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Magnetic Train Training to Increase Teacher Creativity at Manahan Christian Elementary School, Solo

Faradiba Faradiba[a)], Nya Daniaty Malau[b)], Taat Guswantoro[d)], Manogari Sianturi[c)], Fan Damai Sejahtera, Setiana Laia, Nathasya Grisella Manurung, Randi Wardani, Gracia Zealfiana

Physics Education Study Program, Universitas Kristen Indonesia, Jakarta, Indonesia

[a)]Corresponding author: faradiba@uki.ac.id
[b)]nyadaniaty.malau@uki.ac.id
[c)]manogari.sianturi@uki.ac.id
[d)]taat.guswantoro@uki.ac.id

ABSTRACT

Educational teaching aids are one of the media that have been prepared during the teaching and learning process at school. Props that have been created to help students understand lesson material more effectively and interestingly. Community service activities have been carried out at the Manahan Christian Elementary School in Solo, Central Java. The activity will be held on June 28 2024. Participants in the Community Service program were attended by elementary school teachers from 4 schools with a total of 68 participants. The implementation of this community service has been divided into two sessions, namely a material presentation session and a teaching aids workshop session. The magnetic train teaching aids workshop at Manahan Christian Elementary School was successfully implemented with a very good response from the participants. Workshop participants have assessed a high level of satisfaction with all aspects of the training, starting from the material that has been delivered (85.7%), the performance of resource persons and facilitators who have provided services (86.5%), to the overall activity sessions carried out (87. 4%) with the satisfaction score obtained reaching the very good category, this workshop succeeded in providing practical knowledge and skills that are relevant to teaching needs in elementary schools.

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INTRODUCTION

Science learning media plays an important role in facilitating understanding of complex and abstract scientific concepts (Purba et al., 2020). This media includes a wide range of tools and technologies, from physical models, experiment kits, and educational posters to simulation software, animated videos, and interactive applications (Anas, 2014). The use of a variety of learning media allows students to learn through direct experience and visualization, which can improve their memory and understanding of the material. Apart from that, science learning media can also motivate students to be more active in the learning process, encouraging them to carry out experiments, ask questions and think critically. Thus, effective integration of science learning media can create a more dynamic, interactive and immersive learning environment, helping students develop interests and skills in the field of science.

Educational teaching aids are an important tool in the teaching and learning process which are designed to help students understand lesson material more effectively and interestingly (Anas, 2014). These tools can be physical objects, such as human body anatomy models, geographic maps, or science experiment kits, or digital tools such as educational applications and interactive simulations. (Saroja et al., 2016). The use of educational teaching aids allows students to learn through direct experience, observing, and practicing the concepts being taught, thereby increasing understanding and retention of material. Apart from that, these teaching aids can also facilitate more inclusive learning, by meeting the needs of various student learning styles, be they visual, kinesthetic or auditory (Ingsih et al., 2018). Thus, the integration of educational teaching aids in the curriculum can support the achievement of more holistic and effective educational goals.

Utilizing simple items as educational teaching aids in the learning process of basic education students is an effective and economical approach to increasing student understanding and involvement. Items such as buttons, rocks, paper, and cardboard can be turned into teaching aids that help explain abstract concepts in subjects, especially science. (Guswantoro et al., 2024; Widiyatmoko & Pamelasari, 2012). For example, paper, cardboard and plywood can be used as three-dimensional models for geometric materials or the application of physical science concepts (Faradiba et al., n.d.; Guswantoro et al., 2024). This approach not only makes learning more interactive and fun, but also trains students' creativity and motor skills. Apart from that, using simple items as teaching aids teaches students to appreciate and utilize the resources around them, as well as fostering innovative attitudes and problem solving from an early age.

The magnetic train prop is an educational innovation that allows students to understand the basic principles of magnetism and magnetic levitation in an interactive and fun way. Magnetic trains, or maglev, use the principle of magnetic repulsion to make the train float above the tracks, reducing friction and allowing the train to move at high speedsi (Ma'ruf et al., 2019). In an educational context, miniature magnetic train models can be used as teaching aids to demonstrate concepts such as magnetic repulsion and attraction, magnetic fields, and modern transportation technology. By observing and operating a magnetic train model, students can see firsthand how physics principles are applied in real technology, deepening their understanding of science subject matter. This teaching aid can also stimulate students' interest in STEM (Science, Technology, Engineering, and Mathematics) fields, inspiring them to explore further innovation and future technology (Fitrian & Noor, 2020; Iskhaq, 2015). The integration of magnetic train teaching aids in the school curriculum can make learning more relevant, interesting and beneficial for students' intellectual development.

The implementation of this community service activity is in line with the Physics Education Study Program roadmap, namely the development of learning media, which is a strategic step in integrating academic knowledge with community needs. This activity involves lecturers and students in designing and implementing innovative learning media that can be used by schools. For example, through workshops

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and training, community service teams can help local teachers develop interactive teaching aids that suit the curriculum and student needs. In this way, community service activities not only strengthen relations between universities and the surrounding community, but also ensure that the results of research and innovation in the field of education can be directly applied to improve the quality of learning. Through this approach, the study program can contribute significantly to advancing local education while empowering the community to adopt more effective and modern learning methods.

Based on a letter of request from SD Kristen Manahan Solo to the Physics Education Study Program, partners need training in making learning media in the form of teaching aids that are suitable for elementary level students. The results of discussions held online with several elementary school teachers showed that the selection of magnetic train teaching aids as a learning medium is expected to increase students' interest in learning. It is hoped that the creation of this learning media will have an impact on student enthusiasm in the learning process, especially for science material. Apart from that, through the application of these teaching aids, learning is more interesting and more efficient in supporting the learning process.

Educational teaching aids can improve student learning achievement by making the learning process more interesting, interactive and easy to understand (Shunhaji & Fadiyah, 2020). When students can see, touch, and interact directly with learning material through teaching aids, abstract concepts become more concrete and real. For example, the use of three-dimensional models in science lessons helps students understand the structure and function of body organs, while mathematical teaching aids such as blocks or visual diagrams make it easier to understand the concept of numbers and arithmetic operations. Apart from that, educational teaching aids also allow teachers to present material in a more creative and varied way, which can motivate students to be more actively involved in the learning process. (Azis et al., 2006; Rohmah et al., 2017). This not only improves students' memory and understanding of the material, but also encourages them to think critically and analytically. Thus, the effective use of educational teaching aids can have a positive impact on improving students' learning achievement, helping them achieve better academic results and develop the skills necessary for future success.

A simple magnetic train prop is a demonstration device used to show the basic principles of maglev (magnetic levitation). This tool usually consists of a model train equipped with strong magnets at the bottom and a special track which also has magnets or conductive material that can create a magnetic field. When the train is placed on the track, the interaction between the magnets on the train and the track produces a repulsive force strong enough to lift the train so that it appears to be floating in the air. Some models are also equipped with controllable electromagnets to demonstrate how changing magnetic fields can move the train along the track. This teaching aid is very effective in teaching physics concepts such as magnetic force, electromagnetic induction, and frictionless motion, as well as providing practical insight into the technology used in modern maglev train transportation systems.

Based on this need, the Physics Education Study Program welcomed it by sending lecturers and students who have skills in the field of teaching aids design to carry out Community Service with the theme "Training on Making Magnetic Train Props at Manahan Christian Elementary School, Solo". This service is planned as a community service activity which will later become a routine activity for study programs in schools as well as a form of collaboration between the UKI Physics Education study program and several schools.

METHOD

Participants in this PKM program are elementary school teachers from 4 elementary schools that are part of the Christian School Association in Solo. The total number of participants was 68 people. The

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implementation of the training consists of several stages, namely: 1. Stage of providing material; 2. Discussion Stage; 3. Workshop Stage; 4. Stage of giving the questionnaire.

FIGURE 1. Stages of Community Service Activities

After the training process is complete, response questionnaires are distributed to the training participants to determine participant satisfaction with the training activities that have been carried out, as well as to ask for suggestions and input from participants regarding training activities that will be carried out next. Assessment indicators include: Participants' responses to teaching aids, Participants' responses to training materials, Responses to the performance of the implementing team, Responses to the workshop process. The data collection technique used in this PkM activity is using a questionnaire. This data collection technique is used by asking several questions related to the research that will be given to the respondent (teacher). The form of the questionnaire given to respondents is made into digital form so that teachers can access the questionnaire and fill it out easily.

RESULT AND DISCUSSIONS

The implementation of PkM activities begins with the presentation of material related to the role and importance of learning media presented in the learning process. Providing material about learning media for elementary school teachers is an important effort to improve the quality of education at the elementary level. The aim of presenting the material first is to equip participants (teachers) with knowledge and skills in using learning media effectively in the classroom. In this session, teachers were introduced to various types of simple learning media that teachers can design, ranging from visual media such as videos, media from used goods, to educational applications and interactive software.

Apart from that, they are also taught how to choose and integrate learning media that suits the curriculum and student needs. The PkM team, as resource persons in this activity, provided practical examples and case studies on how learning media can be used to improve students' understanding of lesson material. Not only that, teachers are also given the opportunity to carry out direct practice and discuss in groups to share experiences and innovative ideas.

(a)

(b)

FIGURE 2. (a) and (b) Presentation of educational teaching aids material

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With this exposure session, it is hoped that participants will gain initial knowledge in the application of learning media as well as a trigger in generating creative ideas in creating simple learning media in accordance with the curriculum being taught. Apart from that, this activity also helps teachers to continue to develop and adapt to increasingly rapid technological advances, so that they can provide relevant and meaningful education for students.

After the presentation session was carried out, a workshop/training on making simple props was carried out. The workshop activity for making simple teaching aids as a learning medium for elementary school teachers is one of the most important initiatives in efforts to improve the quality of education at the elementary level. In this session, the PKM Team implemented training on designing a simple teaching aid, namely a magnetic train. This teaching aid was chosen because it is simple, the concept taught is easier, the assembly is relatively simple and is suitable for implementation at the elementary school level (in accordance with the elementary school curriculum). At the beginning of the workshop, the PkM Team explained in advance about the tools and materials that would be used in designing the teaching aids. The PkM team has provided tools and materials for each participant and teaching aid modules. The teaching aids module also contains how to use/design magnetic train props.

In this workshop activity, there was a facilitator who guided the participants through the assembly process. The facilitators are students of the Physics Education Study Program who have previously developed the teaching aids, so they have been trained in guiding the participants in every step of making the teaching aids. The facilitator provides guidance on explaining materials, alternative materials that might be substitutes and techniques for assembling props. Apart from that, teachers are also taught how to integrate these teaching aids with the material concepts that will later be produced from the demonstration of these teaching aids, so that their use can be maximized and in accordance with the learning objectives to be achieved.

This workshop also provides space for teachers to be creative and innovate, allowing them to develop teaching aids that suit the needs and characteristics of their students. Through discussion sessions and sharing experiences both in previous material presentation sessions and also in the workshop session. Teachers form small groups (3-4 people) so they can exchange ideas and get inspiration from their colleagues. This activity not only improves the technical skills of teachers, but also builds a mutually supportive and inspiring learning community.

(b)

(b)

FIGURE 3 (a) and (b) Assistance in the process of making magnetic train props

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With simple teaching aids that have been made by themselves, it is hoped that teachers will be able to make the teaching and learning process more interactive and interesting. Students not only listen to explanations from the teacher, but can also interact directly with the teaching aids created, so that their understanding of the subject matter can be deeper. This activity also encourages teachers to continue to innovate in creating creative and relevant learning media, so that they can provide quality and enjoyable education for their students.

Analysis of workshop participant satisfaction using a Likert scale questionnaire is an effective method for evaluating participants' experiences and responses to the activities that have been held. The Likert scale questionnaire is a measuring tool that asks respondents to indicate their level of agreement or disagreement with a series of statements relating to various aspects of the workshop, such as the quality of the material presented, the resource person's delivery skills, the facilities provided, and the relevance of the material to their professional needs.

Participants' responses were classified into 4 parts, namely responses to teaching aids, responses to training materials, training resource persons and training processes:

TABLE 1 Response to props

No	Statement	Response (%)			Response Value		Category
		strongly disagree	disagree	agree	strongly disagree	(%)	
1	The props demonstrated are in accordance with needs	0	0	58	43	86	Very good
2	The demonstration of the teaching aids was interesting and fun	0	0	32	68	92	Very good
3	The presence of teaching aids makes it easier for students to understand physics (science) concepts.	0	0	50	50	88	Very good
4	Schools already use teaching aids to learn science	0	18	71	11	73	Good
					average:	84,8	Very good

The workshop participants' response to the teaching aids showed very positive results with a score of 84.8, which is in the very good category. This score reflects that the participants were very satisfied with the quality, effectiveness and usefulness of the teaching aids provided during the workshop. Workshop participants appreciated the innovation and creativity in the design of teaching aids, which succeeded in making learning material easier to understand and more interesting to study. Apart from that, these teaching aids are considered very relevant to classroom teaching needs, so that teachers feel motivated to implement them in the teaching and learning process. This high satisfaction score also indicates that the teaching aids are able to increase interaction and active participation of participants during the workshop, creating a more enjoyable and effective learning experience.

TABLE 2 Response to training materials

No	Statement	Response (%)			Response Value		Category
		strongly disagree	disagree	agree	strongly disagree	(%)	
1	The material presented is according to the participants'	0	0	64	36	84	Very good

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No	Statement	Response (%)			Response Value		Category
		strongly disagree	disagree	agree	strongly disagree	(%)	
	needs						
2	The material presented is clear and easy to understand	0	0	50	50	88	Very good
3	The training material is delivered in a clear sequence and systematic manner	0	0	61	39	85	Very good
					average:	85,7	Very good

The workshop participants' response to the props workshop training material received a score of 85.7, which is included in the very good category. This high score reflects participants' appreciation and satisfaction with the quality and relevance of the material presented during the training. Participants felt that the training materials were very well structured, presenting comprehensive and practical information regarding the creation and use of teaching aids in the learning process. In addition, material that is relevant to teaching needs in elementary grades increases participants' confidence to apply these teaching aids in their schools. This high satisfaction also reflects that the training succeeded in creating an interactive and inspiring learning atmosphere, encouraging participants to innovate and develop more interesting teaching methods.

TABLE 3 Response to training resource persons

No	Statement	Response (%)			Response Value		Category
		strongly disagree	disagree	agree	strongly disagree	(%)	
1	The resource person mastered the material presented	0	0	46	54	88	Very good
2	The way the presenter presented the PkM material was interesting	0	0	46	54	88	Very good
3	The resource person provided the opportunity for questions and answers	0	0	57	43	86	Very good
4	Every complaint/question/problem raised is followed up properly by the resource persons/service members involved	0	0	64	36	84	Very good
					average:	86,5	Very good

The workshop participants' response to the performance of the resource person and props workshop training facilitator received a score of 86.5, which is included in the very good category. This score shows a high level of satisfaction with the ability, professionalism and way of delivering material by resource persons and facilitators during the training. Participants felt that the resource persons had in-depth knowledge and a strong understanding of the material presented, and were able to explain concepts clearly and systematically. Effective communication skills, coupled with the enthusiasm and active involvement of resource persons and facilitators, create an interactive and dynamic workshop atmosphere. Participants also appreciated the resource person's patience and responsiveness in answering questions and providing guidance during the practical session. Facilitators who assisted in implementing the workshop also received praise for their expertise in managing time and ensuring that each participant could follow and understand each part of the training.

TABLE 4 Response to Implementation of Training Activities

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No	Statement	Response (%)			Response Value		Category
		strongly disagree	disagree	agree	strongly disagree	(%)	
1	The time provided is appropriate for delivering PkM material and activities	0	3	61	36	83	Very good
2	PkM members who are involved in community service activities provide services according to needs	0	0	61	39	86	Very good
3	Participants receive direct benefits from the PkM activities carried out	0	0	54	46	87	Very good
4	PkM activities succeeded in increasing participants' intelligence	0	0	46	54	88	Very good
5	Overall, participants were satisfied with PkM activities	0	0	29	71	93	Very good
					average:	87,4	Very good

The workshop participants' response to the entire props workshop training session received a score of 87.4, which is in the very good category. This score reflects a very high level of satisfaction with all aspects of workshop implementation, from planning to execution. Participants felt that the workshop was very well designed and implemented, covering various important elements such as comprehensive material delivery, useful practical demonstrations, and constructive interactions and discussions. Neat event organization, a timely schedule, and adequate facilities also contribute to a positive attendee experience. Apart from that, the support provided by the committee and facilitators in assisting participants during the workshop, as well as the quality of the materials and teaching aids provided, received high appreciation. The entire training session succeeded in creating an inspiring and supportive learning environment, which not only enriched the participants' knowledge but also increased their motivation to apply what they had learned in their teaching practice. This excellent response is an indicator of the success of the workshop and encourages the organizers to continue to improve the training program in the future, ensuring that every detail of the event remains high quality and beneficial for the participants.

Teaching aids training for teachers is an important initiative in improving the quality of education. This program is a form of the Competency Based Integrated Training Program (PPTBK) (Mirawati et al., 2019). This activity is designed to equip teachers with skills and knowledge in creating innovative and effective learning media. The development of learning media is very important to instill in teachers as an effort to change passive learning patterns into active learning (Sutarna et al., 2021). During this community service training, teachers are taught how to identify student needs and design teaching aids that suit learning objectives. They are also introduced to various types of learning media. starting from pictures, books, physical models, to digital tools and interactive simulations. The type of media used determines learning outcomes. Contextual media such as reading books can increase student literacy (Kusumadewi & Reknosari, 2020), Meanwhile, the application of media types of teaching aids can increase students' creativity and involvement in learning (Guswantoro et al., 2024; Sumaryanti et al., 2021).

CONCLUSION

The implementation of the magnetic train teaching aids workshop at Manahan Christian Elementary School in Solo was successful with a very good response from participants. Workshop participants showed a high level of satisfaction with all aspects of the training, starting from the material presented, the

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performance of resource persons and facilitators, to the entire implementation session. With a satisfaction score reaching the very good category, this workshop succeeded in creating an interactive and inspiring learning environment, as well as providing practical knowledge and skills that are relevant to teaching needs in elementary schools. This success reflects the effectiveness of workshop planning and execution, as well as the organizers' commitment to providing high-quality training programs. The positive response from participants not only shows the success of this event, but also encourages organizers to continue holding similar training in the future, in order to improve the quality of education and creativity in learning.

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