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Improving IPAS Learning Outcomes on the Topic of the Effect of Force on Objects Using the Demonstration Method Assisted by Concrete Objects for Grade IV Students at SDN Mojoroto 3

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Abstract: Penelitian ini dilatarbelakangi oleh rendahnya hasil belajar siswa pada materi pengaruh gaya terhadap benda di kelas IV SDN Mojoroto 3. Hasil pra-siklus menunjukkan bahwa sebagian besar siswa belum mencapai Kriteria Ketuntasan Minimal (KKM) sebesar 75. Penelitian ini bertujuan untuk meningkatkan hasil belajar IPAS melalui penerapan metode demonstrasi berbantuan media benda konkret. Penelitian menggunakan metode Penelitian Tindakan Kelas (PTK) dengan desain Kemmis dan McTaggart yang dilaksanakan dalam dua siklus, yang masing-masing meliputi tahap perencanaan, tindakan, observasi, dan refleksi. Subjek penelitian berjumlah 28 siswa kelas IV SDN Mojoroto 3. Data dikumpulkan melalui tes, observasi, wawancara, dan dokumentasi, kemudian dianalisis secara deskriptif kuantitatif berdasarkan ketuntasan hasil belajar. Hasil penelitian menunjukkan adanya peningkatan ketuntasan klasikal dari 17,9% pada pra-siklus menjadi 71,4% pada Siklus I dan meningkat menjadi 92,9% pada Siklus II. Jumlah siswa yang mencapai KKM meningkat dari 5 siswa pada pra-siklus menjadi 20 siswa pada Siklus I dan 26 siswa pada Siklus II. Peningkatan ketuntasan klasikal dari pra-siklus hingga Siklus II mencapai 75 poin persentase dan telah melampaui indikator keberhasilan sebesar 80%. Dengan demikian, penerapan metode demonstrasi berbantuan media benda konkret dapat meningkatkan hasil belajar IPAS pada materi pengaruh gaya terhadap benda pada siswa kelas IV SDN Mojoroto 3.
Kata kunci: hasil belajar, IPAS, metode demonstrasi, media benda konkret, gaya.

Abstrak: *This study was motivated by the low student learning outcomes regarding the topic of the effect of force on objects among fourth-grade students at SDN Mojoroto 3. Pre-cycle results indicated that the majority of students had not yet met the Minimum Mastery Criterion (KKM) of 75. The study aimed to improve learning outcomes in Natural and Social Sciences (IPAS) through the implementation of a demonstration method supported by concrete objects. A Classroom Action Research (CAR) approach was employed, utilizing the Kemmis and McTaggart design and conducted over two cycles; each cycle comprised the stages of planning, action, observation, and reflection. The research subjects consisted of 28 fourth-grade students at SDN Mojoroto 3. Data were collected via tests, observations, interviews, and documentation, and subsequently analyzed using descriptive quantitative methods based on learning mastery. The results demonstrated an increase in classical mastery from 17.9% in the pre-cycle to 71.4% in Cycle I, rising further to 92.9% in Cycle II. The number of students achieving the KKM increased from 5 in the pre-cycle to 20 in Cycle I and 26 in Cycle II. The improvement in classical mastery from the pre-cycle to Cycle II amounted to 75 percentage points, surpassing the success indicator of 80%. Thus, the implementation of the demonstration method supported by concrete objects effectively improved IPAS learning outcomes regarding the effect of force on objects for fourth-grade students at SDN Mojoroto 3.*
***Keywords**: learning outcomes, IPAS, demonstration method, concrete object media, force*

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Introduction

The caliber of education in Indonesia is influenced by the groundwork established in elementary school; the standard of secondary education relies on the quality of this initial phase (Pratiwi et al., 2023). Education encompasses the cultivation and dissemination of knowledge, skills, values, and attitudes to individuals, equipping them for life and fostering their ability to contribute positively to society (Nisa'i & Syofyan, 2024). Natural and Social Sciences (IPAS) encompasses the investigation of both living organisms and inanimate substances within the universe, alongside their interactions, while also delving into human existence by analyzing individuals as unique entities and as social beings engaging with their surroundings (Septiana & Winangun, 2023). The aim of IPAS in the Kurikulum Merdeka is to cultivate interest, stimulate curiosity, and encourage active engagement, alongside enhancing knowledge and competencies (Anggita et al., 2023).

Instruction in Science and Social Studies (IPAS) at the elementary level prioritizes students' comprehension of theoretical concepts while also promoting their observation and understanding of diverse occurrences in their everyday experiences. This method cultivates inquisitiveness regarding the surrounding occurrences and links these observations to educational experiences in the classroom (Hayudinna & Muzkiyah, 2024). A fundamental subject for fourth-grade pupils is the influence of force on objects. This topic pertains to occurrences recognizable in students' experiences, including the movement of things when exerted upon, variations in motion's trajectory, and modifications in an object's form resulting from applied force. Consequently, teaching about force ought to be executed in a way that allows students to acquire tangible, hands-on learning experiences.

However, the learning situation in the Grade IV class at SDN Mojoroto 3 indicates that students' understanding of the topic regarding the effect of force on objects remains suboptimal. Preliminary interviews with the Grade IV homeroom teacher revealed that the majority of students struggle to grasp this material, resulting in learning outcomes that fall short of expectations. This situation is corroborated by daily test results on the topic, which show that 23 students scored below the Minimum Mastery Criteria (KKM). The average score of the students who failed to meet the mastery standard was 45, whereas the established KKM is 75. These data highlight a significant gap between the students' learning outcomes and the expected level of competence.

These concerns underscore the necessity of enhancing the educational experience, ensuring that learners engage not only with verbal instruction but also with direct observation and validation of concepts. The subject of the impact of force on objects has attributes that are conducive to exploration via demonstrations and tangible materials. Concrete media refer to physical materials that learners can observe, handle, and interact with directly (Kartina et al., 2025). Employing tangible materials in educational practices can improve learners' comprehension of the content (Rahmah & Wiryanto, 2025). Through the direct observation of alterations in an object's motion, orientation, or form following the application of a force, students are anticipated to correlate the principles they are studying with tangible events in their environment.

One approach to tackle these challenges is the application of a demonstrative technique bolstered by tangible resources. The demonstration technique is an instructional strategy that

conveys lesson content by immediately exhibiting the object or the procedure for executing a certain job or operation (Mulyati, 2021). This approach promotes an elevated understanding of the subject matter; it improves students' grasp of the content by utilizing instructional tools and visual resources that elucidate the topics being taught (Natalia & Tacoh, 2023).

This approach is particularly effective for everyday classroom teaching as it cultivates an interactive learning atmosphere; students can witness the mechanisms behind occurrences or examine the tangible aspects of the subject, which significantly enhances their motivation for learning relative to traditional methods (Salsabila et al., 2023). The demonstration technique enables students to directly witness processes or phenomena pertinent to the lesson content. Employing physical objects—such as balls, toy vehicles, magnets, modeling clay, and similar items—provides students with a more concrete educational experience. Through these activities, students can see how forces influence the movement of objects, modify their trajectory, or transform their shape. Instruction that incorporates direct observation is also anticipated to motivate students to engage more actively in exploring and understanding concepts.

The demonstration method can be executed with physical materials actual items that students can observe, handle, and interact with directly. Tangible media assist students in comprehending abstract ideas in a more concrete and accessible manner (Kartina et al., 2025). These mediums function as instruments for transmitting information from the educator to the learners, employing tangible items that are visible, tactile, manipulable, and applicable by the students (Femilianita et al., 2024). Integrating tangible media into the instructional approach enables learners to immediately witness objects and the transformations that take place when a certain action or force is exerted. via these activities, students acquire knowledge not just from teacher explanations but also via firsthand observation and experimentation. When examining the impact of force on objects, utilising tangible items like spheres, miniature vehicles, magnets, and modelling clay allows learners to see alterations in an object's speed, trajectory, or form due to the exertion of force. Consequently, integrating the presentation technique with tangible media enhances a learning experience that is more substantial, engaging, and significant, while assisting students in linking the topics they are exploring to real-world occurrences.

The demonstration approach is fundamentally connected to the employment of physical objects, as demonstrations require items that can be showcased and directly observed to clarify a process or phenomenon. When instructing on the impact of forces on objects, physical objects function as the items being demonstrated, while the demonstration approach provides a methodical means to illustrate how a force can affect an object. For instance, an instructor might demonstrate the action of pushing a ball to indicate a change in motion, guiding a toy vehicle to illustrate a change in direction, or moulding clay to show a change in shape. Therefore, the use of physical objects bolsters the demonstration approach; students do not merely listen to explanations about the effects of forces but can see, touch, and experiment directly. This synergy is expected to assist students in constructing understanding based on real-world experiences, enhance their engagement in learning, and facilitate connections between scientific concepts and everyday phenomena.

Given these issues, instructional improvements are needed to enhance student learning outcomes regarding the topic of the effects of force on objects. Therefore, this study was conducted under the title "**Improving IPAS Learning Outcomes on the Topic of the Effects of Force on Objects through the Demonstration Method Assisted by Concrete Objects for Grade IV Students at SDN Mojoroto 3**." The application of this method and media is expected to foster learning that is more concrete, active, and meaningful, thereby helping students understand the concepts regarding the effects of force on objects and improving their learning outcomes.

Method

This study employs Classroom Action Research (CAR). As CAR is a method for improving the quality of the learning process, the resulting activities should be more efficient, creative, effective, and innovative and thus superior to previous practices (Setiawan et al., 2023). The study aims to improve student learning outcomes in the Natural and Social Sciences (IPAS) subject specifically regarding the topic of the effect of force on objects by using a demonstration method supported by concrete objects. The research was conducted with 28 fourth-grade students at SDN Mojoroto 3. It was carried out over two cycles (Cycle I and Cycle II), preceded by a pre-cycle phase to assess the students' initial abilities.

The research design follows the Kemmis and McTaggart model, a self-reflective spiral action research model comprising planning, action, observation, reflection, and re-planning (Utomo et al., 2024). The following is the research design based on the Kemmis and McTaggart model:

The following is the research design based on the Kemmis and McTaggart model:



Figure 1. Classroom Action Research (CAR) design based on the Kemmis and McTaggart model.

During the pre-cycle stage, an initial test was administered to determine student learning outcomes prior to the intervention. Subsequently, in each cycle, the teacher conducted lessons using the demonstration method supported by concrete objects. Students observed demonstrations and performed simple experiments using items such as balls, toy cars, magnets, and modeling clay to understand the effects of force on motion, direction of movement, and the shape of objects. At the end of each cycle, a test was administered to measure the improvement in student learning outcomes.

Research data were collected through tests, observations, interviews, and documentation. Tests were used to measure student learning outcomes, while observations were conducted systematically to assess improvements in student engagement and achievement (Widayati et al., 2024). Interviews were

held to gather information regarding the learning environment and student difficulties. Documentation served as supporting data for the study.

Learning outcome data were analyzed quantitatively by calculating the number of students who met the Minimum Mastery Criterion (KKM) of 75 and the percentage of class mastery. The class mastery percentage was calculated using the following formula:

$$Class\ Mastery = \frac{Number\ of\ Students\ Achieving\ Mastery}{Total\ Number\ of\ Students} \times 100\%$$

Learning outcomes were compared across the pre-cycle, Cycle I, and Cycle II stages to determine the extent of improvement following the implementation of the interventions. The study concluded once the interventions demonstrated an improvement in class-wide student learning outcomes and the learning process became more active.

Result and Discussion

This classroom action research was conducted with 28 fourth-grade students at SDN Mojoroto 3. The study aimed to improve learning outcomes in the Natural and Social Sciences (IPAS) subject specifically regarding the topic of the effects of force on objects using a demonstration method supported by concrete objects. The research was carried out in three stages: pre-cycle, Cycle I, and Cycle II. Each stage served to assess the progress of student learning outcomes following the implementation of the instructional interventions.

Pre-Cycle

A pre-cycle phase was conducted to assess students' initial learning outcomes prior to the implementation of the demonstration method using concrete objects. During this stage, students took a preliminary test on the topic of the effect of force on objects. The results indicated that the majority of students had not yet met the established Minimum Mastery Criterion (KKM) of 75.

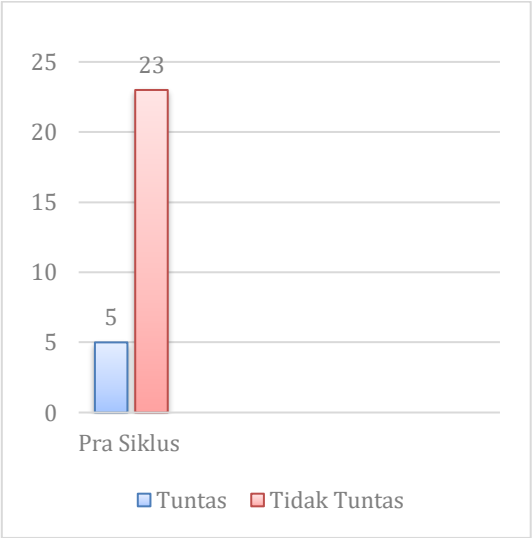


Diagram 1. Student Learning Outcome Mastery in the Pre-Cycle

Based on the diagram above, it is evident that only 5 out of the 28 students met the Minimum Mastery Criterion (KKM), while 23 students did not. Class mastery for the pre-cycle stage is calculated using the following formula:

$$Class\ Mastery = \frac{5}{28} \times 100\% = 17{,}9\%$$

The results indicate that the classical mastery rate during the pre-cycle stage was low at 17.9% reflecting the students' limited initial understanding of the topic regarding the effects of force on objects. Most students struggled to grasp the relationship between force and changes in motion, direction, and the shape of objects. This situation suggests that the students require more concrete learning experiences. Since the subject matter of force is closely linked to everyday life, instruction based on direct observation can help students connect these concepts to the phenomena they experience.

The inadequate learning results noted during the pre-cycle phase suggest that prior teaching failed to adequately facilitate students' comprehension of the notion of force. Learners often grasped the content in an abstract manner, hindering their ability to connect the acquired concepts to tangible occurrences in their environment. Consequently, enhancing the educational process requires the implementation of a demonstration technique that incorporates tangible items. The utilisation of tangible objects is anticipated to enable students to directly witness the impact of force on items—such as alterations in velocity, direction, or form. As a result, the educational experience is rendered more relevant, captivating, and attainable for pupils, thereby promoting enhanced learning results in the following cycle.

Cycle I

Cycle I was conducted using a demonstration method supported by concrete objects. The teacher used balls, toy cars, magnets, and modeling clay to demonstrate the effect of force on objects. Students observed the demonstrations, engaged in group discussions, and completed student worksheets based on their observations.

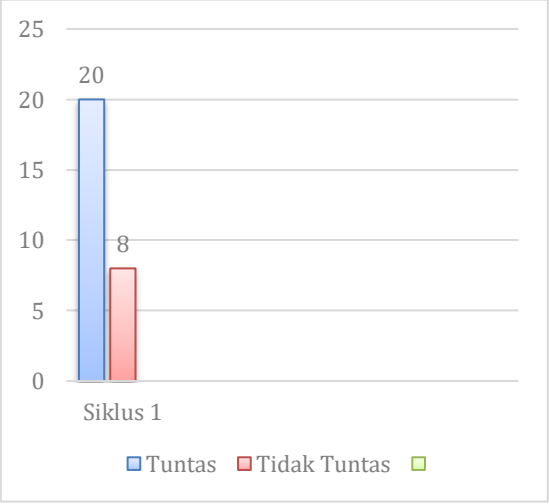


Diagram 2. Student Learning Outcome Mastery in Cycle 1

Based on the diagram above, it is evident that 20 students have met the Minimum Mastery Criteria (KKM), while 8 students have not. The classical mastery for Cycle I is calculated as follows:

$$Class\ Mastery = \frac{20}{28} \times 100\% = 71{,}4\%$$

Compared to the pre-cycle stage, the number of students achieving mastery increased from 5 to 20, representing a rise of 15 students. Class mastery rose from 17.9% to 71.4%, an increase of 53.5 percentage points.

This improvement indicates that the demonstration method utilizing concrete objects began to positively influence student understanding. Students had the opportunity to observe firsthand how the application of force can cause an object to move, change its direction of motion, or alter its shape. Such experiences transformed concepts previously understood only verbally into tangible realities.

The use of concrete objects also heightened student engagement in the learning process. Items such as balls, toy cars, magnets, and modeling clay are familiar to students' daily lives, making them effective tools for explaining the concept of force. This aligns with the findings of Kartina et al. (2025), who describe concrete media as tangible materials that learners can directly see, touch, and manipulate.

Although learning outcomes improved, eight students still failed to meet the Minimum Mastery Criteria (KKM). Observations revealed that some students remained passive during group activities and were not yet fully able to link demonstration results to the concepts being studied. Therefore, improvements are required in Cycle II, specifically by increasing student engagement in demonstration activities and providing

guidance to students who are still experiencing difficulties.

Cycle II

Cycle II was conducted based on the reflections from Cycle I. Improvements were made by providing clearer activity instructions, offering students more opportunities for hands-on demonstrations, and providing guidance to students experiencing difficulties. Students did not merely observe the teacher's demonstrations; they also experimented with concrete objects, recorded their observations, engaged in discussions, and presented their conclusions.

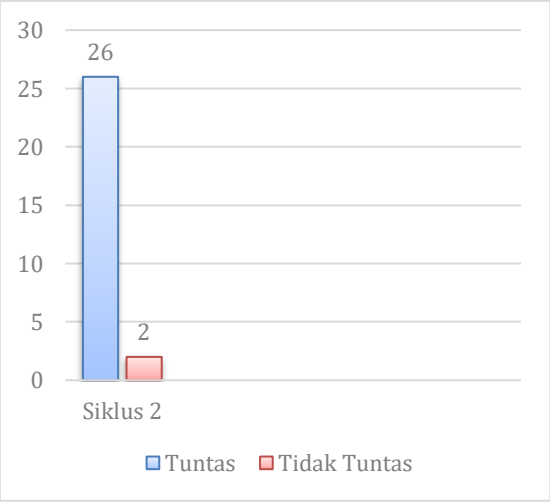


Diagram 3. Student Learning Outcome Mastery in Cycle 2

Based on the diagram above, 26 students have met the Minimum Mastery Criterion (KKM), while 2 students have not yet met it. The classical mastery for Cycle II is calculated as follows:

$$Class\ Mastery = \frac{27}{28} \times 100\% = 92{,}9\%$$

Compared to Cycle I, the number of students achieving mastery increased from 20 to 26—a rise of six students. The class mastery rate rose from 71.4% to 92.9%, an increase of 21.5 percentage points.

The improvement observed in Cycle II indicates that the instructional adjustments yielded more optimal results. Opportunities for students to conduct hands-on demonstrations encouraged them to be more active in observing, experimenting, discussing, and drawing conclusions from their observations. Rather than merely receiving information from the teacher, students gained direct experience regarding the effects of force on objects.

These activities aligned with the nature of the subject matter, which allows concepts to be learned through the observation of real-world phenomena. When pushing or pulling objects, students could observe the resulting changes in motion; when applying force to modeling clay, they could directly witness changes in the object's shape. Such experiences helped students grasp the cause-and-effect relationship between force and changes in objects.

The demonstration technique allows learners to witness a procedure directly. The study conducted by (Haidar et al., 2025), corroborates this, demonstrating enhanced outcomes from the pre-test to the post-test. This enhancement in student learning results from the implementation of the demonstrative approach, which makes the educational process more organized and concentrated, therefore facilitating students' comprehension of the information.
These results are consistent with the work of Rahmah and Wiryanto (2025), who articulate that employing physical media can improve students' comprehension. In this research, tangible items act as a link between the notion of force and the students' everyday experiences, facilitating comprehension of the topic.

Comparison of Student Learning Outcome Mastery

The progression of student learning outcomes from the pre-cycle through Cycle I and Cycle II indicates an increase in mastery following the implementation of the demonstration method supported by concrete objects.

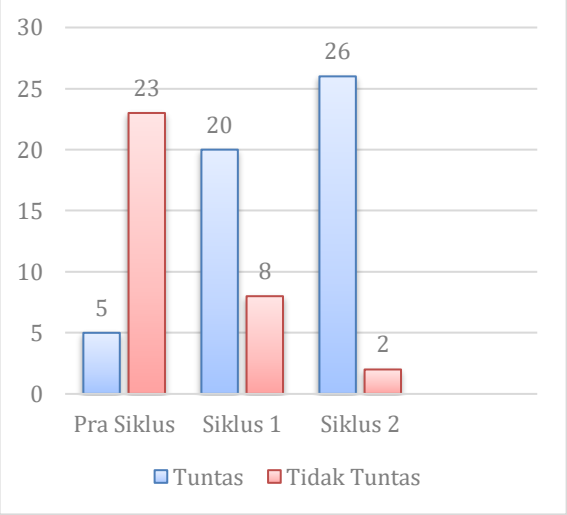


Diagram 4. Comparison of Student Learning Mastery in Each Cycle

The figure above clearly indicates that mastery of learning enhanced at every phase of the study. In the pre-cycle period, mastery of the class attained merely 17.9%. Subsequent to the application of the demonstration technique with tangible items in Cycle I, proficiency increased to 71.4%. Following the enhancements in training during Cycle II, class proficiency rose to 92.9%.

The quantity of pupils demonstrating mastery rose from 5 in the pre-cycle to 20 in Cycle I, and subsequently to 26 in Cycle II. Consequently, there was a net augmentation of 21 pupils achieving the Minimum Mastery Criteria (KKM) from the beginning to the conclusion of Cycle II.

This enhancement illustrates that the presentation technique employing tangible items aids students in comprehending the subject concerning the impact of force on objects. Instruction becomes more tangible as learners are afforded the chance to witness and engage in practical experimentation. Moreover, the incorporation of everyday objects facilitates students' ability to connect the educational content with their personal experiences. This corresponds with the perspectives of Femilianita et al. (2024), who assert that tangible media enhance real-world encounters, enabling students to expand their horizons and experiences illustrating non-verbal learning and to develop precise generalizations. The use of concrete media brings novelty and diversity to students' educational experiences, making the learning results more significant to the learners.

In Cycle II, two pupils were yet to achieve the Minimum Mastery Criteria (KKM). This suggests that the enhancement in educational results was not yet consistent among other pupils; these two people necessitated additional support via mentorship and corrective teaching. Nonetheless, there was a significant overall enhancement in the class mastery rate, escalating from 17.9% during the pre-cycle phase to 92.9% in Cycle II. This corresponds with the research of (Ijirana et al., 2024), indicating that the utilization of concrete medium significantly improves student learning results. Tangible materials allow learners to engage directly with actual items, enhancing comprehension of the subject matter especially abstract mathematical ideas and eventually resulting in superior educational outcomes.

The findings of the study indicate that the congruence of instructional strategies, media, and the characteristics of the subject matter is essential for facilitating students' understanding of Science and Social Studies (IPAS) topics. The demonstration technique enables learners to witness processes directly, whereas physical objects offer experiential learning that can be seen and handled. Integrating these methodologies

promotes learning that is dynamic, tangible, and situated. Consequently, the application of the demonstration technique, augmented by tangible resources, resulted in enhanced IPAS learning results particularly about the influence of force on objects among fourth-grade pupils at SDN Mojoroto 3. This enhancement is demonstrated by a 75-percentage-point rise in the class mastery rate, escalating from 17.9% during the pre-cycle phase to 92.9% in Cycle II.

Conclusion

The findings from the classroom action research carried out with fourth-grade pupils at SDN Mojoroto 3 indicate that utilizing the demonstration method, supplemented by tangible materials, enhances IPAS (Natural and Social Sciences) academic performance concerning the influence of force on objects. This enhancement is apparent in the students' proficiency levels in classical mastery throughout the several phases of the study. During the pre-cycle phase, merely 5 of the 28 pupils achieved the Minimum Mastery Criteria (KKM), leading to a classical mastery rate of 17.9%. Subsequent to the execution of the intervention in Cycle I, the count of students attaining mastery increased to 20, resulting in a traditional mastery rate of 71.4%. Following the enhancements in training during Cycle II, the count of students achieving the KKM rose to 26, yielding a classical mastery rate of 92.9%.

The enhancement in classical proficiency from the pre-cycle stage to Cycle II reached 75 percentage points, escalating from 17.9% to 92.9%. These outcomes exceeded the predetermined research success criterion, which mandated that a minimum of 80% of students achieve the KKM score of 75. The application of the demonstration technique alongside tangible materials enabled students to immediately witness and engage with the impact of force on an object's movement, trajectory, and form. As a result, the educational experience became more tangible, aiding students in linking IPAS topics to their daily life encounters. This research illustrates that the use of the demonstration technique, augmented by tangible materials, constitutes an effective pedagogical approach for enhancing the learning results of fourth-grade elementary students regarding the impact of force on things.

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