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Basic Coding Block Mentorship for IT School Teachers at Insan Teladan Cileunyi, Bandung District

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Abstract. Teachers in schools need to understand the development of technology in the current era of Industry 4.0. With this background, education about technology and its advancements, particularly in the fields of coding and robotics, is essential so that teachers (who are then expected to transfer their knowledge to students) can better understand the importance of learning programming (coding) and robotics in the latest technological developments. In practice, teachers at Insan Teladan Integrated Islamic School (IT) are constantly seeking suitable methods and tools to realize the school's mission, which is technology-oriented. Here is where community service through mentoring activities by Telkom University lecturers, Electrical Engineering undergraduate program, plays a role. The goal is to enhance teachers' understanding of the use of information technology (coding) and robotics to support the teaching-learning process. Based on feedback obtained from the target community (teachers) who filled out questionnaires, it can be concluded that 91% of the target community agrees or strongly agrees that this activity meets their needs.

Keywords: mentoring, coding, block, robotics, teachers

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INTRODUCTION

By definition, programming languages, commonly known as coding, are sequences of information and commands that govern the operation of one or more computers. Mastery of programming languages enables the creation of various applications using computers, machinery, and even smartphones [Prastiwi, 2022]. Research on the interest in mastering programming languages indicates a significant trend, given the belief in the potential for future demand, both in the general industry and industries and technologies related to robotics [Khoirunnisa, 2015; Ore et al., 2018; Vale, 2023].

Awareness of the usefulness of coding skills and mastery sometimes does not receive adequate support in terms of device availability and knowledge transfer, including one of the obstacles being the difficulty in composing and applying the code itself. Currently, there are various programming languages or codes that can be learned and utilized, ranging from simple to fairly complex applications, including for educational purposes [Kishikawa, 2021]. Some popular ones include:

1. Java, which became known in 1994 and can be used on various operating systems.
2. PHP, a coding language that serves as a platform for web developers.
3. The Python programming language, which is highly popular nowadays due to its ease of use and adaptability, especially in the context of artificial intelligence and machine learning trends that often utilize Python for algorithmic instructions in artificial intelligence applications.

Understanding the sequence of code or script in composing the framework of thinking/algorithm of a process using a programming language or coding is a quite challenging task for students. As a solution to simplify algorithm composition, programmers can utilize scratch programming by arranging block flow of thinking to solve an automation process, for example. In block-based coding, the program structure is embedded using blocks containing lines of instructions, which are then visualized by specific graphical characters [Ladias et al., 2022].

In Figure 1, arranging the algorithm to turn on LED lights in a specific and alternating manner can be accomplished using C programming (using the Arduino IDE editor) and can also be done using scratch/block programming.

Training in basic scratch-based coding is an extension activity conducted by lecturers and students of the Electrical Engineering undergraduate program at Telkom University, Bandung, held at Insan Teladan Integrated Islamic School.

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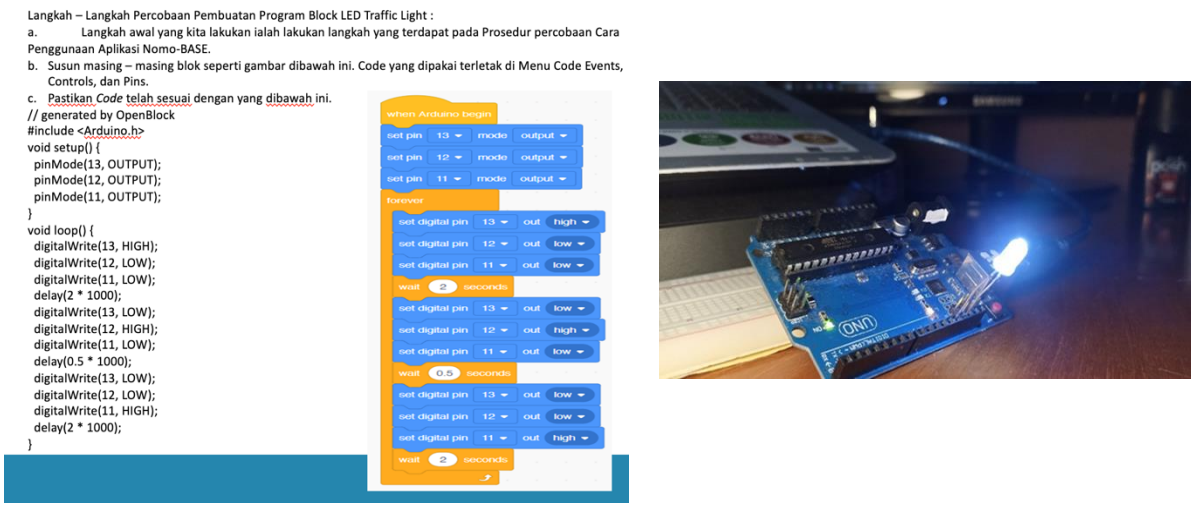

Fig. 1 C Programming, block to turn on the LED

Insan Teladan IT School is a private elementary school that is Islamic Boarding & Full Day School with several advantages such as Comfortable Class, Technology-Based, Child Friendly and Fun, Religious Character, Islamic Activity, Safe, The best quality Teachers, Library Facility, and Computer Lab. Insan Teladan Elementary School has a vision and mission to become a leading Islamic school characterized by Quranic values, environmental awareness, and technology.

The official website of Insan Teladan Elementary School can be found at http://insanteladan.sch.id. According to the school data from the Bandung Dapodik website, Insan Teladan Elementary School is registered with the NPSN number 69755929. It is accredited A and conducts full-day education for 5 days. The location of Insan Teladan IT School is at Jl. Vila Bandung Indah, Cileunyi Kulon, Kec. Cileunyi, Kab. Bandung, West Java Province, approximately 20 km (without toll road) or 18 km (with toll road) from Telkom University Bandung campus.

Fig. 2 Insan Teladan Integrated Islamic School Cileunyi Bandung (source: https://insanteladan.sch.id)

The community targeted for mentoring activities for teachers at Insan Teladan School is very appropriate considering one of its missions is to provide quality and professional Islamic education in knowledge and technology. From this mission, the target partner shows a strong interest in adopting technological advancements. Therefore, mentoring and coding training activities conducted by Telkom University lecturers, Electrical Engineering undergraduate program, have played a role.

PROBLEM

In general, in the industrial and technological world, programming with software as well as information and robotics has become an important part of societal needs. In the educational community, schools and universities, the use of software has been proven to enhance the teaching and learning processes for teachers and students, especially in the current Industry 4.0 era [Montesdeoca, 2023]. Currently, teachers are expected to have a better understanding of technology and robotics education due to the present and future needs of students. In practice, teachers at Insan Teladan IT School constantly strive to consider suitable methods and tools to realize the school's vision and mission related to increasing technological awareness among students in an environment that is continuously evolving, adaptive, and innovative.

The common problems faced by schools regarding technology development trends serve as the basis for drafting the roadmap of community service activities, as seen in Figure 3 below.

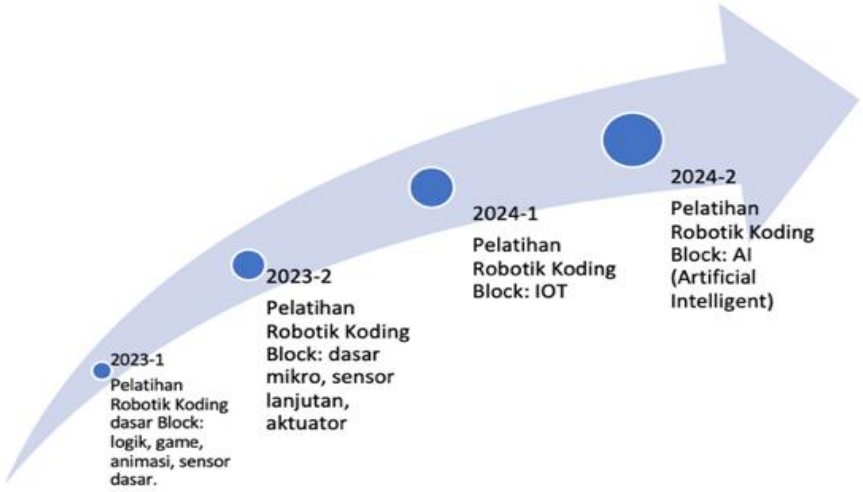

Fig. 3 Roadmap for mentoring programming coding.

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METHOD

Based on the background and existing issues, the community service activities of mentoring provide methods to achieve the activity's goals, namely:

1. Introduction to the basics of programming using blocks.
2. Assistance in installing Nomo-kit software and Nomo link drivers necessary for communication between Nomo-kit software and robotic hardware devices (sensors, LEDs, buzzers, etc.), accessible at https://nomo-kit.com. Introduction video of Nomo kit can be accessed at https://www.youtube.com/watch?v=chVohn5et-g&t=10s.
3. Training on creating animated games using Nomo-kit, followed by some participants presenting their animated game creations to practice applying logical concepts in animation and game creation using block programming.
4. Demonstrating Nomo-kit to communicate with robotic instruments, aiming to enhance participants' understanding of block coding for real-world applications.

To maintain the continuity of mentoring, a discussion group forum was formed after the community service activities. The continued goal of mentoring activities with the presence of a discussion forum is to improve teachers' understanding, which is then passed on to school students, regarding the use of information technology (coding) and robotics in the teaching-learning process. This effort supports the mission of SD IT Insan Teladan School to create a more innovative and adaptive learning environment with a technological perspective.

RESULT AND DISCUSSION

The community service program conducted is the beginning of community service efforts to foster cooperation and improve understanding and skills among teachers in schools to support the teaching of Technology or commonly known as STEM (Science Technology Engineering Math), referring to research reports [Ismail et al, 2023]. Other reports related to robotics learning supporting STEM can be found in several publications, including [Doherty et al, 2019; Rokbani et al, 2022].

In this community service activity, teachers received theoretical and practical assistance on the following topics:

a) Topic Title: Coding For Kids: Introduction
   - Objective / Expected Outcome: Participants are expected to gain an understanding of coding principles, application development stages, and various programming languages.

- Curriculum Content: What is coding?; What is an Algorithm?; Computer Contents; Computer Language; Application Development; Coder Figures; Introduction to Nomokit

b) Topic Title: NomoPro Application: Animation and Game
   - Objective / Expected Outcome: Participants are expected to understand and be able to create simple animation and game applications.
   - Curriculum Content: Animation; Game

c) Topic Title: NomoPro Application: Elephant Playing Piano From Fruits
   - Objective / Expected Outcome: Participants are expected to understand and be able to use block-based software and hardware devices in online/real-time model
   - Curriculum Content: Using block-based programs; Connecting programs with hardware, creating animations linked to hardware.

Fig. 4 Coding Assistance at Insan Teladan Integrated Islamic School, Cileunyi Bandung.

From our visual observations, participants appeared very enthusiastic and eager to participate in community service activities, which concluded with gathering participants' feedback through a questionnaire, with results shown in Table 1, where 91% of participants responded positively, agreeing and strongly agreeing with this community service activity. However, 3% expressed disagreement regarding the allocation of time and material for the community service activities; we acknowledge constraints in time allocation and limited equipment, preventing some participants from fully understanding the material. We have anticipated this by enhancing understanding through group-based simple project assignments with student assistants' guidance.

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Table 1. Questionnaire responses from participants regarding community service activities

Questions	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Activity materials are confirmed according to the needs of partners/participants	0	0	1	25	13
2. The material presented/technology/art is useful for society	0	0	0	24	15
3. The time allocation for activities is considered sufficient and sufficient	0	5	3	20	11
4. The material presented is clear and easy to understand	0	2	9	20	8
5. The committee provided good service during the activity	0	0	0	22	17
6. The community hopes that there will be sustainable activities	0	0	1	21	17
Amount	0	7	14	132	81
Percentage					
Total			100 %		

CONCLUSION

Community mentoring was attended by 39 teachers from Insan Teladan Integrated Islamic School, Cileunyi Bandung, on Saturday, December 16, 2023. Based on the post-activity questionnaire, 91% responded positively to the implementation and future sustainability of the program. The activity aimed to transform knowledge about block coding for teachers, with the hope that it could be passed on to students as preparation for the challenges and potential of coding and robotics in the future.

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