



"The Paradox of Deep Learning: Inequality of Digital Access in the Implementation of Social Sciences Deep Learning in 3T Polewali Mandar Regional Elementary School"

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Abstract

The implementation of deep learning in elementary school social studies learning is an important part of the educational transformation in the Independent Curriculum. However, its implementation in 3T areas still faces challenges due to inequality of digital access. This study aims to analyze the obstacles to the implementation of deep learning in social studies learning in elementary schools in the 3T area and identify adaptive strategies that can be carried out in conditions of limited access to technology. The research uses a qualitative approach with a case study design through observation, interview, and documentation techniques. The results of the study show that the limitations of technological infrastructure, low teachers' digital literacy, and lack of training are the main factors that hinder the optimal implementation of deep learning. To overcome these conditions, adaptive strategies are needed such as the use of simple technology, the use of the environment as a contextual learning resource, and strengthening teacher competence through institutional support. These findings show that deep learning can still be implemented meaningfully if adjusted to the real conditions of schools in the 3T area.

Keywords: deep learning, elementary school social studies, digital divide, 3T area.

INTRODUCTION

In this era of globalization, it shows a transformation in all lines of life. One of them cannot be separated from the change in dynamics in the world of education. Education is crucial in a country. Where in article 31 paragraph 1 of the 1945 Constitution states that education is a



fundamental right owned by every citizen and as the main foundation in national development. Education is a conscious effort to guide, train and teach students to be better prepared to face the future (Fauziah et al.2022).

This hope is not a mere rhetoric, but a manifestation that comes from the collective consciousness that human resources are the direction of the arrow that determines the direction of a nation's civilization. The effort to advance national education is not born from instant steps, education continues to follow the pulse of the times. Each phase of history presents a different pattern of education, adapting to the needs of society and its time. Technological advances have really led to the creation of new competencies that are relevant to the 21st century, such as high-level thinking, collaboration, cross-culture, digital literacy and creativity.

However, the change in the educational paradigm should not be interpreted as a shift towards all-digital alone, but as a momentum to give birth to a reconstruction of the learning paradigm. The government continuously seeks to trigger policy transformations that support the quality and relevance of education. Where the Independent Curriculum is a tangible manifestation of the government's commitment to reconstructing the learning paradigm. The Merdeka Curriculum seeks to answer criticism of learning practices that only focus on understanding the material but lack depth.

Therefore, the concept of deep learning (*deep learning*) be relevant and strategic. Which is one of the approaches initiated by the Minister of Primary and Secondary Education, Mr. Abdul Mu'ti. In the context of 21st century learning, in-depth approaches are increasingly relevant to be applied to today's educational conditions. This approach focuses not only on understanding concepts, but develops the application of knowledge in real-world contexts. This approach promotes a conscious learning experience (*Mindful*)), means (*meaningful*), and fun (*Joyful*) so that students not only understand the material on the surface, but are able to build a deeper understanding and develop critical thinking skills in the learning process (Ministry of Primary and Secondary Education of the Republic of Indonesia, 2025; Komariyah, 2025; Rahmawati et al., 2025).

Following up on the direction of the policy, Social Science Learning (IPS) at the elementary school level plays an important role in helping students develop character and social awareness. The purpose of teaching social studies in elementary school is to improve critical thinking, empathy, and reflection on various social phenomena (Asdevi et al., 2026). In research Widodo et al., (2020) Application *Deep Learning* (Deep Learning) in Social Sciences can increase student involvement and can help in understanding the material contextually and meaningfully.

21st century learning requires the use of technology to adapt to the latest developments



and challenges of the Industrial Revolution 4.0. The goal is to help students develop 21st-century skills. Nevertheless, education in the 3T region often faces challenges in its implementation process that are inconsistent with national education goals, including the integration of technology into learning. Differences in social and economic backgrounds and regional conditions also affect an individual's chances of obtaining equal educational services. (Isik, 2025). PQuality education basically plays an important role in shaping the quality of human resources although in practice the relationship between the quality of education is often influenced by a variety of different policies and social conditions. (Babadagli, 2024)

This inequality has evolved into digital inequality, students have different opportunities to access learning resources, media, and information that support deep learning. As described in Ananda et al., (2025) The unpreparedness of students and teachers to utilize this technology has a direct impact on limitations in teaching and learning activities. This condition is strengthened by data from the Ministry of Education and Culture, the achievement of the quality of basic education in urban areas is consistently above the national average, while the achievement of the 3T area shows a significant gap.

Limited digital access is still a reality faced by some schools. As happened in West Sulawesi Province in the findings (Risal, 2024) who explained that there are still many schools that face unstable electricity problems, limited availability of other supporting facilities such as science laboratories, computer rooms. Data obtained by almost 60% of schools in remote areas of West Sulawesi have very limited facilities. Limited infrastructure is the main obstacle in the implementation of learning, especially technology-based. In addition, from a survey of 40 teachers, more than 70% have difficulty accessing the internet at school because they can only rely on telecommunication networks with limited quality.

The digitalization of Indonesian education is still uneven, education in cities is accelerating, education in 3T areas is shrinking. The facts that occurred in the field were precisely in Pakava Pasangkayu Village, West Sulawesi. The learning activities are still conventional, because the area still lives without electricity and without signal. Likewise, one of the villages in Nusa Tenggara, the availability of laptops is adequate but the optimal use of facilities is hampered because internet access and electricity are often out. (Source : Naramakna.id, 2025) This situation indicates that the demand for technology-based learning has not been balanced with the availability of facilities in the field.

Most of the research on *deep learning* It is still focusing on the implementation of learning models and improving learning outcomes in schools with relatively adequate facilities. As in the study (Najib, 2025; Parisu & Saputra, 2025; Wibowo et al., 2025) However, there has



not been much discussion about the relationship between limited digital access and the implementation of deep learning in elementary school social studies learning in 3T areas that are still limited. This shows that there is a research gap that requires further exploration.

Referring to the conditions that have been described, this study aims to analyze the challenges of deep learning that arise due to inequality of digital access in the implementation of social studies learning in elementary schools in the 3T area, and to identify strategies that can be applied to overcome these inequalities so that deep learning can still be carried out contextually and in accordance with the conditions of educational conditions in this era.

METHOD

This study uses a qualitative approach with a case study design. A case study is a research strategy used to examine in depth a specific program, activity, event, process, or group within a clear time and context (Creswell, 2010). Case studies are used to examine phenomena in depth in real-life contexts, especially when the boundaries between phenomena and their context are not clearly visible (Yin, 2023). The qualitative approach is used because this research seeks to understand social phenomena as a whole, especially related to the real conditions experienced by teachers and students in the implementation of learning. The research focuses on schools in Polewali Mandar, West Sulawesi.

Qualitative research helps researchers interpret events, interactions, and situations that occur in a particular context in a more profound and meaningful way. In line with Creswell's opinion, qualitative research is a research approach that is used to understand and explain phenomena in depth, complex, and contextual. In the contemporary context, the application of qualitative research methods is becoming increasingly relevant because many phenomena are complex and difficult to quantitatively measure (Niam et al., 2024).

The data collection technique in this case study research is carried out through observation, interviews, and documentation. Observations were used to obtain a direct overview of the implementation of deep learning-based social studies learning in the classroom. Interviews were conducted with teachers and related parties to explore more in-depth information about the experiences, obstacles, and strategies used in dealing with limited digital access. The results of the analysis are expected to be able to illustrate how the challenges faced and the strategies used in the application of deep learning in social studies in the midst of digital access inequality in 3T elementary schools.

RESULTS AND DISCUSSION

Conceptually, deep learning emphasizes a mindful, meaningful, and joyful learning experience (Komariyah, 2025). However, based on the results of observations in elementary schools in the Polewali Mandar area, the limitations of internet networks, learning devices, and electricity are the main obstacles in the implementation of technology-based learning. The results of interviews with school principals show that facilities such as LCD and internet networks are still used in a limited and intermittent manner. These findings are in line with Yusuf & Hendrik, (2022) which explains that the digital access gap is still a major challenge for education in remote areas.

Based on the results of interviews and observations, there are several main obstacles faced by teachers in implementing deep learning in social studies learning at Polewali Mandar elementary school, namely:

1. Limitations of teachers' digital literacy
2. Lack of learning technology facilities
3. Limited opportunities to participate in innovative learning training.

However, the results of the study also show that there are adaptive efforts made by teachers. Teachers use simple media such as mobile phones to display images or videos, as well as use the surrounding environment as a learning resource in social studies learning. This strategy helps students to still be able to understand the material contextually even with limited facilities.

Thus, the implementation of deep learning in 3T regional elementary schools still faces various obstacles, especially in terms of digital access and teacher readiness. However, through adaptive strategies and the use of contextual learning resources, learning can still take place meaningfully. Therefore, broader support, both from the government and educational institutions, is needed to improve equitable access and quality of learning in the 3T area.

At the basic education stage, one of the relevant approaches is deep learning. Where at this stage, students are in the phase of building learning skills, thinking foundations and forming characters that will be the spearhead for academic and personality development in the future. Elementary school-age children are in the concrete operational stage. Therefore, meaningful and contextual learning strategies are needed (Suwandi et al., 2024; Widyastuti et al., 2025)

The Concept of Deep Learning in the Basic Education Landscape

Deep learning or *deep learning* In basic education, it is a learning approach that emphasizes understanding concepts in a whole, contextual and meaningful way for students. In



deep learning, Students are not only encouraged to understand an information or material but are also emphasized to understand its reason, relationships, meanings and applications in real life. According to Wibowo et al., (2025) In his writing, deep learning helps students relate the knowledge learned in class to the experiences they encounter or feel. So that this method supports a more relevant learning process for students. In addition, this approach also encourages student participation in the classroom. Where students are given space to explore, find information, be it through discussion, analyze problems, and through direct experience until they understand it themselves.

However, the findings of research at Polewali Mandar elementary school show that limited access to technology still affects the optimization of the application of this approach. This condition is also related to the change in the role of teachers as learning facilitators as explained by Hasanah & Pujiati (2025), which in practice is still not fully implemented due to limited learning support facilities. Thus, the implementation of deep learning in the 3T area is still in the adaptation stage according to school conditions.

Even though the improvement of students' critical thinking skills can be formed through this approach, students are able to connect various concepts and understand a problem from various perspectives. Thus, the learning process not only produces short-term knowledge but is able to build long-term understanding. This new paradigm also shifts the role of the teacher himself, where the teacher is no longer the only source of information but functions as a facilitator who guides students in the learning process (Hasanah & Pujiati, 2025). Teachers facilitate learning that encourages students to actively discuss and explore various information.

Social Studies Learning and Competency Demands in the 21st Century

This 21st century education requires students to have various competencies for the 21st century. Where this skill greatly supports the improvement of the quality of education and is a crucial element that is able to create superior human beings. Nowadays, learning involves a lot of the internet to explore information, be it in the form of applications that are able to facilitate the learning process. It can be said that this learning is technology-based learning to meet the challenges and demands of this era. Where this learning is a prayer that must be considered optimally in order to create effective and more mature learning in facing challenges in the 21st century.

In this context, critical thinking skills, communication skills, cooperation and creative thinking are crucial competencies. This competency is dubbed the 4C competency (*critical thinking, communication, collaboration, creativity*). This skill is very important because it greatly





supports learning that helps students to explore problems more deeply, solve problems creatively, and be able to cooperate with others (Realitawati et al., 2024; Utari & Muadin, 2023).

Meanwhile, in the study Nopa et al., (2023) explained that social studies learning in elementary schools is directed to equip students to be able to overcome social problems that arise in society. From this learning process, students are expected to be able to critically examine problems, provide appropriate assessments, and reflect on existing social phenomena as a form of readiness to face the challenges of the 21st century. These abilities are part of the skills that students need to have today. Therefore, it can be said that social studies learning in the Independent Curriculum is in line with the demands of 21st century education.

The Paradox of Implementing Deep Learning in a Space of Limitations

The focus of deep learning is an approach that not only emphasizes understanding concepts, but develops the application of knowledge in a real-world context. This approach promotes a conscious learning experience (*Mindful*), means (*meaningful*), and fun (*Joyful*) so that students not only understand the material on the surface, but are able to build a deeper understanding and develop critical thinking skills in the learning process (Komariyah, 2025). In the context of 21st century education, deep learning is seen as an important strategy to equip students with various skills needed to face the times.

However, in the context of the 3T Polewali Mandar regional elementary school, the implementation of this approach still faces limitations in digital learning support facilities. This shows that practice in the field does not always run smoothly. This situation is especially seen in primary schools located in border, remote, and underprivileged (3T) areas. On the one hand, education policies encourage the implementation of innovative, technology-based, and student-centered learning. On the other hand, many schools in the 3T region still face limited infrastructure, especially in terms of access to digital technology and adequate learning resources. Aligned with what is said in the research (Yusuf & Hendrik, 2022) that this limited resource makes it more difficult for students in the 3T region to access digital resources than students in other regions. Students' limited knowledge in the 3T region poses a risk due to limited physical access and potential exposure to low-quality information. In addition, in the findings of the study Alwi et al., (2025) It was also explained that teachers at all levels of education still face challenges in implementing the Independent Curriculum, especially in efforts to create meaningful learning, close to students' lives, and emphasizing the optimal development of student competencies.

In social studies learning in elementary school, these limitations have an impact on the



learning process which still tends to be conventional. Teachers use more simple lecture or assignment methods due to the limitations of media and learning resources. As a result, opportunities for students to explore, discuss in depth, and analyze various social phenomena are less than optimal. This paradox shows that there is a gap between the ideality of the concept of deep learning and the real conditions faced by schools in the 3T area.

Teachers' Barriers to the Implementation of Deep Learning

Table 2. Same findings: Teachers' Barriers to Deep Learning Implementation

	Source	Focus of Findings	Important Information
1	(Azmi et al., 2025; Yusuf & Hendrik, 2022) and (Haditsa et al., 2025)	Low Digital Literacy	The challenge in the application of <i>deep learning</i> , namely the unpreparedness of students and teachers in utilizing this technology, has a direct impact on limitations in teaching and learning activities, thereby widening the gap in the quality of education in areas that are less technologically accessible.
2	(Salilah et al., 2025) and (Ananda et al., 2025)	Limitations of Infrastructure in Schools	There are still schools that do not have adequate internet access and digital devices.
3.	(Azmi et al., 2025)	Lack of Teacher Training and Assistance	Not all teachers get the same opportunity in training activities to improve their competence.

Teachers are the main actors in classroom learning. The success of deep learning implementations depends heavily on their ability to design and manage learning processes that encourage students to think actively. However, in practice, teachers in underserved and remote areas face various obstacles that hinder the implementation of this approach.

The findings of the study show that the limitations of teachers' digital literacy have an effect on the optimization of deep learning in 3T regional schools. The limitation of digital literacy is the main factor faced in 3T regional schools in deep learning. As explained in the study (Azmi et al., 2025) that digital literacy, which includes the ability of human resources to utilize

technology and the governance of technology-based education services, is still not optimal in the area. As a result, students and teachers struggle to access modern learning resources, such as e-books, learning videos, and digital education platforms, that are supposed to be supportive. The inequality of digital access has a great influence on the integration of technology in learning. Where not all teachers get the same opportunity to develop digital skills due to the limited facilities and training available. Align in the results of the research conducted Haditsa et al., (2025) which explains that teachers' readiness to access technology is crucial for the creation of meaningful learning. It is inversely proportional to practice in the field, where there are still many teachers who are used to using lecture methods that seem monotonous. This condition certainly makes the application of deep learning not carried out optimally.

In Dike (2017) It was explained that this condition is closely related to the phenomenon of digital divide, namely differences in individual or group access to information and communication technology such as computers, the internet, and smartphones. This gap arises due to the uneven distribution of resources in society, which has an impact on the difference in opportunities for teachers and students to utilize learning technology. In the context of education in 3T areas, limited digital access is not only caused by technical factors, but also influenced by broader social inequalities. As a result, participation in technology-based learning has become uneven, so that the implementation of deep learning in elementary schools has not been able to run optimally and sustainably

In addition, the application of deep learning also faces challenges in the aspect of inadequate technological infrastructure. This is a significant obstacle, where there are still many schools that are still limited to the availability of supporting facilities such as laptops, projectors or LCD, computer labs, stable internet network, and adequate electricity. Meanwhile, deep learning requires the creation of active, exploratory learning and the use of digital learning resources to support students in understanding the material contextually.

This is in line with the explanation in the research (Salilah et al., 2025) which indicates that the infrastructure gap is still quite large, especially in remote areas that experience limitations in terms of the availability of internet network access and technology facilities. These limitations result in the lack of optimal implementation of deep learning because teachers have difficulty integrating technology into learning.

Adaptive Strategy for the Application of Deep Learning in Elementary Social Studies Learning in 3T Areas

Limited digital access such as unstable internet networks, inadequate electricity, low



digital literacy and limited teachers in increasing competence in technology empowerment are challenges that must be faced in 3T regional schools. Geographical conditions and limited infrastructure have an impact on the technology-based learning process that is not always optimally implemented. Even from some conditions, teachers must return to using conventional learning methods when there is an electrical fault or unstable network.

Therefore, a comprehensive and collaborative strategy is needed in responding to these challenges. These efforts include strengthening and equitable distribution of educational infrastructure, sustainable development of teacher professionalism, and providing adaptive and accessible learning technology in a more inclusive manner. In this study, there are several findings regarding adaptive strategies that can be used to deal with conditions of limitations in remote areas, including: *First*, The use of technology is simple and gradual. Teachers can use devices available at school, such as laptops or handheld phones to display videos, images or visual media that are relevant to social studies learning materials. From the integration of technology through visual media, it is able to help students in understanding concepts or materials in a more real and contextual way because students are facilitated with illustrations or illustrations related to the life of the surrounding environment. In addition, the use of visual media can create meaningful and non-monotonous learning (Wahyudi, 2026).

In line with that, the role of the government is also very important in ensuring that the digital transformation process of education runs fairly, contextually, and responsively to the social conditions of the community in the 3T area. Policies that favor equitable access and strengthening the capacity of educational institutions can increase public trust in educational transformation programs and strengthen institutional legitimacy (Adelia et al., 2025). Thus, it is hoped that an inclusive and equitable digital education ecosystem will be created so that all students, without exception, can experience the benefits of the implementation of technology-based learning optimally

Second, Integration of culture-based learning and the surrounding environment. In conditions of technological limitations, the social and cultural environment of the community can be used as a relevant learning resource in social studies learning. In practice, teachers can invite students to observe community activities, local traditions and environmental conditions as material for discussion and reflection in learning. Through this approach, we can apply the principle of deep learning because the material provided is directly related to the real experiences encountered in the surrounding environment. *Third*, Strengthening teacher competence through training and institutional support. This is an important strategy in supporting the implementation of deep learning in 3T schools. From the findings of the study





Revelation, (2026) explained that teachers in the area generally have a positive attitude towards the use of technology and show readiness to adapt to digital developments.

However, this readiness still requires support in the form of training in the use of learning technology, the provision of adequate facilities, and support from schools and the government. Stronger support from the government and various relevant agencies is essential to ensure that every student has equal access to the technology needed for the learning process. The aspect of improving the professionalism of teachers cannot be ignored. Efforts to develop teacher competencies through continuous training programs, particularly in the application of deep learning models, are important factors that contribute to the successful implementation of these models in learning practice.

Practical and contextual training is expected to help teachers develop learning media that are more creative and in accordance with learning conditions in the 3T area. Therefore, the school is expected to function as a space for innovation development as well as the renewal of pedagogical practices. Meanwhile, teachers as the main implementers of learning activities need to receive adequate support in order to be able to carry out their role optimally as reflective facilitators while being able to encourage changes in the student learning process.

Furthermore, strengthening the implementation of deep learning requires integrated cooperation between various parties, namely the government, schools, teachers, parents, and the community. Synergy among these stakeholders is an important factor in building an educational environment that supports the achievement of a meaningful learning process. In this case, the government has a strategic role in formulating education policies that are supportive and empowering (Haditsa et al., 2025).

Thus, the application of deep learning in social studies learning in 3T regional elementary schools requires an adaptive strategy to the conditions of available facilities and infrastructure. The simple use of technology, the use of the environment as a contextual learning resource, and the strengthening of teachers' competencies through training and institutional support are important steps in overcoming the limitations of digital access. Through this strategy, deep learning can still be implemented meaningfully so that it can encourage active student involvement and increase their understanding of various social phenomena.

CONCLUSION

Deep learning is an important approach in social studies learning in elementary school because it is able to encourage meaningful understanding of concepts and develop students' critical thinking skills. However, its implementation in the 3T region still faces various challenges



due to inequality of digital access, such as limited technological infrastructure, unstable internet access, and low digital literacy and training opportunities for teachers. This condition creates a paradox between the demands of implementing innovative learning and the reality of limited educational facilities in the field. Therefore, an adaptive strategy is needed that includes the use of simple technology, the use of the social environment as a contextual learning resource, and the strengthening of teacher competence through training and institutional support so that deep learning can still be implemented effectively in 3T regional elementary schools.

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