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Training Introduction to Simple Robots for Kindergarten Child as a Tool in Improving Children's Psychomotoric Abilities

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Abstract

Early childhood education plays an important role in forming the basis of children's development, including their psychomotor development. Early childhood education (PAUD) teachers at PG & TKIT Little Moslem have a big responsibility in creating a learning environment that supports children's holistic development. However, they often face challenges in choosing effective learning methods, especially when it comes to integrating modern technology. In this context, the use of robotics as a learning aid offers great potential for improving children's psychomotor abilities at an early age. Training on introducing simple robots to teachers at PG & TKIT Little Moslem is a relevant solution to overcome this problem. This training aims to provide knowledge, skills, and understanding of the basic concepts of robotics and how to integrate them into early childhood learning activities. In this way, teachers can create more engaging, interactive, and effective learning experiences for their students.

Keywords: *kindergarten, psychomotorics, robot*

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Introduction

Education is the main foundation for forming children's character and skills from an early age. Early childhood education (*PAUD* or *Pendidikan Anak Usia Dini* in Indonesia) teachers, especially at the TKIT Little Moslem, an Integrated Islamic Kindergarten, have a very important role in developing various aspects of children's development, including psychomotor abilities. Psychomotor is the ability to move the body according to will and desire, which is an integral part of early childhood development. However, in practice, improving psychomotor abilities in children is often a challenge for teachers, especially when it comes to finding methods that are innovative and interesting for children.

In early childhood, from 3 to 6 years old, playing activities are also a kind of training to help develop fine and gross motor skills (Windayana, 2018). During childhood, fine motor skills develop, which are related to physical skills involving small muscles and hand-eye coordination. These fine motor skills can be trained and developed through continuous, routine activities and stimulation. For example, playing puzzles, arranging objects to form desired patterns such as robots, cars, houses, animals, and so on (Darmawan et al., 2023). Furthermore, this review (Mantilla & Edwards, 2019) offers advice for adults working in the early childhood education sector regarding the appropriate use of digital technology by and with young children.

In this era of increasingly advanced technology, conventional approaches to developing psychomotor abilities need to be adapted to technological developments. One technology that has great potential to help improve psychomotor abilities in children is robotics. Robotics not only brings a fun and interesting educational aspect to children, but can also help them in developing various skills, including psychomotor skills (Marlisa et al., 2023). The use of robotics tools in programming education increases motivation, success, and problem-solving skills (Çam & Kiyici, 2022). Educational robot toy designs must accommodate the needs of both play and teaching media (Wahyujati, 2022). The use of simple robots in early childhood learning can provide various benefits, including:

1. Increases interest and motivation in learning: Children tend to be interested in technology and moving toys. The use of simple robots in learning can increase children's interest and motivation in learning, because they can interact directly with the technology.

2. Increases creativity and imagination: Children can use simple robots to carry out various explorations and experiments. This can help in increasing their creativity and imagination, because they can create various scenarios and stories using the robot.
3. Improve psychomotor abilities: Interaction with simple robots can help in improving children's psychomotor abilities. They can learn to control the robot's movements, set direction, and develop fine motor skills through these interactions.
4. Expanding technology insights: Using simple robots can help children understand basic concepts about technology. They can learn about how robots work, how to control them, and other basic concepts about technology.
5. Improves Social and Collaboration Skills: Children can learn to cooperate and collaborate in operating simple robots. They can learn to share ideas, communicate, and work together to achieve common goals.

Educational robots are used both inside and outside the school environment to increase student interest, engagement, and academic achievement (Anwar et al., 2019). One example of the use of educational robots in education is the educational robot. This educational robot was designed using an Arduino module kit and Arduino programming (Rahmi et al., 2019). Another study aimed to identify the effect of the use of educational robotics on the motivation and learning of physics concepts in junior high school students, especially regarding the concept of temperature. The results of this study recommend that teachers integrate educational robotics into their courses to help students achieve better results in physics subjects (Omari et al., 2023). Meanwhile, further research shows that educational robots (ER) can increase student interest and engagement in science, technology, engineering, and mathematics (Arís & Orcos, 2019).

Methods

Community service in the form of training in the introduction of robotics for early childhood education requires a planned and systematic approach. The following are the methods implemented in this service:

1. Participatory approach

   Involving all related parties, including PAUD teachers, administrative staff, parents, as well as external parties such as technology and education experts. This approach ensures that all stakeholders have a voice in training planning, implementation, and evaluation.
2. Action-based learning

Using an action-based learning approach that allows participants to learn through direct experience, reflection, and real action. Participants will be encouraged to design, implement, and evaluate robotics-based learning strategies in their own classroom contexts.

3. Interdisciplinary collaboration

   Combining knowledge and expertise from various disciplines, such as education, technology, child development psychology, and others. This collaboration will enrich the training experience and ensure a holistic approach in overcoming the challenges of developing psychomotor skills in early childhood.

4. Active learning

   Adopt an active learning approach that places participants at the center of learning. Participants will be encouraged to actively participate in discussions, role plays, case studies, and hands-on practice to improve their understanding and skills in the use of robotics in early childhood learning.

The stages of this community service activity include:

1. Planning

   This stage involves identifying training needs and objectives, determining appropriate training methods and materials, as well as planning logistics and implementation schedules. The service team collaborated with the school to understand the local context, assess the initial level of knowledge and skills of teachers, and determine development priorities in training.

2. Preparation of materials and resources

   This stage includes preparing training materials, developing training modules, and preparing the necessary resources, including robotics devices, presentation equipment, and training materials. Training materials were designed comprehensively and according to the needs and level of understanding of participants.

3. Training implementation

   This stage is the implementation of training to introduce robotics to PAUD teachers. Training was carried out through a series of interactive sessions, which included material delivery, group discussions, direct practice, and reflection. The facilitator ensured the smoothness and effectiveness of the training and facilitated collaboration and exchange of experiences between participants.

4. Monitoring and assistance

During the training, the service team monitored the learning process, participant responses, and obstacles that arose. The team also provided additional assistance and support to participants in implementing the concepts and techniques learned in their respective classes.

5. Evaluation and feedback

   After the training was completed, an evaluation was carried out on the effectiveness of the training based on the objectives and indicators that had been previously determined. Participants were asked to fill out an evaluation questionnaire, and a reflective discussion session was held to get direct feedback from the participants. The evaluation results were used to improve and develop training programs in the future.

6. Strengthening implementation

   The final stage is strengthening the implementation of the concepts and techniques learned in daily learning at TKIT Little Moslem. The service team continued to monitor and support teachers in integrating robotics into their curriculum and learning activities. This effort aims to ensure the sustainability and effectiveness of the use of robotics in improving the psychomotor abilities of young children.

Simple robots used in introductory robotics training for early childhood education are usually designed to be easy for children and teachers to understand and use. The shape of the robot must be in accordance with the learning needs of children and allow them to interact directly. The robot used is a type of driving robot, namely a soccer robot. Children were taught how to assemble and operate a soccer robot. This robot can be controlled by children using a remote control. By assembling simple robots, it is expected that children's psychomotor skills can be trained, especially fine motor and coordination skills. This training was carried out for 2 days. The first day of training was to assemble and operate the robot at TKIT Little Moslem. The second day was a direct visit to the robotics laboratory at Telkom University.

Results and Discussions

The first survey process was carried out by members of the community service team to the target community, namely PG & TKIT Little Moslem. The survey was carried out by coming directly to partner locations and conducting interviews with school principals. Based on the results of the survey and discussions that have been carried out, it can be concluded that there are challenges in facing and choosing effective learning methods for young children, especially

in terms of integrating modern technology. Therefore, the community service team offered a solution, namely training in the use of robotics as a learning tool, which offers great potential to stimulate children's psychomotor abilities at an early age. Figure 1 shows participants who took part in a series of visiting activities at the Telkom University Robotics Laboratory.

Fig. 1. The participants of community service

Fig. 2. Training activities in the robotics laboratory

Based on the survey results obtained previously, the community service team began to design the flow of training activities held at TKIT Little Moslem and a visit to the Robotics Laboratory. This community service activity was attended by the principal, vice principal, teachers, and students of PG & TKIT Little Moslem, as seen in Figure 2. The number of participants attending the event was 35. This activity began with an opening by the head of the

community service team and the principal of TKIT Little Moslem. Then, they continued with training and closing activities.

Fig. 3. Participants see directly how one of the robots works in the robotics laboratory

Figure 3 shows a demonstration of how one of the robots works in the robotics laboratory. Participants were given an understanding of how the robot works and operated it directly, and were introduced to the important components of the robot. This aims to increase participants' insight and also improve children's motor skills.

The implementation of community service activities aims to increase the effectiveness of education, especially in developing psychomotor abilities in young children. This training is expected to provide new knowledge and skills to teachers in integrating technology in learning so as to create a more interesting and meaningful learning experience for their students. Evaluation was given by the target community after the implementation of the community service activities. This aims to provide suggestions for improvement and also feedback from the target community. In order to sustain community service activities, feedback is needed from activities that have been implemented and carried out previously. The results of feedback and

suggestions for improvement from the target community were collected and became material for evaluating the implementation of community service in the next semester or period.

Table 1. The recapitulation of training activity feedback

Evaluation Parameter	Answer Score 4*	Answer Score 5*
Activity material is in accordance with the needs of partners/participants	30%	70%
The implementation time of this activity is relatively suitable and sufficient	30%	70%
The material/activities presented are clear and easily understandable	40%	60%
The committee provides good service during the activity	20%	80%
The community receives and hopes that activities like this will continue in the future	10%	90%
The offered technology is very beneficial	0%	100%

*The scoring for each statement on a scale of 1 to 5 (where 1 = strongly disagree and 5 = strongly agree)

From the total of 35 participants who were present during the community service activities, 15 people filled out the online survey given during the community service activities. From a total of 15 participants who filled out the online survey given during the community service activities, the results obtained were as shown in Table 1 above. From the results of this feedback, the training activities carried out were in accordance with their needs. In terms of implementation time, 70% of participants strongly agreed, and 30% agreed. Apart from that, the committee team gave a very good impression to the participants. Regarding the material/activities presented, 70% of participants strongly agreed and 30% agreed that the activities were presented clearly and easily understood. In terms of the committee providing good service during the activity, 80% of participants stated that they strongly agreed, and 20% agreed that the committee provided good service during the activity. Then, it is expected that activities like this can continue in future community service, as many as 90% strongly agree and 10% agree. There was no answer with a score below 4.

Conclusion

Training on introducing simple robots to PAUD teachers at PG & TKIT Little Moslem is a concrete step to overcome challenges in developing the psychomotor abilities of young children. This must be accompanied by a comprehensive and structured approach to ensure its success. The use of technology in early childhood education can provide various benefits, such as increasing children's interest and motivation in learning, providing interactive learning experiences, and helping in the development of various skills. One technology that can be used in early childhood education is a simple robot. Simple robots are electronic devices designed to perform specific tasks with simple interactions. The use of simple robots in early childhood learning can provide a fun and interactive learning experience for children. Through training on introducing simple robots to teachers at PG & TKIT Little Moslem, it is expected that they can overcome several problems and challenges that occur and increase the effectiveness of education, especially in developing psychomotor abilities in young children. It is expected that this training will provide teachers with new knowledge and skills in integrating technology in learning so that they can create a more interesting and meaningful learning experience for their students.

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