

# The Influence of AI Coding and Technology Tools on Human Resource Readiness Through Digital Literacy

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**Abstrak.** The era of Society 5.0 demands the integration of technology and character building in education to prepare superior human resources (HR). However, preliminary observations at public elementary schools in Rejotangan District reveal a gap between policy and reality, characterized by low digital literacy and limited availability of AI-based learning tools. This study aims to analyze the influence of AI Coding-based learning implementation and the availability of technological devices on the readiness of intelligent and competitive HR, mediated by students' digital literacy in science and social studies (SASS). This research employs a quantitative approach with an associative design. The population comprises 319 Grade 5 students, with a sample of 178 students determined using the Slovin formula and proportional stratified random sampling. Data analysis utilizes Structural Equation Modeling (SEM-PLS). The findings indicate that both AI coding learning and device availability significantly influence HR readiness through digital literacy as a mediator. This research provides a model for integrating AI coding in elementary education.

**Keywords:** Coding AI, Digital Literacy, HR Readiness, Society 5.0, Technological Devices

## 1 Introduction

Education in the 21st century faces complex challenges in preparing adaptive and competitive human resources (HR) in the *era of Society 5.0*. The Government of Indonesia through the Independent Curriculum encourages student-centered learning by utilizing technology. One of the strategic implementations is *Coding* and *AI-based* learning that is integrated in science subjects in elementary schools.

However, the success of this implementation is highly dependent on infrastructure. The study of Prayogo, Subiyantoro, and Kadeni (2025) confirms that the availability of technological devices and the development of web-based media are crucial factors in the effectiveness of digital learning. Without adequate device support, technology adaptations such as coding are difficult to do.

In addition to the technical aspect, psychological aspects such as motivation and self-efficacy are also vital. Research by Uma and Anasrulloh (2023) shows that education that instills self-efficacy has a significant effect on an individual's readiness to compete (entrepreneurship/work). This is in line with the need for interactive ICT learning media to increase creativity, as found by Novanti, Subiyantoro, and Purwananti (2025). This study aims to examine the influence of AI coding and technology tools on human resource readiness with digital literacy as a mediating variable.

## 2 Method

This study uses a quantitative approach with a causal associative design. The research population is 319 5th grade students of State Elementary School in Rejotangan District, Tulungagung Regency. A sample of 178 students was taken using *the Proportional Stratified Random Sampling* technique based on the Slovin formula.

The research variables consisted of Implementation of *AI Coding* Learning (X<sub>1</sub>) and Device Availability (X<sub>2</sub>) as exogenous variables, HR Readiness (Y) as endogenous variables, and Digital Literacy (Z) as mediating variables. Data collection was conducted using a Likert scale questionnaire (1-5). Data analysis was carried out using *Structural Equation Modeling* (SEM) with the help of *SmartPLS 4.0 software* to test validity, reliability, and hypothesis (structural pathways).

Based on the theoretical basis of mediation and the results of previous research, the H<sub>7</sub> hypothesis can be formulated: Digital literacy mediates the influence of the implementation of AI Coding-based learning and the

availability of technology learning tools on the readiness of smart and competitive human resources of 5th grade students of State Elementary School in Rejotangan District, Tulungagung Regency.

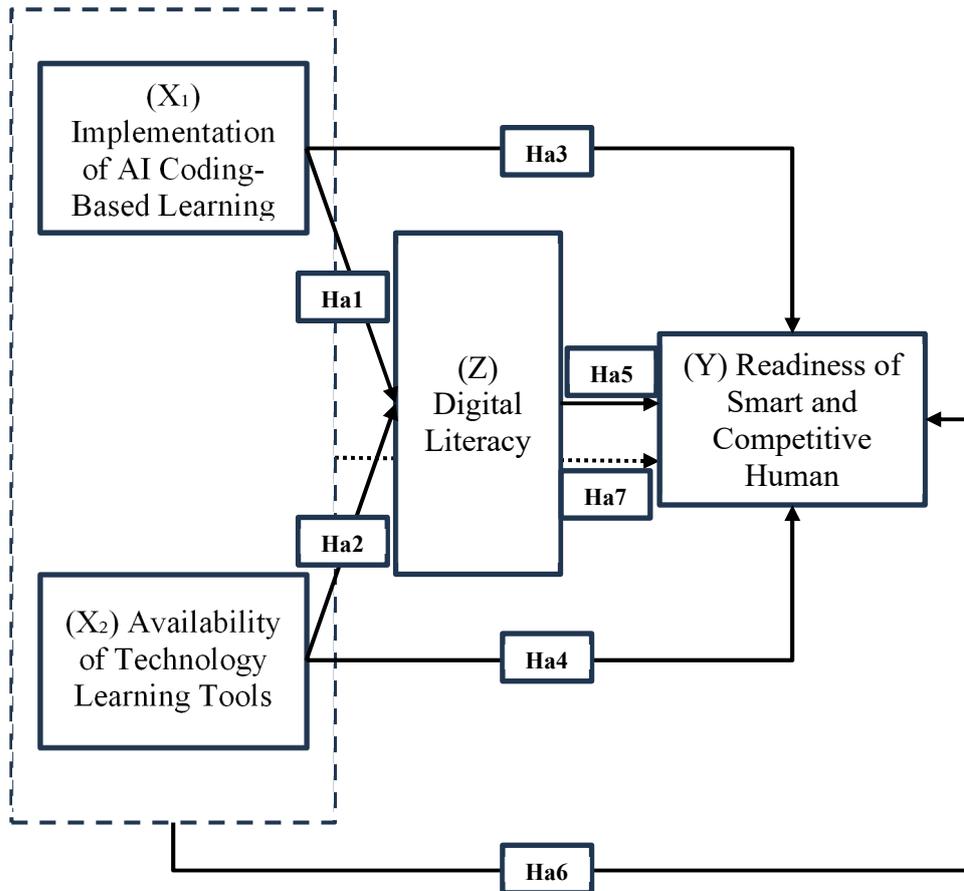


Figure 1. Frame of Mind

Description :

- Direct Influencers
- ..... Indirect influence
- . - . . Simultan

X<sub>1</sub> = AI Coding-Based Learning Implementation  
 X<sub>2</sub> = Availability of Technology Learning Tools  
 Z = Digital Literacy  
 Y = Readiness of Smart and Competitive Human Resources

### 3 Results and Discussion

#### 3.1 Results

##### 3.1.1 Readiness of Smart and Competitive Human Resources (Y)

It is known that the readiness score of intelligent and competitive human resources of grade V students of State Elementary School in Rejotangan District is dominated in the high and medium categories. A total of 74 students (41.11%) were in the high category and 68 students (37.78%) were in the medium category, while the very high category amounted to 12 students (6.67%), the low category was 20 students (11.11%), and the very low category was 6 students (3.33%). This shows that in general, the readiness of intelligent and competitive human resources of students is already at a medium to high level, although there are still a small number of students who need more intensive assistance to reach a higher category.

##### 3.1.2 Implementation of AI Coding-Based Learning (X<sub>1</sub>)

That the score of the implementation of Coding AI-based learning is mostly in the medium and high categories. A total of 63 students (35.00%) were in the medium category and 62 students (34.44%) were in the high category,

while the very high category amounted to 18 students (10.00%), the low category was 24 students (13.33%), and the very low category was 13 students (7.22%). These findings show that the implementation of AI-based learning in grade V of SD Negeri Rejotangan District has generally been running at a medium to high level, but it still needs to be strengthened so that more students reach the high and very high categories.

### 3.1.3 Availability of Technology Learning Tools ( $X_2$ )

It is known that the availability score of technology learning devices is mostly in the high and medium categories. A total of 79 students (43.89%) responded that the availability of devices was in the high category and 66 students (36.67%) were in the medium category, while the low category amounted to 20 students (11.11%) and the very low category was 15 students (8.33%), and there were no respondents in the very high category. This shows that the availability of technology learning tools at SD Negeri Rejotangan District in general is quite good, although it still needs to be improved in order to reach a very high category.

### 3.1.4 Digital Literacy ( $Z$ )

It is known that the digital literacy scores of grade V students of SD Negeri Rejotangan District are mostly in the high and medium categories. A total of 67 students (37.22%) were included in the high category and 54 students (30.00%) were in the medium category, while the very high category amounted to 22 students (12.22%), the low category was 21 students (11.67%), and the very low category was 16 students (8.89%). This shows that students' digital literacy skills in general are quite good, but there are still groups of students with low and very low digital literacy levels who need more intensive assistance.

## 3.2 Discussion

The results of statistical analysis confirm the proposed theoretical model.

- a. First, Technology Devices ( $X_2$ ) have been proven to have a significant effect on digital literacy and human resource readiness. These findings reinforce the research of Prayogo, Subiyantoro, and Kadeni (2025) who stated that digital infrastructure (such as web media and hardware) is an absolute prerequisite for the success of modern education. The availability of the device allows students to explore *complex coding* features .
- b. Second, *AI Coding Learning* ( $X_1$ ) has a positive effect on digital literacy. This is in line with the views of Novanti, Subiyantoro, and Purwananti (2025) which emphasize the importance of ICT-based media (such as *Canva* or other digital platforms) in increasing students' attention and understanding of science and social studies (SASS). *Coding* trains computational logic which is at the core of productive digital literacy.
- c. Third, the role of Digital Literacy ( $Z$ ) as a mediator towards Human Resources Readiness ( $Y$ ) is very dominant. Students who have high literacy tend to have better mental readiness and competitiveness. This supports the thesis of Uma and Anasrulloh (2023) regarding the importance of self-efficacy and relevant education in shaping competitive interests. Digital literacy provides confidence (*digital self-efficacy*) for students to face future challenges

## 4 Conclusion

- a. The implementation of AI Coding-Based Learning did not have a significant effect on the Digital Literacy of 5th grade students in science subjects. The T-statistical value of 1.132 ( $< 1.96$ ) and the P-Value of 0.723 ( $> 0.05$ ) show that the implementation of Coding AI in the current condition has not been able to directly improve students' Digital Literacy, so it is necessary to strengthen the aspects of planning, teacher competence, and integration of coding activities with digital literacy indicators.
- b. The availability of Technology Learning Tools has a significant effect on students' Digital Literacy. A T-Value of 4.836 ( $> 1.96$ ) and a P-Value of 0.000 ( $< 0.05$ ) show that the more adequate the hardware, software, accessibility, connectivity, and maintenance available in schools, the higher the Digital Literacy of students in science subjects. These findings affirm the importance of technological readiness as a prerequisite for strengthening digital literacy in elementary schools.
- c. The implementation of AI Coding-Based Learning does not have a significant effect on the Readiness of Smart and Competitive Human Resources of grade 5 students. The T-statistical value of 0.757 ( $< 1.96$ ) and the P-Value of 0.487 ( $> 0.05$ ) show that AI coding learning has not been able to directly encourage the eight dimensions of human resource readiness (critical thinking, technology adaptation, learning independence, collaboration, creativity, healthy competitiveness, technology application, and work ethic), without first increasing digital literacy and supported by other supporting factors.

- d. The availability of Technology Learning Tools has a significant effect on the readiness of smart and competitive human resources. The T-statistical value of 4.516 ( $> 1.96$ ) and the P-Value of 0.000 ( $< 0.05$ ) show that the availability of adequate technological devices has a direct contribution to shaping the readiness of 21st century human resources in elementary school students. This confirms that investment in technology infrastructure in primary schools is a key factor in preparing students for the challenges of Society 5.0.
- e. Digital Literacy has a significant effect on the readiness of smart and competitive human resources of students. A T-Value of 3.628 ( $> 1.96$ ) and a P-Value of 0.000 ( $< 0.05$ ) indicate that students with higher Digital Literacy—in terms of the ability to access information, use technology to learn science, create digital content, and maintain digital ethics and safety—have better readiness as intelligent and competitive human resources. Thus, Digital Literacy has proven to be an important foundation for 21st century competence at the elementary school level.
- f. The implementation of AI Coding-Based Learning has a significant indirect influence on the Readiness of Smart and Competitive Human Resources through Digital Literacy. The T-statistical value of 2.875 ( $> 1.96$ ) and the P-Value of 0.003 ( $< 0.05$ ) show that although the direct influence is not significant, Coding AI contributes to the readiness of human resources when it succeeds in improving students' Digital Literacy. This confirms the role of Digital Literacy as a mediating variable that bridges the relationship between AI Coding learning and HR Resiliency.
- g. The availability of Technology Learning Tools has a significant indirect influence on the Readiness of Smart and Competitive Human Resources through Digital Literacy. The T-statistical value of 3.129 ( $> 1.96$ ) and the P-Value of 0.003 ( $< 0.05$ ) show that in addition to having a direct effect, adequate technological tools also increase human resource readiness through strengthening Digital Literacy. This confirms that Digital Literacy plays a role as an intervening variable that strengthens the contribution of technological infrastructure to the formation of superior human resources at the elementary school level.

This study proves that the implementation of *AI Coding learning* and the availability of technology tools have a positive and significant effect on the readiness of student human resources, both directly and through digital literacy mediation. These findings imply that the fulfillment of physical infrastructure (Prayogo & Kadeni, 2025) must be accompanied by a curriculum that builds motivation and logic (Uma & Anasrulloh, 2023; Novanti et al., 2025) to produce a superior generation in the *era of Society 5.0*.

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