IMPROVING THE QUALITY OF LEARNING IN THE TKJ DEPARTMENT THROUGH THE LINE FOLLOWER ROBOT TRAINER AT SMK NU 1 KARANGGENENG

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Abstrak
Permasalahan yang terjadi di Sekolah Menengah Kejuruan (SMK) saat ini kurangnya kualitas produk, sarana dan prasarana yang belum menunjang kegiatan pembelajaran dan kerja sama antar Perusahaan, instantasi pemerintah maupun universitas. Akan tetapi beberapa permasalah tersebut dapat diatasi dengan melakukan berkoordinasi dan bersinergi antara perguruan tinggi dan sekolah vokasi melalui program kegiatan pengabdian kepada Masyarakat yang salah satunya dengan mengenalkan trainer robot line follower untuk siswa jurusan TKJ. Kontribusi dalam program ini yaitu Universitas Negeri Malang melalui program pengabdian mahasiswa bekerjasama dengan SMK NU 1 Karanggeneng dengan melaksanakan kegiatan pelatihan trainer robot line follower untuk siswa jurusan TKJ guna meningkatkan mutu belajar. Metode pengabdian yang digunakan untuk penyelesaian trainer ini adalah ADDIE (Analyze, Design, Development, Implementation and Evaluation) dengan model pembelajaran implementasi teori dan praktek. Pada tahap terakhir akan dilakukan evaluasi pelatihan. Kegiatan pengabdian kepada Masyarakat ini berupa pelatihan yang dibagi menjadi beberapa kegiatan diantaranya sosialisasi program pelatihan trainer robot line follower, implementasi robot line follower dalam dunia industri dan evaluasi pelatihan. Kesimpuan dari kegiatan ini menyatakan bahwa siswa dapat meningkatkan kemampuan pengetahuan dan pemahaman tentang robot line follower.
Kata kunci: Robot Line Follower, Pelatihan Siswa, SMK

Abstract
The problems that occur in Vocational High Schools (SMK) are currently the lack of product quality, facilities and infrastructure that have not supported learning activities and collaboration between companies, government agencies, and universities. However, some of these problems can be overcome by coordinating and synergizing between tertiary institutions and vocational schools through community service activity programs, one of which is by introducing line-follower robot trainers for students majoring in TKJ. The contribution to this program is Malang State University through a student service program in collaboration with SMK NU 1 Karanggeneng by carrying out training activities for line follower robot trainers for students majoring in TKJ to improve the quality of learning. The dedication method used for the completion of this training is ADDIE (Analyze, Design, Development, Implementation, and Evaluation) with a theory and practice implementation learning model. In the final stage, a training evaluation will be carried out. This community service activity is in the form of training which is divided into several activities including socialization of the line follower robot trainer training program, implementation of line follower robots in the industrial world, and evaluation of training. The conclusion of this activity states that students can improve their knowledge and understanding of line-follower robots.
Keywords: Robot Line Follower, Student Training, Vacational High School

INTRODUCTION

The increasingly massive development of information technology in various sectors will be directly proportional to the development of innovation in teaching and learning activities in tertiary institutions (Manalu, Sitohang, & Henrika, 2022). Computer Network Engineering (TKJ) focuses on skills related to computers and networks (Sardi & Habibullah, 2022). Basic content in vocational areas of expertise includes hardware, software, and basic programming. SMK NU 1 Karanggeng creates promising graduate students from the Computer Network Engineering major as long as they meet the requirements with the established standard of expertise.

The TKJ major itself, according to the definition from Wikipedia, is an Information and Communication Technology-based science related to the ability of algorithms and computer programming, computer assembly, assembling computer networks, operating software, and the internet (Novianta & Firman, 2021). But apart from that, the TKJ major also provides additional competency competencies, namely electricity, electrical engineering, software, and hardware. In the educational process while at SMK majoring in TKJ, students will be taught from the basic level about assembly, computer repair, peripheral repair, web design, and networking, to network security (Toresa, Putra, Febriadi, & Handayani, 2023; Trianto, 2022). With all the skills taught in full from the first level to the end, students are expected to be able to compete according to their expertise in the technology-based world of work (Yantidewi, Dzulkiflih, Ermawati, & Zainuddin, 2022).

The learning process related to the skills of the Vocational Computer Network Engineering (TKJ) major is generally given in theory first, then followed by practice (Kusumawati & Prapanca, 2023; Saifuddin, Putro, & Irianto, 2020). This is done to equip or as a support during practice, supporting theories can be utilized to help practice activities (Putra, Pradeka, Adiwilaga, Munawir, & Adjhi, 2023). An effective learning model in this practical activity is using learning media that is under what is actually (an intact media model) (Prijono, Hankawidjaja, & Felix, 2023). Learning media is a tool used as an intermediary to convey messages in the learning process (Aini, Edriati, & Pratama, 2023; Ohy, Manoppo, & Parinsi, 2021).

Based on the supporting facilities and infrastructure, the programming subject for the TKJ major at SMK NU 1 Karanggeneng is inadequate. Therefore, a Line Follower Robot Trainer was made as a practicum application for this subject and supports effective and efficient learning and implements project-based learning. The Merdeka Learning curriculum is marked by an increase in digitization programs supported by several factors including the occurrence of new forms of interaction between humans and machines and digital transfer instructions to the physical world, such as robotics and 3D printing (Sumarsih, Marliyani, Hadiyansah, Hernawan, & Prihantini, 2022).

However, the problem is that the TKJ expertise program has not fully implemented the Merdeka Learning curriculum because there is one subject, namely Programming, which does not yet have the facilities and infrastructure for practicum. With these constraints, the learning process is centered on the teacher so that the teacher is not free to design problems according to student characteristics (Sitorus, Gifson, Mangapul, & Aziz, 2020). As a result, the teacher cannot develop learning materials, media, and teaching materials.

To overcome the problems faced by SMK NU 1 Karanggeneng Engineering and Computer Network expertise program, the researchers created a Line Follower Robot trainer and provided training and practice as a support for the Merdeka Learning curriculum. This service activity involved students of class X, XI, and XII of the Engineering and Computer Network along with teachers in charge of these subjects.

There is a community service program that focuses on Line Follower Robot trainers conducted by Andi Junaidi, et al at the Asshidiqiyah 2 Batu Ceper Islamic Boarding School by holding Line Follower Robot Training with the results of assembling and creating programs independently and also modifications by students (Junaidi, 2021). Then what was done by Raditya Artha Rochmanto, et al at the Nurul Furqon Nature School in Rembang conducted training for students to assemble line follower robots to improve skills in making robots so they could keep up with technological developments in the industrial era 4.0 (Rochmanto et al., 2023). Then the activities carried out by Yosi Riduas Hais, et al at SMAN 15 Muaro Jambi by holding a workshop on making Line Follower Robots to improve student competence (Hais et al., 2023).

This service program is carried out by providing training to students and teachers. The purpose of this program is to introduce the Line Follower Robot and the urgency for Malang State University to be able to work with SMK NU 1 Karanggeneng which will carry out Line Follower Robot trainer training activities to improve the quality of learning in the TKJ major in supporting the Free Learning Curriculum.

METHOD

The development of a line follower robot trainer as a form of service at SMK NU 1 Karanggeneng is structured in three forms of activity, namely, model studies based on literature and field needs as well as trainer trials by both students and teachers supporting the subject as well as motorcycle

electricity trainer training. Line Follower Robot trainer training is planned for 6 hours of learning at SMK NU 1 Karanggeneng, especially TKJ students, which will be held on Tuesday, 6 June 2023. The theoretical and practical implementation of how to assemble and manufacture Line Follower Robots (Marwanto, Suharjanto, Pius, & Raharjo, 2021). The type of service method used for the completion of this training is ADDIE (Analyze, Design, Development, Implementation, and Evaluation) (Faiz, Falah, & Syah, 2022; Sulistyorini & Listiadi, 2022). Figure 1. shows the stages of the ADDIE model development service (Juanda & Hendriyani, 2022).

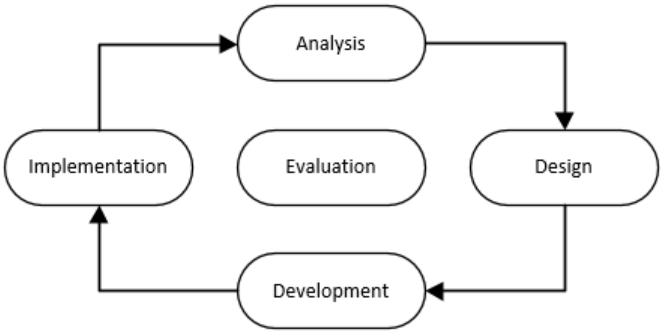

Figure 1. The stages of serving the ADDIE model

1. Analysis
   The initial stage is to analyze the need for trainer development and the feasibility and requirements for trainer development. After that, evaluate whether the trainer is appropriate or not.
2. Design
   Designing trainers according to the results of the analysis that has been carried out then the design results are re-evaluated whether they are appropriate or not.
3. Development
   The ADDIE development service model includes activities for the realization of trainer designs that have previously been made. The framework that is still conceptual is then realized as a trainer that can be used. After that, a re-evaluation was also carried out.
4. Implementation
   The trainers that have been developed are then implemented and an initial evaluation is carried out to provide feedback on the products that have been made.
5. Evaluation
   Conducted to provide value to the development of trainers.

RESULTS AND DISCUSSION

The method used in the implementation of Community Service (PKM) activities for students at the State University of Malang (UM) is by providing line follower robot trainer training at SMK NU 1 Karanggeneng, Lamongan. This training was held from 09.00 AM until 03.00 PM. This training is also equipped with independent assignments. In this training activity, the community service program is divided into several activities such as socialization of line follower robot trainer training programs, implementation of line follower robots in the industrial world, and evaluation of training.

At the socialization stage of the line follower robot trainer training program, the service team coordinated and communicated intensively with the Head of Sekolha SMK NU 1 Karanggeneng Lamongan starting from designing learning in training to the handover of the line follower robot trainer as shown in figure 2. In this activity, communication and coordination were very necessary to be able to prepare training materials and deliver them on target according to what students wanted.

Figure 2. The handover of the tools by the head of the community service team to the principal of SMK NU 1 Karanggeneng

In the implementation of the line follower robot application, UM students presented theory and practice as shown in Figure 3. It involved students of class X, XI, and XII for TKJ majors as participants. The service team also explained the development of line follower robot technology, how the robot works, and how to maintain the operational maintenance of the line follower robot trainer.

Figure 3. Presentation of theory and practice by UM students to students of SMK NU 1 Karanggeneng

The last stage in this service activity is evaluating the community service program regarding line follower robot trainer training by providing a questionnaire containing statements and questions about line follower robot technology to find out students' responses and understanding of this training activity. Participant responses to the questions asked can be seen in Figure 4. Figure 4 shows a very good student response to this activity who was able to understand the material and practice of line follower robot trainer training explained by the team. The evaluation of the community service program contains questions about what is a line follower robot, and with a total of 50 students, all of them answered correctly with a percentage of 100%. Then the question about the function of the line follower robot, the percentage of correct answers reached 82% and 18% wrong. Furthermore, the third question regarding the advantages of using line follower robots for the industrial world produces right and wrong answers from students, namely 70% and 30%. The percentage of these answers has decreased because line follower robot technology is a new technology to be learned for students majoring in TKJ in its application in the industrial world. In the last question regarding the workings of the line follower robot, the correct and wrong answers were obtained by students reaching 74% and 26%. This proves that students can understand the working system of the line follower robot. With the response and enthusiasm of students, it is hoped that they can add understanding, knowledge, and insight to students.

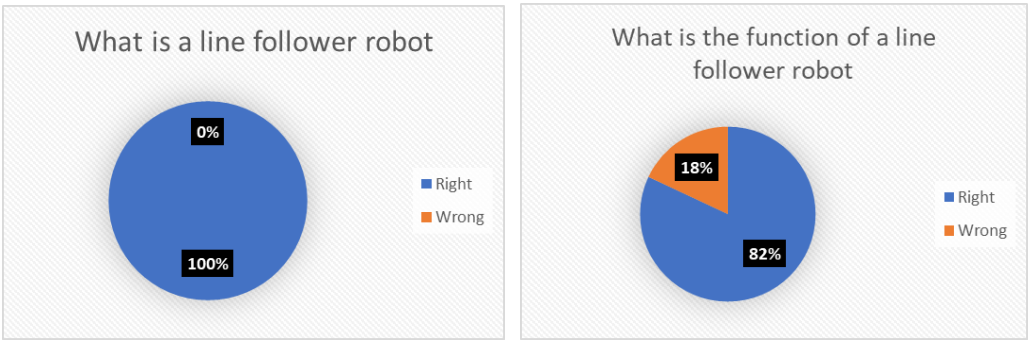

Figure 4. Graph of TKJ student responses at SMK NU 1 Karanggeneng to training activities

CONCLUSION

This community service activity aims to transfer the knowledge of the UM student team to students majoring in TKJ SMK NU 1 Karanggeneng Lamongan by introducing line follower robot technology. This community service program is divided into several activities including socialization of the line follower robot trainer training program, implementation of line follower robots in the industrial world, and training evaluation. In socialization activities, a training program is a form of team and target for communication so that there can be synchronization of materials for line follower robot trainer training at SMK NU 1 Karanggeneng. Implementation was carried out by the team by delivering training materials covering theory, practice, functions, and benefits of line follower robots in the industrial world as well as how to work and maintain.

Training evaluation is the last activity in line with follower robot trainer training. The evaluation was carried out with the hope that students majoring in TKJ would be able to understand the line follower robot trainer training activities and the responses obtained from students in the event were that students could improve their knowledge and understanding of line follower robots. Some of the problems found in this activity include the number of students participating with the number of line follower robot trainers, which only have 1 units, so that in practice the process is carried out with a simple operating system. It is necessary to carry out activities like this in the future to introduce more technology that can be made using a line follower robot trainer for students. It is hoped that this article can be used as a reference in community service activities in Indonesia.

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