form of learning with Virtual Field Trip (VFT) video media, and posttest after treatment. The results of the pretest and posttest are then compared to see an increase or effect on student learning achievement. The data obtained were analyzed using descriptive and inferential techniques.

Descriptive analysis was used to describe the characteristics of the data, while inferential analysis included the Normalized Gain (N-Gain) test to measure the improvement in learning outcomes, the t-test to determine the significance of the effect of the treatment, and the Cohen's d test to determine the magnitude of the treatment effect. In addition, the quality of the instrument was also analyzed through validity, reliability (Cronbach's Alpha), and question difficulty index to ensure the accuracy and consistency of the data produced.

3. RESULTS AND DISCUSSION

3.1 Results

This is evidenced by the data on the average daily assessment of IPAS in table 1 (Hidayat et al., 2025) Relevant previous research has shown similar challenges in the form of low interest in learning students due to excessive use of gadgets, which has an impact on decreased concentration and learning outcomes (Nabila et al., 2025).

Table 1. Average Student Score

No	Grades	Pancasila	Matematika	Seni budaya	B. Indonesia	IPAS
1	Grade IV	88,4	88	87	94,5	82,9
2	Grade V	80,3	83,6	81,5	85,1	80,4
3	Grade VI	91,2	88,5	88,3	93,5	87,9

Source: Data processed by the author, 2026

Based on Table 1, the average score of IPAS subjects is consistently below the average of other subjects at each grade level, seen in grade IV with a difference in scores between Indonesian Language (94.5) and IPAS (82.9) of 11.6 points, and in grade V where IPAS is again the lowest with a score of 80.4; although in grade VI there was an increase to 87.9, the achievement remained below several other subjects such as Pancasila and Bahasa Indonesia, thus showing a pattern of repeated and low IPAS achievements compared to other subjects; Overall, this condition indicates that the IPAS learning process has not been able to produce equal learning achievements, which is caused by the incompatibility of teaching methods that are still conventional and one-way with the needs of diverse student learning styles, even though scientifically learning styles, both visual, auditory, and kinesthetic are important factors in academic achievement because each student has different preferences in processing information. So that the mismatch between instructional strategies and student learning profiles has an impact on low cognitive absorption and leads to low learning achievement (Rogowsky et al., 2020). This media is designed so that students can access the material according to their learning style, supported by mapping the learning style of grade IV through the VARK questionnaire as the basis for determining learning strategies (Annamalai & Sazan, 2025).

Table 2. VARK Test Mapping Results

Visual Learning Style	Auditory Learning Style	Kinesthetic Learning Style	Reading Learning Style
Student Name: 1. ANP 2. AFG 3. AA 4. HSF 5. NTR 6. NAF 7. SQK	Student Name: 1. ADB 2. AFSS 3. ATAK 4. YMI 5. GGR 6. HEA 7. RAA	Student Name: 1. ARA 2. LAEL 3. MMA 4. QAS 5. RTH 6. SH P 7. SAQ 8. YIA	0

Source: Data processed by the author, 2026

The results of the mapping of students' learning styles in Table 2 show a variation in learning tendencies in grade IV, with 36.4% of students being kinesthetic dominant and 31.8% visual and auditory, respectively, and there are no students with reading dominance, indicating that most students need visual involvement and direct activity in learning; This condition emphasizes the need for an approach that is able to accommodate different learning styles, because the use of one method alone has the potential to not meet the needs of all students, especially in understanding conceptual IPAS material, so a strategy that integrates various learning modalities, such as relevant multimodal media is needed to be tested for effectiveness in improving learning achievement, especially with the VARK (Visual, Auditory, Reading/Writing, and Kinesthetic) that can increase participation while improving student learning outcomes (Annamalai & Sazan, 2025). (Divinanto & Yudono, 2021) in their research, it is stated that in elementary school students, it is often found that Kinesthetic and Visual learning styles tend to be dominant, but are often overlooked by conventional teaching methods, which ultimately contribute to low learning achievement. To bridge this gap, the role of Multimodal Media is very important in strengthening VARK's learning style, especially when integrated in active learning models such as *Project-Based Learning* (PjBL). Previous research from (Maulidawati, 2024a) shows that students' understanding of concepts increases in various aspects. Based on the acquisition of N-gain in the class classifying 0.78, exemplifying 0.74, and summarizing 0.71 including the high category, explaining 0.56) and interpretation 0.38 medium category, while comparing 0.17 is in the low category. This increase was obtained through the implementation of Project Based Learning (PjBL) which is adjusted to students' learning styles. This research was carried out at SD Negeri 1 Bodaskarangjati with 22 subjects of grade IV students who have diverse backgrounds and cognitive abilities. The results of initial observations show that there is a gap between students' learning needs and learning practices that are still dominated by conventional approaches. The one-way learning process causes low student involvement and has an impact on the lack of optimal learning outcomes of IPAS studies. This condition is exacerbated by the incompatibility between students' learning styles and learning methods. The majority of students have kinesthetic, visual, and auditory tendencies, but applied learning has not accommodated this diversity. This emphasizes the urgency of implementing multimodal media in the Project-Based Learning (PjBL) model to create more adaptive and interactive learning.

The research instrument used in the form of 20 multiple-choice questions was first tested to ensure its quality. The results of the validity test showed that 13 questions were declared valid and 7 questions were invalid. Thus, only valid question items are used in pretest and posttest measurements because they are able to accurately represent students' cognitive abilities. Furthermore, the reliability test showed a Cronbach's Alpha value of 0.858 which means the instrument has a high level of internal consistency. In addition, the difficulty index analysis showed that most of the questions were in the medium category, with a few easy and hard questions. This shows that the instrument is of good quality and suitable for use in the research. The results of the pretest show that students' initial abilities are still diverse with a relatively even distribution in the high, medium, and low categories. The average pretest score of 68.53 with a standard deviation of 17.27 indicates a fairly high ability disparity between students. This condition reflects the lack of optimal conventional learning in accommodating students' learning needs. The implementation of PjBL-based learning with multimodal media was carried out in four meetings which included the orientation stage, project planning, implementation, to presentation and evaluation. Students are divided into groups based on learning styles (visual, auditory, kinesthetic) and produce products such as posters, videos, and physical works. This process encourages active student engagement through a combination of visual, auditory, and kinesthetic activities. Posttest results showed a significant increase in student learning outcomes. All students managed to get out of the low category, with the majority being in the medium

and high categories. The average score increased to 83.22 and the standard deviation decreased to 9.08, indicating a reduced ability gap between students. Hypothesis testing using the Paired Sample T-Test showed a significant difference between the pretest and posttest values with a significance value of < 0.05. The N-Gain analysis produced a value of 0.47 which is in the medium category, so that learning is stated to be quite effective in improving student learning achievement. In addition, the effect size analysis yielded a Cohen's d value of 1.39 which belongs to the very large category. This shows that the application of multimodal media in the PjBL model is not only statistically significant, but also has a strong practical impact in improving the quality of learning and learning achievement of IPAS studies students.

3.1 Discussion

3.1.1 Analysis of Improving IPAS Learning Achievement through Multimodal Media

Based on the results of the inferential statistical analysis that has been presented previously, there is empirical evidence that shows that there is a significant difference in the learning achievement of IPAS studies subjects of students between before and after the intervention is carried out. This success can be seen from a considerable increase in average scores, from 68.53 in the initial test to 83.22 in the final test. The significance value of <0.001, which is well below the threshold of 0.05, further reinforces that this increase in learning achievement is a real impact of the instructional treatment given, not caused by mere coincidence (Sugiyono, 2023). Based on the learning perspective, the increase in student achievement due to the use of multimodal media is able to reduce the cognitive load (mind load) of students when they understand environmental pollution material. In the first meeting, students were given a *Virtual Field Trip* (VFT) video showing in-depth visualization, accompanied by sound narration. This combination allows students to process information through two sensory channels at once, namely vision and hearing, simultaneously. Thus, the process of assimilating materials becomes lighter and more effective. These results are also in accordance with the *Cognitive Theory of Multimedia Learning* from (Mayer, 2021). The theory explains that combining images (visual) and sound (auditory) can strengthen students' memory in the long run and help them understand concepts more realistically. This is different from the one-way teaching method that has been more often used in grade IV. With the active involvement of students when observing natural phenomena virtually, they are able to connect abstract concepts into more meaningful understandings. These findings are empirically strengthened by the results of previous research conducted by (Maulidawati, 2024a) which explains that the application of a learning model that accommodates learning preferences makes a positive contribution to the stability of students' concept mastery. In the study, it was recorded that the normalized gain index was 0.47 which was included in the category of quite effective, and the value of the effect size was 1.39 which was included in the criteria was very large. These figures prove that multimodal interventions have absolute practical power in transforming academic achievement at the primary school level. The magnitude of the effect suggests that the shift in instructional pattern from conventional methods to immersive multimodal stimulation is able to provide substantial cognitive changes for all students.

Other research from (Tangke et al., 2025b) in their research to strengthen multimodal constructivism by proving the effectiveness of PjBL in IPAS studies learning in Indonesian elementary schools which has been rarely researched. These results provide quantitative evidence on the causal impact of PjBL on learning outcomes while validating that student-centered innovations, including the use of immersive multimodal media (visual and auditory), can be applied in traditional lecture-dominated education systems. Practically, the results of the study show that PjBL combined with a multimodal approach is successfully integrated into the existing curriculum and increases student engagement and achievement, thereby supporting the development of 21st century skills such as critical thinking, communication, and teamwork. Based on the results and empirical evidence, the success of improving learning achievement is very important because it is able to reduce the ability

gap between students which was previously a problem at SDN 1 Bodaskarangjati. Before the implementation of multimodal learning was implemented, there was a very striking difference in grades between students with the highest scores and the lowest scores. However, after students actively explore environmental issues through multimodal stimulation that blends images and sounds, the gap is successfully reduced. The final results achieved by students prove that they have grown and developed optimally according to their age stages. This success is also clear evidence that the school has carried out its mission well, which is to organize effective learning so that each student can develop themselves according to their respective intellectual abilities.

3.1.2 The Effectiveness of the PjBL Model in Accommodating Students' VARK Learning Styles

The dynamics of the escalation of learning outcomes in this study are not only based on the availability of multimodal media, but also driven by the flexibility of *the Project-Based Learning* (PjBL) model in facilitating the heterogeneity of student learning modalities that include visual, auditory, and kinesthetic aspects. The most substantive empirical finding in this study was the occurrence of a reduction in cognitive ability disparity among 22 grade IV students. This was identified from the sharp decrease in the standard deviation value which originally reached 17.27 at the initial test stage to 9.08 at the final test stage. According to the researcher's analysis, this narrowing of the gap proves that the interventions provided are able to reach the entire spectrum of students' learning styles in an inclusive manner, so that students who initially have serious cognitive barriers are able to achieve the set competency standards. This effectiveness is rooted in the implementation of the multimodal action phase which was carried out intensively at the second and third meetings, precisely on March 9 and 13, 2026. The researcher applied a differentiated learning strategy by dividing the working group based on the tendency of how each individual processes information. The kinesthetic group, which represents the largest population in the class, at 36.4 percent, is facilitated through physical activity in the form of modifying garbage cans from used gallons as a real solution to waste pollution. These manipulative activities allow kinesthetic students to build an understanding of concepts through hands-on experience, which has been neglected by conventional one-way instructional patterns. This condition is in harmony with the view (Tomlinson, 2017) that learning that is responsive to the learning profile of students will create a more adaptive instructional environment and improve overall cognitive engagement. On the other hand, the needs of 31.8 percent of visual learners and 31.8 percent of auditory learners are accommodated through the work of educational poster projects and the production of demonstration videos on the impact of environmental pollution. The researcher positions himself as a facilitator who provides stepwise assistance or scaffolding to ensure that each group is able to transform theoretical understanding into a quality functional product. This process proves the theory of constructivism which states that students no longer position themselves as passive recipients of information, but rather become active subjects in constructing their own knowledge based on interaction with the media and their social environment.

Empirically, the success of the PjBL model in serving this diversity of learning styles reinforces the findings (Meylani et al., 2025a) shows that differentiated learning strategies and technology integration are able to increase the effectiveness of PjBL in diverse students. The study also emphasized the importance of developing adaptive PjBL models, especially to accommodate auditory learning styles and reading/writing. Findings from (Annamalai & Sazan, 2025) indicates a predominance of visual and auditory learning style preferences, with moderate support on kinesthetic and writing activities, while reading is relatively less desirable. Qualitative data also reinforce that the use of visual media, verbal explanations, and hands-on practical activities play a role in increasing student understanding and involvement. So that from this empirical evidence, it is in line with the VARK approach which emphasizes learning adjustments based on students' learning preferences, namely visual, auditory, reading/writing, and kinesthetic, so that the implementation of multimodal

PjBL can accommodate the diversity of student characteristics and create more inclusive and effective learning. In addition, the effect size value of 1.39 which was classified as very large in this study showed that interventions that considered individual characteristics had a strong influence on improving academic achievement. The implementation of learning that accommodates a variety of VARK learning profiles allows visual, auditory, reading/writing, and kinesthetic needs to be facilitated more proportionally, so that each student gets learning opportunities that suit their preferences. The equitable distribution of cognitive quality that has been achieved also shows that the implementation of learning has supported the school's mission in optimizing the development of each student. Thus, the multimodal PjBL model can be seen as a credible instructional alternative to answer the challenge of learning heterogeneity at SDN 1 Bodaskarangjati.

3.1.3 Implementation of Differentiated Learning and Achievement of Profil Pelajar Pancasila

The integration of multimodal media within the framework of the Project-Based Learning (PjBL) model at SDN 1 Bodaskarangjati has substantively realized the principle of differentiated learning which is the main pillar of the Independent Curriculum. Based on instructional observations carried out intensively from the first to the fourth meeting, precisely in the range of March 7 to March 14, 2026, the researcher identified a significant transformation of learning behavior in students. Field facts show that this learning design is not only oriented to the cognitive aspect, but also simultaneously strengthens the dimension of the Profil Pelajar Pancasila, especially in the aspects of critical reasoning and mutual cooperation. This is supported by the data recorded in Appendix 7 which shows the escalation of independence and the active involvement of 22 grade IV students during the intervention process. Such character transformations are theoretically rooted in product differentiation strategies that provide autonomy for students to choose cognitive expression pathways according to their VARK learning modalities. The kinesthetic group that performed a real action of modifying used gallons into character trash cans at the third meeting (March 13, 2026) was shown to have higher intrinsic motivation because they interacted directly with physical objects to solve pollution problems. Meanwhile, visual and auditory groups explore their creativity through the production of educational posters and waste impact demonstration videos. This condition is in harmony with the view (Tomlinson, 2017) that a learning environment that is responsive to the uniqueness of the individual will create an adaptive and inclusive instructional climate. The researcher observed that the critical dialectic that emerged during the orientation phase using Virtual Field Trip (VFT) video became a trigger for students to hone critical reasoning in analyzing environmental problems around the school objectively.

The long-term impact of the implementation of this strategy is the creation of a collaborative and student-centered learning culture. The circulation of responsibilities in groups, such as the activity of recording the chronology of project work on the monitoring table in LKPD in turn, has strengthened the spirit of student mutual cooperation. In line with the findings of Alimun dkk., (2025) which shows that the application of the PjBL model increases student involvement, discussion activity, and collaboration, thereby having an impact on improving learning outcomes and understanding of Pancasila values. This model also helps students relate the concept of Pancasila to real situations, so that it is effective in improving learning outcomes as well as shaping students' character. Other findings from (Safitri et al., 2025) emphasized that the implementation of PjBL is effective in improving students' collaboration skills, creativity, independence, and love for local culture. This shows that PjBL can support the realization of the Profil Pelajar Pancasila dimension, although it still requires improvements in the aspects of socialization, time management, and the provision of facilities. These findings are proof that the PjBL model creates a more meaningful educational atmosphere and matures students' social-emotional skills. With the achievement of this character strengthening, the researcher has conclusively fulfilled the second mission of SDN 1 Bodaskarangjati to organize an effective learning process so that each individual can develop

optimally. This success confirms that the synergy of multimodal media and the PjBL model is a credible instructional solution to produce a generation of environmental heroes who are academically intelligent and character-resilient in accordance with the Profil Pelajar Pancasila.

4 CONCLUSION

The application of multimodal media in the Project-Based Learning (PjBL) model has been proven to provide a very significant increase in the learning achievement of IPAS students in grade IV of SD Negeri 1 Bodaskarangjati. This is shown by the stark difference between pretest and posttest results, with the average score increasing from 68.53 to 83.22 as well as a decrease in standard deviation which indicates a reduction in the ability gap between students. Valid and reliable research instruments also strengthen these findings, while the results of statistical tests show the effectiveness of learning in the medium category with a very large influence size. In addition to improving academic achievement, the integration of multimodal media in PjBL is also able to create more inclusive learning and adaptive to various student learning styles. This approach not only reduces cognitive disparities, but also encourages character strengthening in the Pancasila Student Profile, especially in the aspects of critical reasoning and mutual cooperation through project-based activities. Overall, this model has proven to be effective in improving the quality of learning while supporting the development of student competencies holistically. The findings of this study theoretically confirm that the integration of multimodal learning, including the use of Virtual Field Trip (VFT), effectively supports the Cognitive Theory of Multimedia Learning through the optimization of dual information processing so as to be able to reduce the cognitive burden of students in understanding abstract concepts, while practically demonstrating that differentiation of project products (such as posters, videos, and recycled works) is an adaptive strategy to accommodate the diversity of styles learning students and encouraging a shift in the role of teachers to responsive facilitators. Therefore, it is recommended that teachers consistently apply multimodal media based on student learning style mapping, schools provide adequate policy support and technological infrastructure, and further researchers develop studies with stronger experimental designs and wider scope of materials and variables to strengthen the validity and generalization of findings.

5 ACKNOWLEDGEMENTS

This article was compiled as one of the requirements for graduating from the undergraduate program at the University of Muhammadiyah Purwokerto. The researcher expresses his deepest gratitude to the supervisor who has provided direction, input, and guidance during the research and writing process of this article. Gratitude was also addressed to the fourth grade students of SD Negeri 1 Bodaskarangjati and the school who have provided the opportunity and full support in the implementation of the research. In addition, the researcher stated that the use of Microsoft Copilot's artificial intelligence (AI) technology in this writing process is limited to the preparation of the writing framework and the translation of the manuscript into English. All analysis, data interpretation, and conclusions are the result of the researcher's own work.

6 REFERENCES

Alimun, N. M., Pomalingo, S., Putri Ismail, R., & Guru Sekolah Dasar, P. (2025). Meningkatkan Hasil Belajar Pkn Tentang Penerapan Nilai- Nilai Pancasila Melalui Model Project Based Learning (Pjbl) Di Kelas Iv Sdn 8 Kabila Kabupaten Bone Bolango. *SINERGI : Jurnal Riset Ilmiah*, *2*(3), 1362–1374. https://doi.org/10.62335/SINERGI.V2I3.1013

Ambarsari, R. Y., Harbono, Respatiningrum, R. A., & Endrawan, R. (2025). Tantangan Dan Peluang Implementasi Pendidikan Karakter Di Sekolah Dasar: Perspektif Guru Dan Orang Tua. *Elementary School*, *12*(2), 852–856.

Annamalai, , Nagaletchimee, & Sazan, D. (2025). Understanding Students' Learning Preferences: The Use of VARK-Based Strategies in the LMS. *Educational Process International Journal*, *19*(1). https://doi.org/10.22521/edupij.2025.19.574

Divinanto, K., & Yudono, A. (2021). Preferensi Modalitas Belajar Vark Siswa Sekolah Dasar Kelas III. *Jurnal Ilmiah Kontekstual*, *3*(01), 26–32. https://doi.org/10.46772/Kontekstual.V3I01.480

Fauziyah, S. H., & Yuniarti, Y. (2024). Penerapan Pendekatan Multimodal dalam Pembelajaran Abad 21 di Sekolah Dasar: Sebuah Tinjauan Pustaka. *Jurnal Lensa Pendas*, *9*(2), 323–343. https://doi.org/10.33222/jlp.v9i2.3699

Hidayat, A., Syarifuddin, S., & Safitri, L. A. D. (2025). Bagaimana Tantangan Pembelajaran Peserta Didik Di Sd Negeri Repok Puyung Pada Era Generasi Revolusi Industri. *At-Ta'dib: Jurnal Pendidikan Agama Islam*, *5*(01), 1–13. https://iaiqh.ac.id/ejurnal/index.php/at-tadib/article/view/215

Kemendikbudristek, B. S. K. dan A. P. (2024). *Kajian Akademik Kurikulum Merdeka*.

Lailiyah, N., & Mas'ud, S. (2024). Analisis Tantangan Guru dalam Menerapkan Pembelajaran Berdiferensiasi pada Kurikulum Merdeka di Sekolah Dasar. *Journal on Teacher Education*, *6*(2), 1–12. https://doi.org/10.31004/JOTE.V6I2.38501

Maulidawati, Y. (2024). *Penerapan Model Project Based Learning Berbasis Gaya Belajar Siswa Untuk Meningkatkan Pemahaman Konsep Pada Materi Suhu Dan Kalor* [Skripsi, Universitas Malikussaleh]. https://rama.unimal.ac.id/id/eprint/5983/

Mayer, R. E. . (2021). *Multimedia learning* (3rd ed.). Cambridge University Press. https://books.google.com/books/about/Multimedia_Learning.html?hl=id&id=jMfjDwAAQBAJ

Meylani, N., Hidayat, U. S., Lyesmaya, D., & Mulyani, A. (2025). *Systematic Literature Review: Experimentation of the Project-Based Learning Model on the Learning Outcomes of 5th Grade Elementary School Students in Terms of Learning Styles*. 172–185. https://doi.org/10.2991/978-2-38476-450-1_12

Mustika, D., Zahra, M. A., Putri, D., Daniela, A. A., Anjani, A., & Wulan, W. (2025). Systematic Literature Review: Efektivitas Pembelajaran Tematik di Sekolah Dasar. . *Consilium: Education and Counseling Journal*, *5*(2), 935. https://doi.org/10.36841/consilium.v5i2.6516

Nabila, N., Febriani, N., Adrias, A., Zulkarnaini, A. P., & Padang, U. N. (2025). Studi Literatur: Dampak Penggunaan Gadget Pada Minat Siswa Dan Hasil Belajar Peserta Didik Di Sekolah Dasar. *Jurnal Pendidikan Transformatif (JPT)*, *4*(2), 147–153. https://doi.org/10.9000/JPT.V4I2.2128

Pangestu, K., Malagola, Y., Robbaniyah, I., & Rahajeng, D. (2024). The Influence of Project Based Learning on Learning Outcomes, Creativity and Student Motivation in Science Learning at Elementary Schools. *Jurnal Prima Edukasia*, *12*(2), 194–203. https://doi.org/10.21831/jpe.v12i2.63208

Pratiwi, N. Wyn. D., Sri Asri, I. G. A. A., & Kristiantari, M. G. R. (2018). Hubungan Motivasi Dengan Prestasi Belajar Siswa. *International Journal of Elementary Education*, *2*(3), 192. https://doi.org/10.23887/ijee.v2i3.15958

Rogowsky, B. A., Calhoun, B. M., & Tallal, P. (2020). Providing Instruction Based on Students' Learning Style Preferences Does Not Improve Learning. *Frontiers in Psychology*, *11*, 511773. https://doi.org/10.3389/fpsyg.2020.00164

Safitri, J. A., Asril, & Jamurin. (2025). Implementasi Project Based Learning Dalam Kegiatan Proyek Penguatan Profil Pelajar Pancasila Di Sma N 4 Solok. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, *10*(03), 266–274. https://doi.org/10.23969/JP.V10I03.32838

Sari, D. P. (2021). *Hubungan Gaya Belajar dan Motivasi dengan Hasil Belajar Peserta Didik Kelas V Sekolah Dasar* [Skripsi]. Universitas Lampung.

Sugiyono. (2023). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. In *Alfabeta* (5th ed.). Alfabeta. https://fliphtml5.com/cyqfr/jppo/Metode_Penelitian_Kuantitatif%2C_Kualitatif%2C_dan_R%26amp%3BD/

Syafriani, D., Sahputri, A. A., Alyanti, D., Ramadani, D. S., & Pardosi, K. T. (2025). Pembelajaran Kurikulum Merdeka di Indonesia. *Jurnal Akuntansi Hukum Dan Edukasi*, *2*(1), 22–31. https://rayyanjurnal.com/index.php/jahe/article/view/5753

Tangke, F. N., Nashrullah, N., Herlina, H., Muchdar, M., & Wilade, S. (2025). Project-Based Learning as an Innovative Approach to Improve Elementary Social Studies Learning Outcomes. *Journal of Innovation and Research in Primary Education*, *4*(4), 2702–2712. https://doi.org/10.56916/JIRPE.V4I4.2006

Tomlinson, C. A. . (2017). *How To Differentiate Instruction In Academically Diverse Classrooms* (3rd ed.).

Wardana, M. Pd. I., & Djamaluddin, S. Ag. , S. Sos. , M. Pd. I. Dr. A. (2020). *Belajar Dan Pembelajari (Teori, Desain, Model Pembelajaran dan Prestasi Belajar)*. Kaaffah Learning Center.