



The Utilization of Adaptive Digital Platforms in Social Studies Learning to Improve Social Literacy of Elementary School Students

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Abstract

This study aims to analyze the effectiveness of using adaptive digital platforms in Social Science (IPS) learning to improve the social literacy of elementary school students. Although digital technology is increasingly used in education, social studies learning in Indonesia is still teacher-centric and does not accommodate diverse learning needs. This study examines how adaptive platforms like Google Classroom can strengthen students' empathy, cooperation, and civic awareness. The study used a mixed-methods sequential explanatory design involving 60 grade V students from two elementary schools in South Kalimantan. Quantitative analysis using paired-sample t-test and ANCOVA showed a significant increase ($p < 0.05$) in all dimensions of social literacy, with the highest Increase in empathy (18%), followed by cooperation (15%) and civic awareness (12%). Qualitative findings from interviews and observations show that adaptive digital learning encourages active engagement, collaboration, and reflective communication among students. Adaptive platforms also create learning environments that are inclusive and responsive to individual learning styles, thus not only improving academic outcomes but also shaping social character and digital ethics. Theoretically, this research expands the application of social constructivism theory in the context of adaptive digital learning by placing social interaction at the core of the formation of social literacy in the 21st century. The results of this study provide practical implications for teachers, curriculum developers, and researchers to integrate adaptive technology in social studies learning to foster empathy, cooperation, and social responsibility in the digital era.

Keywords:

adaptive learning platforms; social literacy; IPS; basic education; Digital pedagogy.

A. INTRODUCTION

Global digital transformation has driven a significant shift in the 21st-century education paradigm. The emergence of adaptive digital learning platforms powered by artificial intelligence (AI) and data analytics has shifted the orientation of education from a uniform approach to learner-centered learning (Lin et al., 2025). Adaptive systems allow personalized learning based on individual abilities, learning styles, and developmental speed. This approach aligns with the theories of constructivism and adaptive learning (Yousafzai et al., 2024, and Duong, 2025), emphasizing the importance of contextual, reflective, and independent learning experiences.

In the last 5 years of research, it has been shown that adaptive learning technologies not only improve academic outcomes but also strengthen self-regulated learning (Xu et al., 2023) and student learning engagement (Wang et al., 2023). As tangible evidence, Lin et al. (2025) found that using the *Taiwan Adaptive Learning Platform* (TALP) significantly improved elementary school students' self-regulation abilities and mathematical achievement through feedback-based learning mechanisms and automatic adjustments. (Smith et al., 2025) also emphasized the importance of cultural adaptation in the design of digital platforms, so that learning systems can

accommodate differences in values, communication styles, and educational expectations in different countries.

However, in Indonesia's basic education context, especially in Social Science learning, the adaptive digital approach has not been utilized optimally. Social studies learning in elementary school is still oriented towards memorizing and reproducing factual information, rather than reflective social engagement and participatory experiences (Li et al., 2022). As a result, students' social literacy skills—which include empathy, cooperation, appreciation for diversity, and civic awareness—have not been comprehensively developed (Arrivillaga et al., 2024).

Although the curriculum encourages a student-centered learning approach, in practice Social Studies (IPS) at the elementary school level is still largely teacher-centered. This occurs because Social Studies is often viewed as a subject filled with concepts, historical facts, and memorization, leading many teachers to rely on lectures as the quickest method of instruction, which in turn makes students passive listeners. Furthermore, not all teachers are familiar with active learning models such as project-based learning, inquiry, or problem-based learning, causing them to revert to traditional teaching methods. In addition, learning resources for Social Studies are often limited to textbooks. The lack of supporting media such as maps, videos, simulations, or educational games makes it difficult for teachers to create more engaging learning experiences.

Social literacy is an important competency for 21st-century learning because it shapes critical thinking skills, participatory ethics, and social responsibility (Currie & Kelly, 2022). Several studies have shown that collaborative digital tools and social simulation-based learning can improve students' empathy and social understanding (Y.-S. Lee et al., 2021; Wendt et al., 2023). (Alsubaie, 2022) emphasized that during the COVID-19 pandemic, distance learning presented a double dilemma: expanding digital access on the one hand, but reducing the intensity of meaningful social interaction on the other. Therefore, technology-based pedagogical innovation that balances cognitive and affective dimensions is urgently needed.

In the study of digital literacy, Kalantzis and Cope (2025) introduced the concept of social-cyber *literacy*, which represents the evolution of traditional literacy towards social awareness in the digital space. This literacy includes communicating empathically, managing digital ethics, and actively participating in online communities constructively. This approach expands the meaning of conventional social literacy by emphasizing the dimensions of technology and artificial intelligence as a medium of social learning.

Digital transformation requires teachers to adjust and become more responsive to technological developments. However, many elementary school teachers still face various challenges, such as insufficient ICT skills to operate digital learning platforms, interactive applications, or Learning Management Systems (LMS). The training provided to teachers is often conducted only once, without ongoing support, and frequently does not align with the actual needs of teaching Social Studies at the elementary level. Moreover, integrating technology in the classroom is not merely about presenting slides. Teachers need to understand how technology can enhance interaction, support students' comprehension of Social Studies content, and foster their digital literacy.

Empirically, various studies in primary education show the effectiveness of the application of adaptive technology and AI to improve learning engagement, motivation, and academic outcomes (Villena-Taranilla et al., 2022; Leftwich et al., 2023; Deng et al., 2025). The results of a study on the use of AI-based chatbots and *virtual reality* (VR) have been proven to increase interest, empathy, and collaboration between students in the context of elementary education (D. Lee & Yeo, 2022; Tai & Chen, 2024; Yuan, 2024). Through meta-analysis, it was found that the self-regulated learning strategy in an adaptive digital environment had a moderate positive effect on academic achievement across educational levels.

However, most research focused on STEM (mathematics and science), while studies exploring adaptive platforms in social studies learning are still limited (Blundell et al., 2022). In fact, social studies is a domain rich in social and moral potential that can be developed through digital simulations, online collaborations, and community-based projects. Wu et al. (2022) even

showed that teachers' competence in developing digital information and social literacy is a key factor for successful technology integration in basic learning.

In the context of an educational culture in Indonesia that is still oriented towards cognitive achievement, adaptive digital platforms offer opportunities to simultaneously integrate the dimensions of knowledge, skills, and social values. The system can adjust learning scenarios based on student feedback, identify affective needs, and facilitate virtual collaboration across social backgrounds. Thus, adaptive technology can be a pedagogical strategy to strengthen 21st-century social competencies, such as empathy, cooperation, cross-cultural communication, and global citizenship awareness (Morgan et al., 2022).

Although the literature on adaptive digital learning is growing rapidly, there is a gap related to its application and impact in social studies learning in elementary schools, especially in developing countries such as Indonesia. Most studies are still focused on cognitive efficiency and improving academic achievement, but they are not yet focused on the formation of social literacy and civic character. Therefore, this study aims to analyze the implementation of adaptive digital platforms in elementary school social studies learning, evaluate their effectiveness in improving students' social literacy, and identify challenges and opportunities for integrating adaptive technology in the basic education system in Indonesia.

B. METHODS

This study uses a mixed-methods sequential explanatory design (Creswell & Creswell, 2017) to comprehensively explore the influence of adaptive digital platforms on improving the social literacy of elementary school students in Social Science learning. A quantitative approach is used to test the effectiveness of an intervention statistically, while a qualitative approach is used to understand the learning experience of students and teachers in depth.

In the first stage (quantitative), this study used a quasi-experimental design with *pre-test* and *post-test models* to measure changes in students' social literacy levels before and after treatment. Meanwhile, the second (qualitative) stage is carried out through semi-structured interviews and classroom observations to gain a deeper understanding of learning dynamics, student involvement, and teachers' perceptions of the application of adaptive digital pedagogy.

The study participants comprised 60 elementary school grade V students aged 10 and 11 from two public elementary schools in South Kalimantan, Indonesia. Students were divided into two groups, namely the experimental group ($n = 30$), who participated in social studies learning using an adaptive digital platform (*Google Classroom*), and the control group ($n = 30$), who participated in learning with conventional methods centered on teachers. In addition, two social studies teachers acted as facilitators in learning and provided a Reflection on implementing adaptive digital methods.

The research instruments used include the Social Literacy Scale, quoted from (Banks & Banks, 2019), covering three main dimensions: empathy, cooperation, and civic awareness. In addition, observation sheets are used to record patterns of interaction, participation, and collaborative behavior of students during the learning process. To complement the qualitative data, a semi-structured interview guide was also prepared to explore teachers' and students' perceptions of the learning experience and the ease of use of adaptive technology (Braun & Clarke, 2019).

The Social Literacy Scale instrument is an assessment tool designed to measure students' social skills, particularly at the elementary and secondary education levels. This instrument evaluates three main dimensions: empathy, cooperation, and civic awareness. Each dimension is represented by a set of statements measured using a specific scale, and its quality is tested through reliability analysis. The following is a breakdown of each main dimension:

Table 1. Dimensions for Measuring Students' Social Skills

Dimension	Indicator
Empathy	1. Capacity to comprehend the perspectives of others 2. Exhibition of positive social behaviors 3. Readiness to offer assistance to others
Cooperation	1. Active participation in group activities 2. Ability to resolve conflicts constructively 3. Willingness to share tasks and responsibilities
Civic Awareness	1. Adherence to rules and regulations 2. Active participation in community service activities 3. Concern for the school environment and community

The measurement in this study employs a Likert scale, which is widely recognized as an effective method for assessing attitudes, perceptions, and social behaviors. This scale allows respondents to indicate their level of agreement or disagreement with a series of statements related to the construct being measured. The five-point Likert scale used in this study is structured as follows:

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Undecided / Neutral
- 4 = Agree
- 5 = Strongly Agree

Using this scale provides a quantitative way to evaluate subjective perceptions, making it possible to analyze trends, compare responses, and calculate overall scores for each dimension of social literacy, such as empathy, cooperation, and civic awareness. (Cronbach, 1951; Tavakol & Dennick 2011). The reliability of the instrument is measured using Cronbach's Alpha, which indicates the internal consistency among items within each dimension as well as across the entire instrument. A well-constructed Social Literacy Scale typically achieves: an overall Alpha of 0.80–0.90 and a minimum Alpha of 0.70 for each dimension. An Alpha value greater than 0.70 indicates that the instrument has adequate internal consistency. Items that weaken reliability are usually revised or removed based on item-total correlation analysis.

This systematic research was carried out for six weeks with the following stages:

- 1. Preparation, which includes instrument validation by three basic education experts;
- 2. Pre-test, to measure the initial social literacy ability of students in both groups;
- 3. Implementation, in the form of the application of social studies learning based on an adaptive digital platform for experimental groups and conventional learning for control groups;
- 4. Post-test, to assess the improvement of social literacy after treatment; and
- 5. Interviews and observations were conducted to obtain qualitative data on changes in social behavior, empathy, and student involvement in the learning process.

Clarification of weekly duration and learning scenario using an adaptive digital platform in the study was conducted over a period of six weeks, with one session per week, each lasting approximately 90 minutes, in accordance with the effective instructional time for Social Studies in elementary schools. Each session was structured around three main stages: opening, main activities, and closing. The following describes the learning scenario implemented through the adaptive digital platform.

- 1. Opening Activities: Students log into the platform and begin modules that have been tailored to their initial abilities, based on pre-test results or previous adaptive modules. The platform automatically adjusts the level of difficulty according to each student's responses, making the learning process adaptive. The material is presented in interactive formats, including videos, animations, simulations, and quizzes, to comprehensively support students' understanding.

2. **Main Activities:** The teacher divides students into small groups, after which they engage in virtual group activities or platform-based discussions. They then collaborate to solve problems while responding to one another's ideas. These activities are designed to foster students' cooperation skills and empathy
3. **Closing Activities:** Students complete quizzes or reflective tasks to assess their understanding of Social Studies concepts and their development of social literacy. The platform provides automatic feedback and adjusts subsequent materials to support each student's individual learning progress.
4. **Teacher Monitoring:** The teacher observes students' activities and interactions on the platform, monitors both individual and group progress during discussions, and notes the social behaviors that emerge throughout the learning process. The data collected are used for the post-test and serve as qualitative evidence for interviews and observations.

Quantitative data were analyzed using *paired-sample t-test* and covariance analysis (ANCOVA) to identify significant differences between *pre-test* and *post-test values* in both groups. Meanwhile, qualitative data from interviews and observations were analyzed using a thematic analysis method (Braun & Clarke, 2019), which included the process of encoding, categorization, and drawing key themes related to empathy, collaboration, and civic awareness. To ensure the reliability of the results, this study applied data triangulation through the comparison of findings from various sources and methods (Denzin, 2017).

C. RESULT & DISCUSSION

The results of the paired-sample t-test shown in Figure 1 describe a significant improvement in students' social literacy after implementing the Google Classroom-based adaptive digital platform. The significance value of $p < 0.05$ shows that the intervention positively impacts all dimensions of social literacy, namely empathy, cooperation, and civic awareness. The most significant average Increase occurred in empathy (18%), followed by cooperation (15%), and civic awareness (12%). The results of the ANCOVA test strengthened this conclusion with a value of $F(1.57) = 9.42$, $p = 0.003$, confirming that adaptive digital learning has a real impact on improving the social skills of elementary school students.

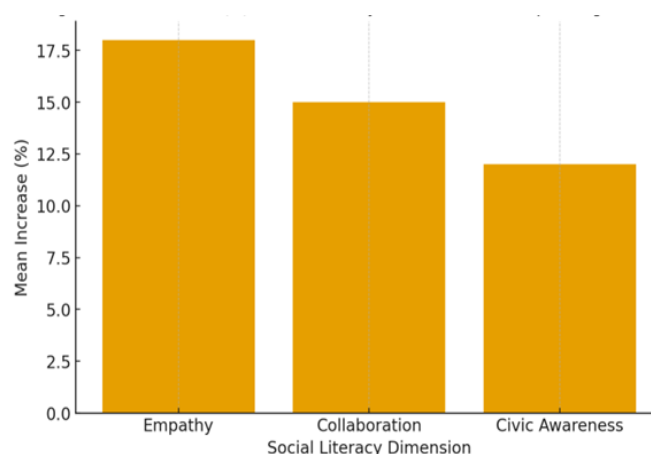


Figure 1. Mean Increase (%) in Social Literacy Dimensions After Adaptive Digital Learning

Figure 2 and Table 1 compare the average pre-test and post-test scores on the three dimensions of social literacy—empathy, collaboration, and civic awareness—after implementing adaptive digital learning in Social Science subjects in elementary school. The results showed consistent improvement across all dimensions, with empathy increasing from an average score

of 70.0 to 82.6, collaboration from 68.0 to 78.2, and civic awareness from 72.0 to 80.6. This upward trend suggests that adaptive learning platforms effectively improve students' social literacy through deeper social understanding, interactive collaboration, and reflective awareness. The highest Increase in empathy indicates that the use of adaptive digital tools can facilitate emotional engagement and the ability to understand the perspective of others.

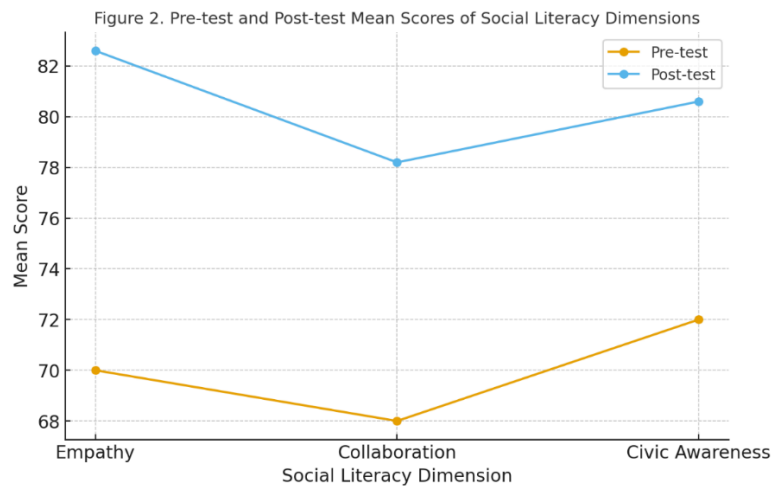


Figure 2. Pre-test and Post-test Mean Scores of Social Literacy Dimensions

Table 2. Quantitative Results of Social Literacy after Adaptive Digital Learning

Social Literacy Dimension	Pre-test Mean	Post-test Mean	Mean Difference	Percentage Gain (%)
Empathy	70	82.6	12.6	18
Collaboration	68	78.2	10.2	15
Civic Awareness	72	80.6	8.6	12

The findings of this study are consistent with the results of a study (Lin et al., 2025) that used the *Taiwan Adaptive Learning Platform* (TALP) and found a significant improvement in academic achievement and students' self-regulated learning abilities. The adaptive approach allows the learning system to adjust the level of difficulty and learning speed according to the cognitive profile of the learners, thereby supporting the continuous improvement of learning outcomes. In line with this, Zhang and Zhang (2024) emphasized that adaptive digital literacy can reduce the gap between motivation and actual learning behavior through strengthening reflective and social thinking skills. Thus, adaptive learning strengthens cognitive aspects and fosters social awareness and collaborative abilities.

The interviews and observations showed that students in the experimental group displayed a higher level of social participation, with empathetic behavior, helping each other, and being active in group discussions. Teachers reported that using digital platforms encourages collaboration and increases students' enthusiasm in understanding social studies materials. This finding aligns with Alsubaie (2022), who stated that social interaction in online learning can strengthen social literacy if supported by collaborative activities and reflective communication and is also reinforced by Morgan et al. (2022), who emphasize that social literacy in the digital context is an essential competency for the 21st century, where the ability to interact ethically and productively is the main prerequisite. Furthermore, Kalantzis and Cope (2025) introduce the concept of cyber-social literacy, which is the ability to participate critically and collaboratively in an interactive digital space.

Thematic analysis with the approach of Braun and Clarke (2019) yielded three main themes:

1. Empathy and Social Awareness: Students show improvements in understanding differences and respecting the views of their peers.
2. Digital Collaboration – team-based activities strengthen teamwork and participation in virtual learning communities.
3. Social Reflection – students relate social studies learning to contextual social issues, such as tolerance and social responsibility.

Overall, the results of this study confirm that adaptive digital platform-based learning contributes significantly to the development of social literacy in elementary schools. This approach creates a learning environment that is flexible, inclusive, and responsive to individual learners' differences and is in line with the view (Smith et al., 2025), which emphasizes that the success of adaptive learning systems depends on their ability to adapt content and interaction to the cultural needs and social character of students.

Rowe (2022) added that social literacy can be strengthened through biliterate composing and digital tools such as Google Translate, which allows cross-lingual and cross-cultural interaction, thereby expanding the multicultural dimension in social studies learning. These findings also support the results of Currie and Kelly's (2022) research on critical social literacy, which emphasizes that digital participation can be a means of empowerment if students are trained to think critically about media and manage social communication ethically. Thus, the integration of adaptive technology in learning not only serves to improve academic outcomes but also shapes social awareness, digital ethics, and civic responsibility.

This study's integration of adaptive, collaborative, and reflective approaches shows strong relevance to socio-constructivism theory (Shafiq, 2024), which asserts that effective learning occurs through social interaction and contextual support. Within this framework, adaptive digital platforms act as scaffolding that helps students achieve higher levels of social literacy through personalized, targeted, and meaningful learning experiences.

Based on the findings of the study, several important implications emerge for the development of primary education, particularly in the context of implementing adaptive technology in Indonesia:

1. Implications for Teachers and Education Practitioners
Teachers need to leverage adaptive digital platforms to improve academic outcomes and as a pedagogical medium to shape students' social values and character. Learning must be designed with collaborative activities, reflective discussions, and personal feedback that encourage empathy and cooperation (Morgan et al., 2022; Rowe, 2022).
2. Implications for Curriculum Developers and Schools
The social studies curriculum should integrate social literacy based on adaptive technology to strengthen the Pancasila Student Profile. The adaptive approach is in line with the principles of Freedom of Learning, which emphasize students' independence, collaboration, and social responsibility.
3. Implications for Educational Technology Researchers and Developers
Further innovation is needed in the development of adaptive systems that take into account students' social, emotional, and local cultural dimensions. In line with Smith, Dupont, and (Tanaka 2025), the adaptive learning system of the future must be sensitive to the socio-cultural diversity and contextual values of Indonesian education.
4. Implicasi's theorem
This research expands the application of socio-constructivist theory in an adaptive digital environment by placing social interaction as the primary means of social literacy development. Adaptive platforms act as digital scaffolding that encourages collaborative learning and the formation of contextual and sustainable social awareness.

D. CONCLUSION

The Conclusions should directly address the research objectives and clearly explain how the study advances the field beyond current knowledge. Without a clear conclusion, reviewers and readers may find it difficult to assess the value and contribution of the work, as well as its suitability for publication. Avoid repeating the Abstract or merely listing experimental results. Provide a concise scientific justification for the paper's findings, and indicate their possible applications or implications. Authors are also encouraged to suggest directions for future research or mention ongoing related studies. This study concludes that the application of adaptive digital platforms significantly increases the social literacy of elementary school students in social studies learning, especially in empathy, cooperation, and civic awareness. Students who participated in learning using adaptive platforms such as Google Classroom showed higher engagement, collaboration, and social awareness levels than students who learned through conventional methods. The adaptive learning model can personalize the learning process according to each student's abilities and learning style, so that it improves academic achievement and develops social and emotional skills. Overall, integrating adaptive digital platforms in elementary school learning creates an inclusive and interactive learning environment, fostering empathy, responsibility, and meaningful collaboration in the digital age.

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