

Introduction to AI and Computational Thinking for Teachers at SDIT Mafatih Bekasi

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Abstract

The development of Artificial Intelligence (AI) and the demand for strengthening Computational Thinking (CT) skills make AI and CT literacy a key competency for educators in the 21st century. At the elementary level, particularly in Integrated Islamic Elementary Schools (SDIT), teachers play a crucial role in instilling systematic thinking and technological literacy from an early age, yet many teachers lack conceptual understanding or practical skills related to AI and CT. This community service activity aims to improve SDIT teachers' basic understanding of AI concepts, examples of AI applications in education, and the CT process and its implementation in elementary school learning activities. The activity was carried out in the form of face-to-face training that included material presentations, demonstrations of educational AI applications, and practical CT activity designs tailored to the characteristics of elementary school students. Evaluation was conducted using pre- and post-tests to measure knowledge gains, and questionnaires to assess participants' perceptions and satisfaction levels. The implementation results showed an increase in participants' knowledge scores between before and after the training, accompanied by a more positive change in attitudes towards the use of AI and CT in the classroom. Teachers were also able to design simple and contextual CT-based learning activities for elementary school students. This activity shows that structured training with a combination of conceptual material and directed practice is effective in building AI and CT literacy among SDIT teachers.

Keywords: Artificial Intelligence, Computational Thinking, SDIT.

1. INTRODUCTION

The development of Artificial Intelligence (AI) has brought significant changes to various sectors, including education. Numerous studies have shown that AI has significant potential to support more personalized, adaptive, and data-driven learning through adaptive learning systems, intelligent tutoring systems, and learning analytics [1]–[3]. On the other hand, Computational Thinking (CT) is seen as one of the 21st century competencies that is important for all students, not just aspiring computer scientists [4], [5].

Wing introduced CT as a way of thinking that involves problem solving, system design, and understanding behavior by utilizing fundamental concepts of computer science [4]. Further studies confirm that CT includes decomposition, pattern recognition, abstraction, and algorithm design, and is closely related to higher-order thinking skills such as problem solving and critical thinking [5]–[7]. Various studies show that the integration of CT in primary and secondary education can improve students' problem-solving abilities and readiness to face the challenges of a technology-based world of work [8].

In the elementary school context, CT can be introduced through unplugged activities, the use of teaching aids, games, and simple visual programming. Research shows that unplugged activities can significantly develop CT in elementary school students because they provide concrete and enjoyable experiences without relying on digital devices [6], [9]. The combination of unplugged activities and block programming has also proven effective in strengthening the understanding of algorithm and logic concepts in early childhood students.

As AI advances in education, teacher readiness and perceptions are key factors in the successful integration of this technology. International studies show that teacher readiness, attitudes toward technology, and professional development support influence the intention and practice of teaching AI in the classroom [10]. In the context of primary education, several studies have found that teachers still face challenges in understanding AI concepts, selecting appropriate

applications, and designing safe and ethical learning activities. Therefore, structured training that is relevant to teachers' work contexts is needed to build AI and CT literacy.

Based on initial observations at partner schools of the Integrated Islamic Elementary School (SDIT), most teachers do not yet have an adequate understanding of the basic concepts of AI, examples of AI applications in education, or the stages of CT that can be adopted in teaching and learning activities. Learning that develops CT is generally not yet carried out explicitly, and the use of AI-based applications is still very limited. This community service activity is designed to: (1) introduce the basic concepts of AI and their implications in education to SDIT teachers; (2) introduce the main processes and components of CT as well as examples of activities suitable for elementary school students; and (3) train teachers to design simple learning activities that integrate CT and/or utilize educational AI applications.

2. METHOD

The community service activity uses a training approach (workshop) with a combination of interactive lecture methods, demonstrations, and directed practice (hands-on). The evaluation design uses a one-group pre-test and post-test model (one group pre-test–post-test design) to measure the increase in participants' knowledge after participating in the training. The activity was carried out at SDIT Mafatih located in Bekasi, in collaboration with Mafatih Group. Participants consisted of 17 SDIT Mafatih teachers across subjects selected based on school recommendations and willingness to participate in the full training. The material presented in the community service included.

- i. Introduction to the concept of AI: a brief history, definition, and comparison of how humans and AI work.
- ii. Developments and examples of AI applications in education (e.g., adaptive learning platforms, automated assessments, and AI-based learning assistants).
- iii. Basic concepts of AI: decomposition, pattern recognition, abstraction, and algorithms.
- iv. Examples of AI-based activities using unplugged and simple programming (Scratch or similar).
- v. Discussion of ethics and the role of teachers in the use of AI.

Knowledge assessment was conducted using multiple-choice tests (pre-test and post-test) on basic AI concepts, examples of AI applications in education, and CT concepts. Additionally, a perception questionnaire was used to measure teachers' attitudes toward AI and CT, perceived ease of use, and level of satisfaction with the training. A Likert scale of 1-4 was used for each statement. The stages of activity implementation were as follows: (1) coordination with partner schools and selection of participants, (2) development of pre-test/post-test modules and instruments, (3) administration of a pre-test to measure participants' prior knowledge, (4) delivery of introductory material on AI and CT, (5) demonstration of AI applications in education, (6) practice of developing CT-based learning activities in groups, (7) administration of a post-test and completion of a questionnaire, and (8) reflection and follow-up discussions on implementation in the classroom. Pre-test and post-test data were analyzed descriptively by calculating the mean, standard deviation, and percentage improvement. Paired difference tests (e.g., paired t-tests) can be used to determine the significance of changes in scores if the number of respondents is sufficient. The questionnaire data were analyzed using descriptive statistics (mean and percentage) to describe participants' perceptions of the training materials, methods, and usefulness.

3. RESULT AND DISCUSSION

The analysis showed that participants' pre-test knowledge scores were in the low-moderate category, with most teachers unable to accurately explain the definition of AI and

unfamiliar with CT terms such as decomposition and algorithm. After participating in the training series, post-test scores improved for almost all participants. Improvements were evident in participants' ability to explain the differences between AI and traditional computing, cite examples of AI applications in education, and identify CT steps in a learning case study. Overall, these findings indicate that the training successfully improved teachers' conceptual understanding of AI and CT.

Questionnaire data showed that participants considered the training materials relevant to their learning needs and helpful in unlocking insights into the potential of AI in schools. Most teachers expressed interest in trying out specific AI applications (e.g., for question creation, text summarization, or adaptive exercises) and implementing CT activities in their lessons. Challenges identified included limited class time, the need for more technical advanced training, and the availability of devices and a stable internet connection. This finding is in line with previous studies which emphasize the need for continuous support and a conducive environment for the integration of AI and CT in learning to run effectively.



Figure 1. Discussion of PKM material

The increase in teacher knowledge after participating in the training is consistent with the findings of teacher professional development studies in the field of AI and CT, which emphasize the importance of learning experiences that combine conceptual understanding, tool exploration, and designing learning practices. The integration of CT activity design practice sessions allows participants to directly contextualize the concepts learned with their respective subjects, thereby increasing the relevance and potential sustainability of implementation. On the other hand, the identification of barriers such as limited infrastructure and teaching time indicates the need for institutional support and school policies to accommodate AI and CT-based learning innovations. The results of this activity can be the basis for designing more in-depth follow-up training programs, for example focusing on the development of curriculum-integrated CT teaching modules or intensive training on the use of specific AI platforms.



Figure 2. Discussion of advanced PKM material

4. CONCLUSION

The community service activity, which included training on introducing AI and Computational Thinking for teachers at Mafatih Islamic Elementary School (SDIT Mafatih), successfully improved their conceptual understanding of these two topics and fostered a more positive attitude toward the use of AI in the classroom. Teachers gained a concrete understanding of examples of AI applications in education and the CT process that can be embedded through simple learning activities.

Practically, this training resulted in several CT-based learning activity designs that can be implemented in partner schools and further developed. This activity emphasized the importance of supporting ongoing teacher professional development in facing changes in the education ecosystem increasingly influenced by AI. Future community service programs are needed, including mentoring for classroom implementation and developing a community of practice among teachers to share experiences and resources. Further research can also be conducted to evaluate the long-term impact of teachers' AI and CT literacy on student learning outcomes and learning innovation in schools.

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