The Effect of Manipulative Media on Understanding the Concept of IPA in Elementary School

Nabila Nurul' Ain[1], Candra Utama[2]

[1]State University of Malang
[2]Department of Elementary School Teacher Education, State University of Malang, Indonesia
*email: nabila.nurulain.2301516@students.um.ac.id.

Keywords

Manipulative media, conceptual understanding, metamorphosis, science, elementary school.

Abstract

This study aims to describe the effect of using manipulative media in the form of dioramas on the concept of metamorphosis in grade III students of Wirobiting 1 Elementary School. This study uses a qualitative approach with a case study. The subjects of this study consisted of one grade III teacher and five students selected based on their active involvement in science learning. Data collection techniques used include observation, interviews and documentation of test scores. The results of this study indicate that the use of diorama media is able to improve students' understanding of the concept of butterfly and frog metamorphosis. During the learning process, students were more enthusiastic, actively observed, discussed, and were able to re-explain the concepts that had been learned. The average student score increased from 65 (pre-test) to 85 (post-test), which indicates that there was a significant increase in understanding. The teacher also said that the use of diorama media made it easier to convey abstract material in a concrete way. Thus, manipulative media can be used as an effective learning strategy to improve understanding of science concepts in elementary schools.

1. Introduction

A general understanding of the concept of IPA is an ability where individuals can understand, explain, and relate concepts and facts directly related to the universe. Natural science is a systematic knowledge, and in general it is limited to natural symptoms according to Wahyana/Trianto (2012:136). Subsequently, Sujana (2013) stated that science is a science that studies the events of natural events.

Elementary school science studies often face challenges due to the many abstract concepts that are difficult for students to understand. Concepts in which such as gravitational forces, respiratory organ systems, life cycles or metamorphoses, water cycles or energy changes are not always directly observable, so that learning that was originally only theoretical tends to be less effective. Students also need concrete experiences to better understand and internalize these concepts.

The use of manipulative media can also be one of the solutions that can help to overcome these challenges. However, with a medium of concrete objects that can be seen, touched, and manipulated, students can also relate theory to real experience, so that the understanding gained by students of the science concept is better and more effective. In addition to increasing involvement in learning, manipulative media can also help to strengthen the memory of students' understanding of the material taught.

Manipulative learning media are learning tools used in learning activities with the aim of helping students actively explore ideas by students as well as helping to clarify the concept or understanding of examples of objects (Lusbiantoro & Selviana, 2022). However, many students still have difficulty understanding the abstract concepts taught, especially in interactive learning methods and not involving hands-on experience. With manipulative media, students can relate abstract concepts with direct experience, so learning can become more meaningful.

Nevertheless, the effectiveness of manipulative media in increasing understanding of the IPA concept still needs to be examined further. Several studies have shown that manipulative media can also improve students' understanding, while other studies have suggested that the results may

depend on other factors, such as teachers' skills in using them and readiness for students in learning, as well as on the subject. Therefore, this study aims to examine how manipulative media influence the understanding of the concept of science in elementary schools.

This study aims to analyze the effectiveness of the use of manipulative media in an effort to improve understanding of the concept of science in elementary school students. This manipulative medium is also a tool that allows students to interact directly with learning objects, so they can also understand the concept more concretely and deeply. With this, involving direct experience, this media is also believed to be able to reduce misconceptions and increase students' understanding of science materials.

In addition, this research can also be aimed at explaining how manipulative media work mechanisms in the IPA learning process. This understanding of the work mechanism is also important to know how manipulative media can directly facilitate the construction of students' knowledge, as well as how teachers can also integrate it more effectively into learning. Thus, the results of this study are expected to provide insight for educators in selecting and implementing more innovative and experience-based learning strategies directly

2. Method

This study used a qualitative approach with case study type, which aims to describe the effect of manipulative media use on understanding the concept of elementary school students' IPA. This research was conducted at Wirobiting State Elementary School 1, located in Prambon District, Sidoarjo Regency. The school was chosen deliberately with consideration for having applied thematic IPA with the use of manipulative media, such as dioramas and explaining the process of metamorphosis.

The subjects in this study consisted of third-grade teachers who taught science subjects and had used diorama media in the study of metamorphosis topics and 5 third- grade students who were selected based on their active involvement during science studies with manipulative media. The selection of class III as a subject in this study was based on the following considerations:

1. The topic of butterfly and frog metamorphosis is part of class III primary school IPA material that requires gradual visualization and observation of the process.
2. The use of diorama media makes it easier for students to understand the stage of change in living things concretely.
3. Class III students who are at the stage of concrete operational cognitive development (according to the piaget) make it easier for them to understand scientific concepts through real and visual media.

Table 1. Study Observation Sheet

No.	Observed Aspects	Indicators	Description (✓/ X)	Note
1.	Student activities	Students actively hold and try manipulative media		
2.	Student response	Students ask media-related questions		
3.	Conceptual understanding	Students can re- explain the concept of IPA after practice		
4.	Teacher strategy	Teachers explain how to use the media directly		
5.	Class participation	Students engage in group discussions while using the media		

2.1. Method 2

In this study, data analysis was conducted following a model proposed by Miles & Huberman (1994), which included three main stages of data reduction, data presentation, and conclusions/verification. In the data reduction stage, information obtained from the observation/interview sheet is selected and grouped by key themes such as student activities, student responses, teacher strategies, and understanding of the IPA concept of this process is conducted in a balanced manner from the beginning of data collection to the end of report preparation. The stage of presenting the data, in compiling the reduced data into a form that is easy to understand and further analyze. The data is presented through observation results tables showing student and teacher activities, as well as the thematic narratives of teacher and student interviews. This presentation is intended to show clearly the relationship between the use of manipulative media such as dioramas and the increased understanding of science concepts by students. The stage of drawing conclusions, obtained by interpreting the presented data and associated with the research focus. To strengthen the validation of the findings, verification was carried out through triangulation of data, by comparing and confirming the results of observations and interviews, and through discussions with related parties.

3. Results and Discussion

This study was conducted in class III of Wirobiting State Elementary School 1, with the aim of finding out the effect of using diorama media on understanding the concept of metamorphosis in students. The diorama medium used can describe visually and more concrete stages of butterfly and frog metamorphosis.

This study used data collection techniques by conducting observations, interviews, documentation of value results. And by using research instruments to support the data collection process, the following are the instruments used: metamorphosis in students. The diorama medium used can describe visually and more concrete stages of butterfly and frog metamorphosis.

This study used data collection techniques by conducting observations, interviews, documentation of value results. And by using research instruments to support the data collection process, the following are the instruments used:

Table 2. Observation study sheet.

No.	Observed Aspects	Indicators	Description (✓/ X)	Note
1.	Student activities	Students actively hold and try manipulative media	✓	After being shared and briefed by the teacher, the student seemed enthusiastic about holding and observing closely. Enthusiasm remains conducive
2.	Student response	Students ask media-related questions	✓	Students actively ask questions about what they think is unclear and teachers provide assistance to each group
3.	Conceptual understanding	Students can re-explain the concept of IPA after practice	✓	It was given time for each group to present the results of their group's work
4.	Teacher strategy	Teachers explain how to use the media directly	✓	The teacher gave an explanation of the use and work method at the beginning after the teacher divided the groups and divided the media
5.	Class participation	Students engage in group discussions while using the media	✓	The LKPD and the media were given as groups so that cooperation between group members and the division of labor was established by themselves

3.1. Results and Discussion 2

Teacher Interview Guidelines

Respondent Identification:

Name : Enung Megawati S. Pd
Class Teacher : III
Long service : 16 Year

Table 3. Observation study sheet.

No.	Question	Answer	Conclusion
1.	What kinds of manipulative media have you/Mom used in science studies in class?	Real-life media, dioramas (metamorphosis dioramas of butterflies, frogs)	Teachers mentioned that the types of manipulative media used in science studies in class included original material media and dioramas, such as butterfly and frog metamorphosis dioramas, to help students understand concepts taught more concretely and visually.
2	How do students respond before and after to the use of manipulative media when learning the concept of IPA?	Before: When children are explained the concept, for example with the topic of butterfly metamorphosis, children will only imagine, looking at the picture in the support book. Elementary school age children When teachers explain the concept so that students can understand more by explaining concretely (real) it can be seen and easily understood according to the level of thinking of children who are still concrete. After: When students are given manipulative media, they must feel happy and interested because in their minds they are not forced to study but they feel like they are playing an unknowingly game that they are learning and discovering concepts independently of what they are learning. Learning with interesting media then the child is brought to a learning atmosphere while playing so that it will be a meaningful learning.	The use of manipulative media in learning has been shown to have a positive impact on elementary school students' understanding. Before the implementation of the media, students tend to only be able to imagine the concept described by teachers through pictures in books, which are still abstract and not in accordance with the child's concrete stage of thinking development. However, after being given media that can be manipulated directly, students become more enthusiastic and actively involved in the learning process. They feel like they're playing, so learning becomes more fun and doesn't feel burdensome. Through this approach, students can understand and discover concepts independently, which ultimately create a more meaningful and effective learning experience.

No.	Question	Answer	Conclusion
3	According to Father/Mother, how effective is manipulative media in helping students understand the abstract concept of science?	For teachers: using manipulative media, teachers will be easier to give students concrete pictures, more concretely in planting abstract concepts, making them easier to understand For students: Manipulative media becomes a bridge for students to understand abstract concepts more clearly approaching real objects that are impossible to present in class. With manipulative media, students will be more interested so that they can increase their learning motivation.	The use of manipulative media is considered very effective in supporting the learning process in elementary schools. For teachers, this medium makes it easier to convey abstract concepts more concrete and concretely, making it easier for students to understand the material. Meanwhile, for students, manipulative media serves as a bridge to connect abstract concepts with real experience. This not only helps understanding, but can also increase learning interest and motivation because students feel more involved and interested in the learning process.
4	Is there a difference in understanding th e concept of science between students who study with manipulative media and those who do not?	There are. Students who learn the concept of ipa with manipulative media are more interested, by being interested (joyful learning), students with their own consciousness (meaningful learning) will develop a desire to find the concept of ipa. Students not only memorize but they understand (meaningful).	The use of manipulative media in science learning has been shown to increase students' interest and association. When students are happy and interested (joyful learning), they are encouraged to learn consciously and meaningfully (meaningful learning). This process encourages students not only to memorize, but to truly understand concepts learned through a more profound and enjoyable learning experience.
5	What are the challenges that you/Mother faced before and after in the use of manipulative media in class?	Before: Preparing the interesting media that fit the age of children "now so that teachers are required to continue to upgrade themselves with the development of the times. After: • Teachers must be fully present to assist students, direct them to provide guidance and to achieve the goals of learning • Compiling/drawing conclusions together on what has been learned and emphasizing the concepts being studied • Provide follow-up so that the understanding of the concepts that have been built does not break up only when studying at school but can relate these concepts to daily life.	In today's learning, teachers are required to continue to adapt to the development of the times, including in preparing relevant and interesting learning media for students. After the learning process, the teacher's role does not stop at submitting material, but must also be fully present in accompanying students, providing direction, and ensuring that the learning objectives are achieved. In addition, teachers need to invite students to draw up conclusions together and re-emphasize the important concepts they have learned. Follow-up of learning is also important, so that students' understanding does not stop in class alone, but can be linked to real experiences in everyday life.
6.	How did you/Mother respond to the use of manipulative media in science studies?	It is helpful in concretizing abstract concepts so that they are more real, close and easy to understand.	Manipulative media is helpful in concretizing abstract concepts. With the help of this medium, concepts become more real, close to the student's experience, and much easier to understand according to their cognitive

No.	Question	Answer	Conclusion
			development stage.
7.	According to you/Mom, does this media affect students' understanding? Why?	Very influential, because the media is a tool used to make it easier for teachers to convey abstract concepts seem real and or impossible to present in class.	The medium of learning has a significant influence in the process of delivering material, particularly in explaining abstract concepts. Through the use of the media, teachers can present more concrete and concrete representations, even for difficult or impossible things to present directly in the classroom, making it easier for students to understand the material more deeply.
8.	How do you/Mrs evaluate the successful use of manipulative media in science learning?	Viewing and observing students' responses during the learning process in class by using the media, giving tests to students. It can be by oral test or written test, by asking for student feedback while participating in learning activities	Evaluation of the effectiveness of media use in learning can be done by observing the student's response during the learning process, as well as by providing tests, either verbally or in writing. In addition, teachers can also request direct feedback from students to find out the extent to which the media is helpful in understanding the material learned.
9	Do you plan to continue using manipulative media in the future? Why?	Yes, but taking into account students' learning needs and styles, as the use of manipulative media is tailored to the material or concepts to be studied also takes into account student learning styles that are not the same between students and one another.	The use of manipulative media is indeed important and recommended in learning, but it needs to be adapted to each student's needs and learning style. Each student has a different way of learning, so media selection must consider relevance to the material taught and its compatibility with the characteristics of the student, so that learning can run effectively and optimally.
10	What do you/Mother suggestions for other teachers who want to start using manipulative media in science learning in elementary school?	Many manipulative media have actually implemented it, but teachers continue to upgrade knowledge so that the media presented to students is the right media in the era where students were.	Although the use of manipulative media has been widely implemented, teachers need to keep up to date with their knowledge and skills in order to present the media that fits the times. Thus, the media used in learning will be more relevant and interesting to students, in line with their current needs and trends.

3.2. Results and Discussion 3

Student Interview Guildelines

Identification of Respondent:
Name : Gibran
Class : III

Table 4. Observation study sheet.

No.	Question	Answer	Conclusion
1.	What difficulties did you experience while studying science before manipulative media became available?	It's hard to understand just reading and listening to the teacher explain.	Students find it difficult to understand the material if they rely solely on reading or explanation from the teacher verbally. More interactive and contextual methods are needed to improve their understanding.
2.	What do you think of science lessons before using the media?	It's hard to understand.	Students revealed that the study of science before using the media was difficult to understand, suggesting the need for a more concrete and effective approach to material delivery.
3.	Do you understand science lessons before teachers use manipulative media?	Sometimes understanding is hard to understand.	Students stated that understanding of IPA learning prior to the use of manipulative media varies, sometimes they can understand the material well, but sometimes also find it difficult.
4.	Have you ever learned science by using tools or real objects? Tell me!	Once, in the past, the teacher once asked me to make *sticky notes* on the growth of living things, and the teacher asked me to make dioramas of frog metamorphosis, butterfly.	Students revealed that they had studied science using props or real objects, such as when the teacher asked them to make *sticky notes* about the growth of living things and the metamorphosis dioramas of frogs and butterflies. The use of this concrete medium helps students better understand the concepts taught.
5.	Have you ever learned science by using tools or real objects? Tell me!	Dioramas of butterfly metamorphosis, frogs.	Students mentioned that the manipulative medium they used when studying science in class was a diorama of butterfly and frog metamorphosis, which helped them understand these natural processes more visually and concretely.
6.	Do you think studying science with the media is fun or not? Why?	It's fun, it's like playing games because shearing colors stick.	Students feel that learning science with manipulative media is fun, because the process feels like playing. Activities such as shearing, coloring, and sticking provide a more enjoyable and Interesting learning experience for them.
7.	Does that manipulative media make it easier for you to understand science lessons? Why?	Yeah, more clearly the order of the butterfly's life cycle.	Students feel that manipulative media make it easier for them to understand science lessons, as they provide a clearer picture, especially in explaining the order of the butterfly's life cycle.
8.	Which is easier, learning science with the media or just listening to teachers tell stories? Why?	It's more fun to study with the media while playing like you're not studying.	Students prefer to learn science using the media, because the learning process feels more fun and like they're playing, so they

No.	Question	Answer	Conclusion
			don't feel burdened like they're just listening to teachers tell stories.
9.	Do you want to study science with that manipulative medium again? Why?	Yeah, because like playing games, I color, I cut, I make the life cycle of butterflies and frogs like playing puzzles.	Students want to study science with manipulative media again because these activities feel fun, such as playing. They enjoy such activities as coloring, shearing, and compiling the life cycle of butterflies and frogs, which for them are similar to playing puzzles.

During the study of butterfly metamorphosis students were enthusiastic about trying dioramas. Some students also seem curious and ask what the order of the butterfly's life cycle is. The teacher also explained patiently and repeatedly explained about the life cycle of butterflies. A conducive and interactive class atmosphere.

From the results of a class III teacher interview, it was found that the use of manipulative media such as diorama metamorphosis can help students understand the concept of butterfly metamorphosis more quickly. This data is grouped under the theme: "conceptual understanding through concrete visualization".

Table 5. Comparison of Understanding IPA Concepts before and after media use

No.	Student Name	Before Media (Test Score)	After Media (Test Score)	Description
1.	Abiyu	50	80	Significant improvement
2.	Gibran	60	85	Better understand butterfly metamorphosis

Narrative Quote Teacher interview:

"Teachers stated that the use of manipulative media, such as dioramas, helps elementary school students understand concepts more concretely and pleasantly. Previously, students only imagined the concept of a picture in a book, but with real media, they could learn while playing. This makes students more interested, not feel compelled to learn, and independently discover learned concepts, thus creating meaningful learning".

In this study, it can be seen that the importance in the use of manipulative media in the study of science is very necessary. With the existence of manipulative media students can also feel happy and interested in learning because they are not forced to do their studies.

During the observation, Interviews and documentation can be seen that the observation shows students who are very active when using the media. The results of the student interview also revealed that they "would rather study with the media while playing like they were not studying "

The teacher stated that:

"Yes, yes, I did say that concrete media makes it easier for children to understand the material about butterfly metamorphosis very helpful in concretizing abstract concepts so that they are more real, closer and easier to understand".

After conducting the learning process, students showed high enthusiasm when interacting with diorama media. They are active in observing, discussing and explaining the stages of metamorphosis presented. Teachers also become easier to convey material due to the presence of visual aids from dioramas

Student interview:

"It's hard to understand if you're just reading and listening to the teacher explain, but you already know it's fun, like playing games because you're cutting colors stick."

Teacher interview:

"Using manipulative media teachers will be easier to give students vivid images, more concretely in planting abstract concepts, making them easier to understand. "

Tests given before and after in the use of media show a significant improvement in the understanding of grades. The average student's score increased from 65 (pre - test) to 85 (post - test), indicating that with the presence of a medium of learning dioramas it becomes more effective in improving the understanding of the concept of metamorphosis.

The results of this study are in line with previous case studies that show that diorama media can improve understanding of the concept of science in elementary school students. Diorama as a manipulative medium can provide a concrete learning experience, in accordance with the cognitive development stage of grade III students which is in the concrete operational stage according to piaget theory, students are in the concrete operational phase, and students are in the concrete operational phase. where they are also easier in understanding concepts that are concrete and visual than abstract concepts.

In the context of the study of metamorphosis, dioramas serve as effective visual tools in describing the process of gradually changing the shape of living things. This medium allows students to see and understand more clearly every stage of metamorphosis that occurs in living things such as butterflies and frogs. The use of such media supports the results of previous studies that show that dioramas are very effective in improving students' learning outcomes, especially in materials involving concepts of change or life cycle, such as metamorphosis.

The use of dioramas in the study of metamorphosis can provide vivid visualizations in helping students understand the process of gradually changing the shape of living things. This can support the findings of previous studies that have suggested that diorama media is very effective in improving student learning on metamorphosis materials. Dewi and Ibrahim

(2019) emphasized the importance of understanding concepts to avoid misconceptions in the study of science in elementary school.

In addition, the use of visual media such as dioramas can increase students' emotional involvement and learning motivation in learning. Ningsih et al. (2024) in his literature study stated that simulation and visual media can improve understanding of science concepts as well as student involvement in learning. By giving students the opportunity to interact directly with the learning medium, they are more motivated and interested in the subject matter taught, which in turn has a positive effect on their learning outcomes. Different from Octavia et al's research. (2023) which only examines the impact of visual media on the results of IPA of Grade IV students of Public Elementary School 1 Ollo, this study also highlights students' emotional involvement in IPA learning.

Thus, the use of diorama media in the study of science on metamorphosis materials in grade III elementary school can be considered an effective strategy to improve understanding of concepts in students. It can not only increase the understanding of abstract concepts, but also play a role in creating a more enjoyable and meaningful learning experience for students. Therefore, the integration of manipulative media such as dioramas in IPA learning is strongly recommended to continue to be applied and developed, in order to support students' optimal cognitive development

3.3. Conclusion

Based on the results of research conducted in class III of Wirobiting Elementary School 1, it can be concluded that the use of manipulative media has a positive effect on the understanding of the IPA concept of elementary school students. This manipulative media helps students connect abstract concepts to become more concrete through direct experience, thus facilitating the understanding process of students.

Through observation and interviews, diorama media can increase students' interest in learning and involvement in a learning process. Students became more enthusiastic, active in discussion and able in providing explanations for butterfly and frog metamorphosis significantly improved the understanding of the concept of science in grade III students. Visualization of the stages in metamorphosis through dioramas helps students understand the process of changing animal shapes concretely and thoroughly.

In addition, the media diorama not only improves students' cognitive aspects, but also has a positive impact on emotional involvement and learning motivation. This is in line with the findings that show that visual and simulation media can increase students' learning motivation and interest so that the learning process becomes more effective and enjoyable.

The teacher also stated that manipulative media enriched teaching methods and provided ease in explaining IPA material. Thus, manipulative media can be used as an alternative to effective learning strategies in increasing students' understanding of science materials. Manipulative media can be used as an alternative to effective learning strategies in increasing students' understanding of science materials. Subsequent studies can study the application of similar media to other topics or higher levels to see their effectiveness and relevance in different contexts.

Author Contributions

All authors have equal contributions to the paper. All the authors have read and approved the final manuscript.

Funding

No funding support was received.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

al., N. e. (2025). Efektivitas Penggunaan Media Simulasi Dalam Meningkatkan Pemahaman Konsep IPA Pada Siswa Sekolah Dasar : Literature Review. Jurnal Penelitian Ilmiah Multidisipliner.

Amalia, R. S. (2023). Penggunaan Media Diorama dalam Pembelajaran IPA Materi Ekosistem untuk Meningkatkan Hasil Belajar Siswa Kelas V di SD Negeri Campaka. Jurnal Pedagogik Pendidikan Dasar, 10(2), 94–99.

Ardianto, D. H. (2019). Pemanfaatan Media Manipulatif untuk Meningkatkan Keterampilan Proses Sains Siswa Sekolah Dasar. Kiprah: Jurnal Ilmiah Pendidikan, 7(1), 1–10.

Ariani, F. &. (2024). Pengembangan Media Diorama pada Pembelajaran Metamorfosis Hewan di Kelas IV SDS Pembangunan Tanjung Morawa T.A 2022–2023. Didaktik: Jurnal Ilmiah PGSD STKIP Subang, 9(5), 3365–3376.

Damayanti, D. &. (2023). Model Pembelajaran Kooperatif Tipe Mind Mapping Berbantuan Media Manipulatif untuk Meningkatkan Pemahaman Konsep Siswa. Jurnal Educatio, 9(2), 560–566.

Dewi, R. A. (2019). Pengaruh Penggunaan Media Diorama Terhadap Hasil Belajar IPA Siswa Kelas V SDN 1 Sukoharjo. Jurnal Pendidikan Sains Indonesia, 7(1), 45–52.

Febriantara, R. (2019). Peningkatan Hasil Belajar IPA Siswa Kelas VI SD Menggunakan Model Pembelajaran Berbasis Proyek di SDN 3 Kalipetir Pengasih Kulon Progo. Jurnal Pendidikan Guru Sekolah Dasar, 8(2), 1–10.

Ghony, M. D. (2012). Metodologi Penelitian Kualitatif. Yogyakarta: Ar-Ruzz Media.

Hermayunita, H. R. (2024). Pengembangan Media Diorama pada Pembelajaran IPA di Sekolah Dasar. Didaktika: Jurnal Kependidikan, 13(4), 5165–5169.

Kurniati, E. (2022). Pengembangan Media Pembelajaran Jigsaw Puzzle pada Materi Metamorfosis Makhluk Hidup Mata Pelajaran IPA Kelas IV MI/SD. Skripsi, Universitas Islam Negeri Sultan Syarif Kasim Riau.

Lusbiantoro, R. &. (2022). Pengembangan Media Manipulatif "Koordinat Riemann" Pada Materi Integral Tentu Untuk Kelas XII. EDUPEDIA,5(2), 168-177.

Miles, M. B. (1994). Qualitative Data Analysis: An Expanded Sourcebook (2nd ed.). Thousand Oaks, CA: Sage Publications.

Moleong, L. J. (2013). Metode Penelitian Kualitatif (Edisi Revisi). Bandung: PT Remaja Rosdakarya.

Nasution, S. A. (2021). Pemanfaatan Media Manipulatif untuk Meningkatkan Keterampilan dan Pemahaman Konsep IPA di Sekolah Dasar. Jurnal Kiprah, 9(1), 45-53.

NURRAHMAN, M. N. (2022). Keefektifan Media Pembelajaran Dalam Bentuk Permainan Papan Pada Pembelajaran IPA di Sekolah Dasar. Jurnal Pendidikan Dasar dan Sosial Humanior,2(2), 437-446. .

Oktavia, W. A. (2023). Pengaruh Media Visual dalam Pembelajaran IPA terhadap Hasil Belajar Siswa Kelas IV SD Negeri 1 Ollo. Penuh Asa: Jurnal Mahasiswa Pendidikan Guru Sekolah Dasar, 1(1), 1–10.

Pahkeviannur, A. (2022). Metode Penelitian Kualitatif Bidang Pendidikan: Konsep dan Aplikasi. Indonesian Social Science Journal, 4(2), 1–10.

Purwanti, E. P. (2023). Pengaruh Penggunaan Media Manipulatif terhadap Ketuntasan Belajar Siswa dalam Pembelajaran IPA. Jurnal Pendidikan Dasar, 19(1), 1-8.

Supardi, K. (2017). Media Visual dan Pembelajaran IPA di Sekolah Dasar. JIPD (Jurnal Inovasi Pendidikan Dasar), 1(2), 160-171.7.

Sya'diah, K. A. (2024). Penelitian Pengembangan Media Pembelajaran Interaktif Diorama Metamorfosis terhadap Hasil Belajar IPAS. Algoritma: Jurnal Matematika, Ilmu Pengetahuan Alam, Kebumian dan Angkasa, 2(5), 172–180.

Winingsih, S. T. (2021). Pengembangan Media Scrapbook Pembelajaran IPA Materi Daur Hidup Hewan untuk SD. Skripsi, Institut Agama Islam Negeri Bengkulu.

Yanti., Y. (2023). Pengaruh Penggunaan Media Manipulatif terhadap Pemahaman Konsep Siswa pada Materi Bangun Ruang Sisi Datar di SMP Negeri 6 Rejang Lebong. Skripsi, Institut Agama Islam Negeri Curup.

Yasmidas, Y. (2024). Peningkatan Hasil Belajar Matematika Melalui Penggunaan Alat Peraga Benda Manipulatif Sekolah Dasar. Journal Of Exsploratory Dynamic Problems, 1(1), 173-182.