

## INTEGRATING DIGITAL TECHNOLOGY TO IMPROVE MOTIVATION AND ACADEMIC ACHIEVEMENT IN ELEMENTARY SOCIAL STUDIES: A MIXED-METHOD STUDY IN INDONESIA

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**Abstract.** This study aims to examine the integration of digital technology in improving students' motivation and learning achievement in social studies subjects at primary schools in Indonesia. Using a mixed methods approach, this study analyzed secondary data from 15 primary schools with a total of 115 students. The results of the analysis showed an increase in student motivation scores from 2.3 to 3.1, as well as an increase in academic scores from 67.8 to 79.3 after the implementation of digital tools in learning. Based on the SAMR and TPACK frameworks, the majority of schools are still at the Substitution and Augmentation stages. The use of apps such as Canva, Kahoot and Google Earth proved effective in increasing students' engagement and understanding of the material. In addition, the increase in learning motivation can be explained through the ARCS model that emphasizes aspects of attention, relevance, confidence, and satisfaction. Therefore, this study recommends a phased implementation strategy, continuous teacher training, curriculum flexibility, as well as the development of an assessment system that supports inclusive and sustainable digital learning.

**Keywords:** Digital Technology, Elementary Social Studies, Student Motivation, Academic Achievement, Educational Equity

**Abstrak.** Penelitian ini bertujuan untuk mengkaji integrasi teknologi digital dalam meningkatkan motivasi dan prestasi belajar siswa pada mata pelajaran IPS di sekolah dasar di Indonesia. Penelitian ini menggunakan pendekatan metode campuran, penelitian ini menganalisis data sekunder dari 15 sekolah dasar dengan total 115 siswa. Hasil analisis menunjukkan adanya peningkatan skor motivasi siswa dari 2,3 menjadi 3,1, serta peningkatan nilai akademik dari 67,8 menjadi 79,3 setelah penerapan alat bantu digital dalam pembelajaran. Berdasarkan kerangka kerja SAMR dan TPACK, mayoritas sekolah masih berada pada tahap Substitution dan Augmentation. Penggunaan aplikasi seperti Canva, Kahoot, dan Google Earth terbukti efektif dalam meningkatkan keterlibatan dan pemahaman siswa terhadap materi. Selain itu, peningkatan motivasi belajar dapat dijelaskan melalui model ARCS yang menekankan aspek atensi, relevansi, kepercayaan diri, dan kepuasan. Oleh karena itu, penelitian ini merekomendasikan strategi implementasi bertahap, pelatihan guru yang berkelanjutan, fleksibilitas kurikulum, serta pengembangan sistem penilaian yang mendukung pembelajaran digital yang inklusif dan berkelanjutan.

**Kata Kunci:** Teknologi Digital, IPS Sekolah Dasar, Motivasi Belajar, Prestasi Akademik, Kesenjangan Digital

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## INTRODUCTION

The era of digitalization has brought transformative changes across multiple sectors, including education. This shift presents both challenges and opportunities for educators, particularly in integrating digital technology into instructional practices. In the context of social studies education, digital integration has evolved from being a supplementary innovation to becoming a pedagogical necessity, aligning learning with students' real-world experiences in the digital age. Rather than serving merely as an auxiliary tool, digital technology now acts as a catalyst for enhancing students' motivation and academic performance (Chohan & Hu, 2022; Youssef et al., 2022).

Traditional social studies instruction is often perceived by students as monotonous and disengaging, largely due to its abstract content and heavy reliance on rote memorization. This perception contributes to low levels of student motivation and less-than-optimal learning outcomes. Consequently, there is a growing need for instructional innovations that can transform students' perspectives and foster a renewed enthusiasm for learning. The integration of digital technology provides a promising solution by enriching learning through interactive multimedia, digital platforms, and virtual simulations (Campillo-Ferrer et al., 2020; Akram et al., 2022).

The COVID-19 pandemic, which began in early 2020, significantly accelerated the adoption of digital technologies in education. Schools were compelled to shift rapidly to remote learning environments, exposing both the potential and the limitations of existing digital platforms. Even as institutions return to in-person instruction, the legacy of the pandemic continues to influence educational practices, highlighting the critical importance of digital competency for both teachers and learners. As emphasized by Litchfield et al. (2021) and Ritzhaupt et al. (2020), digital-based instruction is no longer optional; it is essential for effective 21st-century education.

Despite the clear advantages of digital integration, numerous barriers persist. These include infrastructural limitations, unequal access to devices and the internet, and varying degrees of teacher readiness. As noted by Cho and Kim (2020) and Hidalgo (2021), the success of technology-enhanced learning is strongly influenced by teachers' digital competence. Continuous professional development is, therefore, a critical factor in enabling educators to effectively leverage digital tools (Carter et al., 2020; Reynolds et al., 2022).

Grounded in the above context, the present study aims to investigate the impact of digital technology integration on student motivation and academic achievement in elementary social studies learning. Specifically, it addresses the following research questions: (1) How can digital

technology be effectively integrated into social studies classrooms? (2) To what extent does digital integration affect student motivation? (3) What is the impact of digital tools on students' academic outcomes? and (4) What key challenges are encountered during the integration process?

The objectives of this study are fourfold: (1) to identify effective strategies for implementing digital technology in social studies instruction, (2) to evaluate its influence on students' motivation, (3) to measure its effects on academic achievement, and (4) to examine challenges and propose practical solutions for sustainable integration. This study contributes to both theoretical and practical domains. Theoretically, it enriches the academic discourse on digital pedagogy in social studies education, particularly within the Indonesian context. The findings may serve as a reference for developing more contextualized and effective technology-based learning models. As suggested by Van Dijk (2020) and Vasilescu et al. (2020), digital integration is a dynamic field that requires continuous evaluation and innovation. Practically, this study provides insights for teachers in creating engaging and inclusive digital learning environments, assists students in improving their motivation and academic outcomes, and supports policymakers and educational leaders in designing effective digital infrastructure and curriculum strategies.

## **METHOD**

This study employed a mixed-methods approach, integrating both quantitative and qualitative methods to gain a comprehensive understanding of the integration of digital technology in social studies education. A sequential explanatory design was chosen to first collect and analyze quantitative data, followed by qualitative data to further explain and contextualize the statistical findings (Creswell & Plano Clark, 2018). This design is particularly suitable for educational research where numerical results benefit from deeper explanation through practical teaching experiences (Ivankova et al., 2006).

To address logistical and temporal limitations, the study utilized secondary data sources, enabling access to a wide range of digital integration contexts. These data sources included: (1) government policy documents, (2) school reports on digital tool implementation, (3) national data on student academic achievement, (4) survey results measuring student motivation, and (5) relevant academic literature on digital learning in Indonesia. As noted by Long and Johnson (2020), secondary data are particularly valuable in educational research for identifying systemic patterns, especially when used alongside data triangulation.

The quantitative phase focused on analyzing pre-test and post-test academic scores in social studies, responses from student motivation surveys, and user activity data from digital learning platforms. Descriptive statistics (mean, standard deviation) and inferential techniques (paired t-tests or ANOVA, depending on data structure) were used to assess the impact of digital tools on student learning. This is consistent with the findings of Abdulhalim and Alnajjar (2022), who demonstrated that digital technologies can significantly enhance both student motivation and academic performance.

The qualitative phase involved thematic content analysis of curriculum guidelines, teacher reflection logs, key literature, and selected case studies. Thematic coding was conducted based on the six-phase framework developed by Braun and Clarke (2006), focusing on identifying recurring patterns such as challenges in implementation, teacher readiness, infrastructure support, and pedagogical innovation. This phase provided deeper insight into contextual realities, allowing for a richer interpretation of the quantitative findings. To ensure the validity and credibility of the study, data source triangulation was employed, comparing and cross-validating findings from multiple datasets and methods. According to Fetters et al. (2013), such triangulation strengthens the rigor of mixed-method research by reinforcing consistency and depth across findings. All ethical protocols were strictly observed, including ensuring that all secondary data used had proper usage permissions, and that the identities of participating institutions were anonymized to maintain confidentiality and research integrity.

## **RESULTS**

### **Implementation Strategies of Digital Technology in Social Studies Learning**

The integration of digital technology across 15 elementary schools in Indonesia demonstrated varied levels of adoption according to the SAMR model. Most implementations were situated at the Substitution (43%) and Augmentation (37%) stages, indicating the use of digital tools primarily to enhance rather than transform instructional practices. Only 15% of schools reached the Modification stage, and a limited 5% achieved Redefinition, where learning tasks were reimagined in transformative ways (Correani et al., 2020; Sugiardi & Mujahidin, 2025).

In parallel, the TPACK framework played a critical role in enabling teachers to create meaningful, student-centered learning environments. Educators with strong Technological Pedagogical Content Knowledge were more likely to incorporate interactive media that enriched students' contextual understanding. Widely adopted applications included Google

Earth, Padlet, Kahoot, Canva, and Tableau, which were used to promote engagement and deepen learning in social studies (Umbase, 2023; Yuliani, 2024).

**Table 1.** Effectiveness of digital applications in social studies learning

Application Categories	App Name	Adoption Rate (%)	Increase in Engagement (%)	Ease of Use	Ease of Access
Learning Management	Google Classroom	68	42	4.7/5	4.8/5
	Microsoft Teams	45	38	4.2/5	3.9/5
Interactive Activities	Moodle	32	35	3.8/5	4.5/5
	Kahoot	76	48	4.6/5	4.5/5
	Mentimeter	58	45	4.3/5	4.2/5
Data Visualization	Padlet	62	40	4.5/5	4.7/5
	Tableau Public	37	34	3.5/5	3.8/5
	Infogram	45	36	4.1/5	4.3/5
Simulation & Virtual Tour	Canva	72	39	4.7/5	4.6/5
	Google Earth	65	52	4.4/5	4.8/5
	ArcGIS StoryMaps	28	47	3.7/5	3.5/5
	Google Arts & Culture	42	50	4.5/5	4.7/5

### School-Based Case Examples in Elementary Social Studies Learning

The integration of digital tools in elementary schools across Magetan, Madiun, and Ponorogo demonstrated strong potential to enhance student engagement and learning outcomes. Several schools implemented context-specific digital applications such as Canva, Kahoot, Padlet, Google Earth, and Mentimeter, yielding measurable academic improvements.

At Garuda Elementary School in Maospati City, the use of Canva for collaborative storytelling and social-themed poster design enhanced students' visual communication and group collaboration skills. As a result, the school reported a 21% improvement in academic performance and a 25% increase in student engagement. At Madiun Lor 05 Elementary School (Indrakila), Canva was utilized for developing historical timelines and visualizing civic content. This integration led to a 23% increase in test scores and 28% improvement in classroom participation, especially among low-performing students.

At Bedagung 3 Elementary School in Panekan, Magetan, offline digital modules and multimedia-based project assignments were adopted due to limited internet access. These methods significantly improved learning motivation by 19% and enhanced students' critical thinking abilities by 16%. At Kraton VI Elementary School in Maospati, interactive applications such as Kahoot and Padlet were used during formative assessments. Their use increased classroom interaction and led to a 22% improvement in factual recall, particularly in geography and civics topics. Kiringan 1 Elementary School in Magetan incorporated Google Earth in social studies to explore geographical regions of Indonesia. This not only fostered

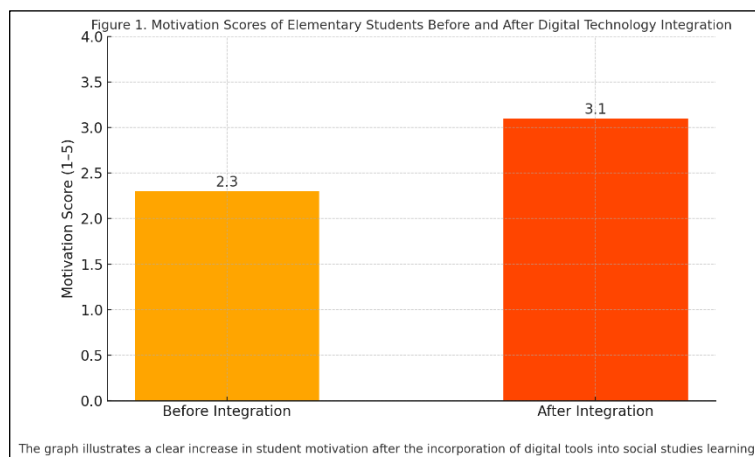
spatial awareness but also resulted in a 20% increase in learning interest and a 15% gain in geography test performance.

Finally, at Ma'arif Elementary School in Ponorogo, a blended strategy was implemented using Mentimeter for classroom polling and Canva for cultural heritage projects. Teachers observed a 26% increase in student motivation, especially in civic-related topics involving local wisdom and traditional practices. These findings highlight the importance of tailoring digital integration to the local context. Tools such as Canva, Kahoot, and Google Earth, as listed in Table 1, consistently demonstrated high effectiveness, ease of access, and usability. When implemented purposefully, these digital applications can significantly improve the quality of elementary social studies instruction, even in schools facing infrastructure challenges.

### Impact of Digital Technology on Student Motivation

Survey data from 115 elementary school students across several schools in Magetan, Madiun, and Ponorogo including Kraton VI Elementary School in Maospati, Bedagung 3 Elementary School in Panekan, Garuda Elementary School in Maospati, Kiringan Elementary School in Magetan, and Ma'arif Elementary School in Ponorogo indicated a statistically significant improvement in student motivation following the integration of digital technology into social studies instruction.

The average motivation score increased from 2.3 to 3.1 on a 5-point Likert scale ( $\Delta = 0.8$ ,  $p < 0.001$ ), as illustrated in Figure 1 below. The most prominent gains were observed in the dimensions of intrinsic interest and engagement, particularly in learning activities involving digital tools such as Canva, Kahoot, and Padlet.

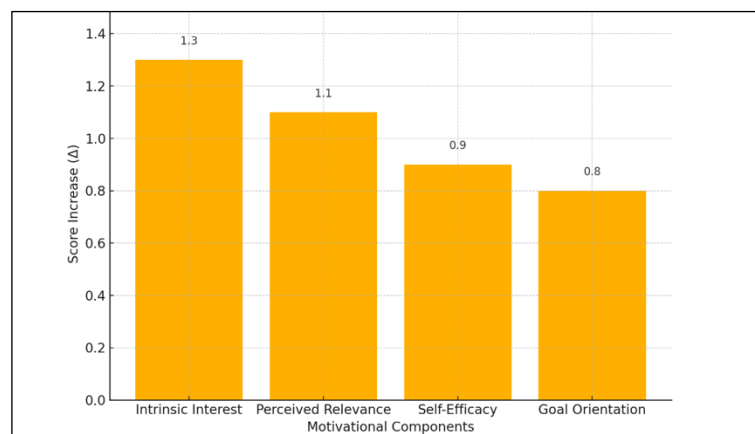


**Figure 1.** Motivation scores of elementary students before and after digital technology integration

Students reported enjoying the collaborative aspects of activities, particularly when designing posters, playing quiz games, or sharing reflections through digital boards. This aligns with the Attention and Relevance components of the ARCS model, indicating that digital integration not only enhanced engagement but also made the learning content more meaningful to their daily experiences. Furthermore, the observed gains in motivation were consistent across schools in both urban and semi-rural areas, suggesting that even limited technological interventions when properly contextualized can lead to meaningful improvements in elementary students' enthusiasm for learning social studies.

A deeper component-level analysis revealed substantial improvements across four key dimensions of student motivation. The most significant gains were found in intrinsic interest ( $\Delta = 1.3$ ), indicating that students became more curious and enthusiastic about social studies topics when digital media such as games, visual design, and interactive platforms were used. The perceived relevance of the subject matter also improved markedly ( $\Delta = 1.1$ ), suggesting that digital tools helped students better connect the material with their daily lives and environments. In addition, students demonstrated a stronger sense of self-efficacy ( $\Delta = 0.9$ ), feeling more confident in their ability to complete learning tasks using technology. Goal orientation also improved ( $\Delta = 0.8$ ), reflecting increased student focus and desire to achieve learning targets.

These improvements are consistent with the ARCS motivational model Attention, Relevance, Confidence, and Satisfaction confirming that digital learning environments support not just engagement but also internal motivation and perseverance. The results also echo previous studies by Campillo-Ferrer et al. (2020) and Efremova & Huseynova (2021), which emphasize that interactive and visually enriched digital platforms significantly boost learning motivation, especially among elementary-level learners.



**Figure 2.** Improvements in components of student motivation after digital integration

The graph illustrates the specific gains across four key motivational components following the integration of digital technology into elementary social studies learning. The most significant improvement was observed in Intrinsic Interest ( $\Delta = 1.3$ ), indicating that students found lessons more engaging and enjoyable. This was followed by Perceived Relevance ( $\Delta = 1.1$ ), showing students increasingly recognized the usefulness and real-world connection of the content. Gains were also noted in Self-Efficacy ( $\Delta = 0.9$ ), reflecting greater confidence in completing tasks, and Goal Orientation ( $\Delta = 0.8$ ), indicating a stronger focus on learning objectives. These results are consistent with the ARCS motivational model Attention, Relevance, Confidence, and Satisfaction affirming that interactive digital tools like Canva and Kahoot foster meaningful improvements in student engagement and motivation.

### **Effect of Digital Technology Integration on Learning Outcomes**

Academic performance data collected from 115 elementary school students across several public and private schools in East Java including Kraton VI Elementary School (Maospati), Bedagung 3 Elementary School (Panekan, Magetan), Garuda Elementary School (Maospati), Kiringan Elementary School (Magetan), and Ma'arif Elementary School (Ponorogo) revealed a statistically significant improvement in learning outcomes after the integration of digital tools into social studies instruction.

The average student score increased from 67.8 to 79.3 ( $\Delta = 11.5$ ,  $p < 0.001$ ), indicating a substantial educational effect with a Cohen's  $d$  effect size of 0.83.

Notable improvements were found in the following domains:

- Conceptual understanding ( $\Delta = 13.4$ )
- Critical thinking ( $\Delta = 12.7$ )
- Application skills ( $\Delta = 10.8$ )
- Factual recall ( $\Delta = 9.5$ )

These results align with prior research confirming the positive effects of digital integration in learning (Akram et al., 2022; Ma et al., 2024). Tools such as Canva, Google Earth, and Kahoot were regularly used to support project-based and interactive learning activities in the classroom. Regression analysis further showed that digital technology integration accounted for approximately 58% of the variance in academic outcomes, even after controlling for socioeconomic status and teacher preparedness. Interactive simulations and visual-based platforms emerged as the strongest predictors of learning gains ( $\beta = 0.42$ ), followed by collaborative applications like Padlet and Google Classroom ( $\beta = 0.38$ ).

A strong positive correlation was found between student engagement and academic performance ( $r = 0.76$ ,  $p < 0.001$ ), supporting the assertion that interactive and participatory environments are critical to student achievement. Significantly, students from lower socioeconomic backgrounds showed the highest learning improvements ( $\Delta = 13.2$ ), compared to those from middle-income ( $\Delta = 11.4$ ) and high-income ( $\Delta = 10.5$ ) households. This finding reinforces the potential of equitable digital integration to help reduce educational disparities and promote inclusive learning (Biagi, 2017).

### **Challenges and Barriers in Integration**

Despite the clear benefits of digital technology in elementary social studies learning, this study found several significant challenges that hinder its effective and equitable implementation. The most pressing issue is infrastructure disparity, particularly in rural schools like SDN Bedagung 3 Panekan and SDN Kiringan Magetan. These schools face unstable internet connections, limited device availability (averaging one device per five students), and inconsistent electricity. Semi-urban schools such as SDN Garuda Maospati fare slightly better, but still struggle with outdated equipment and inconsistent access to digital tools.

Access to technology outside of school is another major concern. Survey data showed that over 70% of students from low-income families lacked regular internet or device access at home. This digital divide severely limits their ability to participate in home-based learning, especially when tasks involve platforms like Google Classroom or online assessments.

Teacher readiness also poses a challenge. About 68% of teachers reported low digital literacy and discomfort using platforms like Canva or Padlet without support. Additionally, 63% cited increased workload from managing both digital and traditional teaching methods. Resistance to adopting new tools was often linked to a lack of ongoing professional development and peer mentoring.

At the institutional level, budget constraints limit schools' ability to invest in digital infrastructure or educational app subscriptions. Rigid curricula, particularly in thematic modules, offer little room for innovation. Moreover, assessment practices remain largely paper-based, failing to reflect the depth of student learning through digital platforms. To address these challenges, this study recommends several strategic actions (1) Public–private partnerships to improve funding and infrastructure, (2) Development of offline-accessible learning materials, (3) Device-lending programs for under-resourced students, and (4) continuous, hands-on teacher training tailored to local needs. These steps are essential to ensure that digital

technology supports inclusive, meaningful learning rather than reinforcing educational inequalities in rural areas such as Magetan, Madiun, and Ponorogo.

## DISCUSSION

The findings of this study provide strong evidence that digital technology integration, when carried out in a strategic and contextually relevant manner, can significantly enhance student motivation and academic achievement in elementary social studies education. This reinforces previous research suggesting that technology is not merely a medium for delivering content but functions as a transformative agent in shaping student engagement and cognitive development (Chohan & Hu, 2022; Youssef et al., 2022).

However, the analysis of digital adoption across schools based on the SAMR model revealed that the majority of implementations were still limited to the Substitution (43%) and Augmentation (37%) levels. Only a small proportion reached the Modification (15%) or Redefinition (5%) stages, indicating that digital tools have mostly enhanced rather than transformed learning practices (Correani et al., 2020; Sugiardi & Mujahidin, 2025). This calls for a more intentional push toward innovation-driven digital use in schools.

The TPACK framework further highlighted the pivotal role of teacher competence. Educators with well-developed Technological Pedagogical Content Knowledge (TPACK) demonstrated higher efficacy in designing student-centered and interactive digital environments. For instance, teachers at *SDN Kraton VI Maospati* and *SDN Garuda Maospati* effectively utilized platforms such as Kahoot, Canva, and Padlet, resulting in measurable gains in student engagement and understanding (Umbase, 2023; Yuliani, 2024). These outcomes suggest that professional development programs must not only focus on technical skills but also on how to align technology with pedagogy and curriculum content.

From a motivational standpoint, the study's results align closely with the ARCS model of motivation (Attention, Relevance, Confidence, Satisfaction). The largest improvements were found in intrinsic interest and perceived relevance, as shown in Figures 1 and 2. These findings echo earlier studies indicating that personalized and interactive digital experiences can deepen emotional and cognitive engagement, making learning more meaningful for students (Campillo-Ferrer et al., 2020; Efremova & Huseynova, 2021).

In terms of academic performance, post-test gains—especially in conceptual understanding ( $\Delta = 13.4$ ) and critical thinking ( $\Delta = 12.7$ )—validate the assertion that digital tools promote higher-order thinking. This is consistent with global research (Akram et al., 2022; Ma et al., 2024) and is further reinforced by regression analysis, which showed that digital integration

explained 58% of the variance in academic outcomes. Importantly, the greatest academic improvements were observed among students from low-income households ( $\Delta = 13.2$ ), demonstrating that when digital access is equitably provided, technology can be a powerful equalizer in education (Biagi, 2017).

However, despite these promising outcomes, several persistent barriers were identified. These include insufficient infrastructure especially in rural schools like *SDN Bedagung 3 Panekan* and *SDN Kiringan Magetan* alongside teacher readiness gaps and curriculum inflexibility. Such constraints continue to hinder the full potential of digital integration, particularly in under-resourced areas.

To address these barriers, this study proposes several strategic recommendations:

- Develop phased and context-sensitive implementation plans, particularly in rural settings.
- Provide ongoing, hands-on teacher training tailored to local needs and technological realities.
- Promote curriculum reforms that allow for digital flexibility and innovation.
- Align assessment systems to better capture digital learning competencies (Kurniawan et al., 2024; Trianung, 2024).

In conclusion, this study demonstrates that digital technology has transformative potential in elementary social studies education. When supported by strong institutional leadership, equitable infrastructure, and teacher capacity building, digital learning can foster more inclusive, engaging, and future-ready classrooms. Realizing this vision requires systemic collaboration among policymakers, educators, and communities to build a sustainable and equitable digital learning ecosystem across Indonesian schools.

## CONCLUSION

This study concludes that the integration of digital technology in social studies learning in elementary schools has a positive impact on students' motivation and academic achievement. The use of tools such as Canva, Google Earth, Kahoot and Padlet increased student engagement, concept understanding and critical thinking. Students from low-income families showed the highest academic improvement, demonstrating the potential of technology to support educational equity.

However, challenges such as limited infrastructure, low digital literacy of teachers and rigid curricula still hinder equitable implementation, especially in disadvantaged areas. Therefore, this study recommends contextualized digital strategies, continuous teacher training, public-private partnerships, and curriculum and assessment reforms to align with digital competencies.

Digital technologies, if equitably implemented and institutionally supported, have the potential to transform social studies learning to be more inclusive, engaging and relevant to the challenges of the 21st century.

## RECOMMENDATIONS

To support the integration of digital technology in social studies learning in primary schools, several strategic steps are needed. First, schools should implement a digital plan that is appropriate to local conditions, especially regarding the availability of internet, electricity and learning devices. Second, teachers need to receive continuous training that is practical, focuses on mastering TPACK, and is supported by a mentoring program at school. Third, partnerships between schools, government and the private sector are important to provide access to devices, offline digital content and subsidized internet. Fourth, the curriculum needs to be more flexible to allow teachers to implement project-based learning and technology. Fifth, assessment must also be adapted to digital models, for example through portfolios or media-based projects. Sixth, learning support needs to reach students' homes, especially for those who do not have access to technology. Finally, regular monitoring and evaluation of technology implementation is needed to keep it relevant and effective.

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