Transforming Learning in Inclusive Schools Through Deep Learning Approaches: A Systematic Literature Review

Muhammad Bakhtiar Safari[1*]
Universitas Negeri Yogyakarta, Indonesia
muhammadbakhtiar.2022@student.uny.ac.id

Azzumardin Syaidi[2]
Universitas Hamzanwadi, Indonesia
azzumardinsyaidi@hamzanwadi.ac.id

Abdul Khair[3]
Universitas Negeri Yogyakarta, Indonesia
abdul.khair@hamzanwadi.ac.id

Nindya Seva Kusumaningsih[4]
Universitas Hamzanwadi, Indonesia
nindia.seva@hamzanwadi.ac.id

Khoirun Annisah[5]
Universitas Hamzanwadi, Indonesia
khairunnisa@hamzanwadi.ac.id

Abstrak: Transformasi pembelajaran di lingkungan sekolah inklusif menjadi kebutuhan mendesak untuk menjawab tantangan dan tuntutan pendidikan abad ke-21. Dalam hal ini, kehadiran pendekatan deep learning sebagai strategi pedagogis dalam sistem pendidikan Indonesia, dinilai mampu menjadi solusi pembelajaran yang adaptif, reflektif, dan responsif terhadap kebutuhan peserta didik yang beragam. Melalui pendekatan penelitian Systematic Literature Review (SLR), fokus utama penelitian ini untuk mengidentifikasi tantangan yang dihadapi guru dalam transformasi pembelajaran yang inklusif melalui pendekatan deep learning, khususnya dalam konteks pendidikan di Indonesia. Data penelitian diperoleh melalui database jurnal google scholar dengan kata kunci pencarian Inclusive Education OR Inclusive School AND Deep Learning OR Deep Learning Approach OR Deep Learning Pedagogy AND Transforming Learning OR Learning Transformation. Proses screening artikel dilakukan dengan metode PRISMA (Preferred Reporting Items for Systematic Review and Meta-analysis). Hasil penelitian secara umum menunjukkan bahwa transformasi pembelajaran inklusif melalui pendekatan deep learning dalam konteks pendidikan Indonesia menghadapi berbagai tantangan yang dikelompokkan menjadi tidak klaster utama yaitu tantangan yang dihadapi sekolah, guru, dan peserta didik. Fragmantasi kebijakan sekolah, keterbatasan infrastruktur digital, dan keterbatasan sumber daya menjadi tantangan yang dihadapi sekolah. Sementara itu, guru menghadapi tantangan berupa rendahnya kompetensi pemahaman guru, beban administratif, dan keberagaman budaya belajar peserta didik. Kemudian tantangan yang bersumber dari peserta didik ialah rendahnya interaksi antar peserta didik dan rendahnya aktivitas kolaboratif antar peserta didik. Adapun implikasi dari hasil penelitian ini mengarah pada pengembangan strategi pembelajaran inklusif berbasis teknologi melalui pendekatan deep learning.

Kata kunci: Transformasi Pembelajaran; Pendidikan Inklusif; Pembelajaran Mendalam; Tantangan Guru; Inovasi Pembelajaran Digital.

Abstract: *Transforming learning in inclusive school environments is an urgent need to address the challenges and demands of 21st-century education. In this regard, the presence of a deep learning approach as a pedagogical strategy in the Indonesian education system is considered capable of being an adaptive, reflective, and responsive learning solution to the needs of diverse learners. Through a Systematic Literature Review (SLR) research approach, the main focus of this study is to identify the challenges faced by teachers in transforming inclusive learning through a deep learning approach, especially in the context of education in Indonesia. Research data was obtained through the Google Scholar journal database with the search keywords Inclusive Education OR Inclusive School AND Deep Learning OR Deep Learning Approach OR Deep Learning Pedagogy AND Transforming Learning OR Learning Transformation. The article screening process was carried out using the PRISMA (Preferred Reporting Items for Systematic Review and Meta-analysis) method. The results of the study generally indicate that the transformation of inclusive learning through a deep learning approach in the context of Indonesian education faces various challenges that are grouped into three main clusters, namely challenges faced by schools, teachers, and students. Fragmentation of school policies, limited digital infrastructure, and limited resources are challenges faced by schools. Meanwhile, teachers face challenges such as low teacher understanding, administrative burdens, and diverse student learning cultures. Furthermore, challenges stemming from students include low student interaction and collaborative activities. The implications of this research lead to the development of technology-based inclusive learning strategies through a deep learning approach.*

Keywords: Learning Transformation; Inclusive Education; Deep Learning; Teacher Challenges; Digital Learning Innovation.

INTRODUCTION

The transformation of 21st century learning faces significant challenges in preparing students to adapt to increasingly rapid social, economic, and technological changes. Global developments in digitalization, artificial intelligence (AI), and the knowledge-based economy require education systems to foster critical thinking, creativity, communication, collaboration, and digital literacy skills for all students, including those with special needs (Kennedy & Sundberg, 2020; Khoiri et al., 2021; Zebua, 2025). In this context, schools are required to not only act as institutions for the transfer of knowledge, but also as learning spaces that are inclusive, adaptive, and responsive to the diversity of abilities and learning needs of students, especially in Indonesia, which is currently striving to strengthen inclusive practices nationally (Zebua, 2025). Therefore, transforming learning in inclusive schools is an urgent need to ensure that all students have equal opportunities to develop their potential so that they can compete in facing the realities of the 21st century.

In the effort to transform 21st century learning, the deep learning approach is one of the pedagogical strategies that is believed to be able to create a meaningful, reflective learning experience that is oriented towards deep conceptual understanding for all students. (Fullan & Gallagher, 2017; Kovač et al., 2025). Meanwhile, Dewi (2025) emphasized that the implementation of the deep learning approach is able to foster creativity, critical thinking, and intrinsic motivation of students in learning activities. Furthermore, the deep learning approach is

designed collaboratively to encourage the active involvement of diverse learners and is able to strengthen social skills, communication, and empathy in diverse learning. (Wu, 2025). Thus, the deep learning approach not only emphasizes mastery of academic content, but also character development, human values, and adaptability in an inclusive and dynamic learning environment.

Meanwhile, in the context of inclusive education, the deep learning approach has great potential to accommodate the diverse characteristics, abilities, and learning needs of diverse students. Through student-centered, reflective, and collaborative learning, this approach allows each individual to learn according to their own pace and learning style, without losing the meaning and purpose of learning (Dewi, 2025). Furthermore, the deep learning approach also helps teachers design learning experiences that foster empathy, mutual respect for differences, and encourage the active participation of all students, including those with special needs (Amri & Adifa, 2025; Mahardika & Jaya, 2025).

However, various studies show that the implementation of this approach in inclusive schools still faces several obstacles, such as limited digital infrastructure, low teacher competency in designing in-depth learning, and a lack of support from innovation-oriented school policies (Wejang & Nasar, 2025; Eryanto & Prasetyono, 2025; Saqjuddin et al., 2025). These conditions demonstrate a gap between the ideal potential of deep learning as a transformative approach and the reality of its implementation in the field. Therefore, a systematic study is needed to comprehensively identify the various challenges faced by schools, teachers, and

students in transforming inclusive learning through a deep learning approach, particularly in the context of education in Indonesia.

Based on this description, it can be concluded that although the deep learning approach has great potential to support inclusive learning, its implementation in Indonesian schools still faces various conceptual, technical, and policy challenges. While various previous studies have highlighted the benefits of the deep learning approach in improving student engagement and learning outcomes, few studies have systematically examined the inhibiting factors faced by schools, teachers, and students in the process of transforming inclusive learning based on deep learning. This research gap underlies the need for in-depth studies to provide a comprehensive understanding of the current conditions and direction of development of inclusive learning practices in Indonesia.

Thus, the primary objective of this study is to identify and categorize the various challenges faced by schools, teachers, and students in transforming inclusive learning through a deep learning approach. To achieve this goal, this study employed a Systematic Literature Review (SLR) approach using the PRISMA (Preferred Reporting Items for Systematic Review and Meta-analysis) method. The research questions in this study are as follows:

RQ1: What are the challenges schools face in transforming inclusive learning through a deep learning approach?

RQ2: What are the challenges teachers face in implementing a deep learning approach in an inclusive learning environment?

RQ3: What are the challenges faced by students in inclusive learning based on deep learning?

RESEARCH METHODS

This study uses a Systematic Literature Review (SLR) approach with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method, which aims to identify, analyze, and synthesize the results of previous research related to the challenges in transforming learning in inclusive schools through a deep learning approach. This approach was chosen because it can provide a comprehensive overview of the conditions, challenges, and direction of the development of inclusive learning practices based on deep learning in Indonesia. The research data source was obtained from the Google Scholar database with the search keywords "Inclusive Education OR Inclusive School AND Deep Learning OR Deep Learning Approach OR Deep Learning Pedagogy AND Transforming Learning OR Learning Transformation". In order to focus the research results, the inclusion and exclusion criteria are presented in Table 1 below.
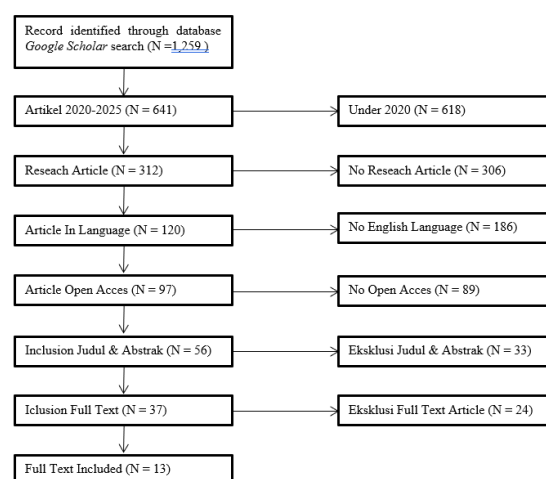
Table 1 Inclusion and Exclusion Criteria for Determining Research Data

Inclusion Criteria	Exclusion Criteria
Research articles that discuss the application of deep learning in the context of inclusive education, primary or secondary education	Articles that only discuss deep learning in the context of artificial intelligence (AI) or machine learning
Empirical articles, literature reviews, or research reports that examine the challenges of inclusive learning	Articles that have no relevance to the context of inclusivity or learning transformation
Articles published between 2020–2025 and available in full text format	Non-full-text articles or articles that have not gone through the peer-review process

Meanwhile, the process of identifying, screening, and determining research data is carried out systematically based on the inclusion and exclusion criteria of research data and is presented in the form of a PRISMA diagram to illustrate the systematic stages in determining research data.

Chart 1 PRISMA Diagram of Research Data Identification, Filtering, and Determination

Meanwhile, the data analysis technique uses thematic data analysis with the stages of reading and understanding each article's contents in depth, identifying keywords, main themes, and patterns related to the challenges of inclusive learning transformation through deep learning, grouping themes into three main clusters, namely challenges at the school, teacher, and student levels, and interpreting the relationships between themes to answer research questions RQ1, RQ2, and RQ3.

RESULTS AND DISCUSSION

Based on the process of identifying, filtering, and determining research data using the PRISMA (Preferred Reporting Items for Systematic Review and Meta-

analysis) method, 13 scientific articles were obtained that met the inclusion criteria and were relevant to the theme of inclusive learning transformation through a deep learning approach. These articles cover various educational contexts in Indonesia. The research data are presented in the form of an extraction table.

Table 2. Data Extraction for Inclusive Learning Transformation Research Using a Deep Learning Approach

No	Article Title	Author	Year	Citations
1	Analysis of the Implementation of Deep Learning in the Islamic Religious Education Curriculum at State Elementary School 125 Ogan Komering Ulu, South Sumatra	Irfanuddin et al	2025	(Irfanuddin et al., 2025)
2	Integration of Deep Learning in Elementary School Curriculum: Challenges and Opportunities	Isnayanti et al	2025	(Isnayanti et al., 2025)
3	Exploring the Opportunities and Challenge	Wejang & Nasar	2025	(Wejang & Nasar, 2025)
	s of Deep Learning Integration in Elementary Education			
4	Deep Learning Approach in Early Childhood Education Learning	Dwijantie	2025	(Dwijantie, 2025)
5	The Role of Deep Learning Approach in Developing Students' Writing Skills	Dewi et al	2025	(Dewi et al., 2025)
6	Deep Learning Approach: Its Potential and Challenges in Indonesian Education	Amri & Adifa	2025	(Amri & Adifa, 2025)
7	Learning Transformation in Vocational High Schools: An In-Depth Analysis of M-Learning Flexibility	Ananda & Suranto	2024	(Ananda & Suranto, 2024)
8	Teachers'	Mahardi	20	(Mahardi

N o	Article Title	Author	Ye ar	Citations
	Perceptions of the Application of Deep Learning in the Deep Learning Framework	ka & Jaya	25	ka & Jaya, 2025)
9	Implementation of Deep Learning in Improving the Effectiveness of the Impact Curriculum in Schools	Suryati & Yelliza Gusti,	20 24	(Suryati, Yelliza Gusti, 2024)
1 0	Implementation of Deep Learning in Early Childhood Education	Jayawardana	20 25	(Jayawardana, 2025)
1 1	The Effectiveness of In-Depth Learning in the Implementation of the Independent Curriculum at Cikampek Selatan I Public Elementary	Eryanto & Prasetyono	20 25	(Eryanto & Prasetyono, 2025)

N o	Article Title	Author	Ye ar	Citations
	y School			
1 2	Exploring Deep Learning Practices in Social Studies within Inclusive Elementary Classrooms	Saqjuddin et al	20 25	(Saqjuddin et al., 2025)
1 3	Analysis of Student Learning Activity Stages in Biology Learning: A Case Study as a Basis for Developing Deep Learning Design	Setiaji et al	20 25	(Setiadji et al., 2025)

Based on the results of the analysis of 13 articles designated as research data as contained in Table 1, it was found that the process of transforming inclusive learning through the deep learning approach still faces several challenges as grouped and presented in Table 3 below.

Table 3: Cluster Challenges for Inclusive Learning Transformation Through a Deep Learning Approach

Cluster	Challenges faced
School	Fragmentation of School Policy (Wejang & Nasar, 2025) Limitations of Digital Learning Infrastructure (Amri & Adifa, 2025; Eryanto & Prasetyono, 2025; Isnayanti et al., 2025;

	Wejang & Nasar, 2025) Limited Resources (Saqjuddin et al., 2025)
Teacher	Low Teacher Competence and Understanding (Amri & Adifa, 2025; Dewi et al., 2025; Irfanuddin et al., 2025; Mahardika & Jaya, 2025) Limited Professional Development Training for Teachers (Mahardika & Jaya, 2025; Wejang & Nasar, 2025) Administrative Learning Burden (Saqjuddin et al., 2025) Diversity of Student Learning Cultures (Amri & Adifa, 2025; Dewi et al., 2025)
Student	Low Interaction Between Students (Setiadji et al., 2025) Collaborative Student Activities (Setiadji et al., 2025)

Challenges Faced by Schools in Transforming Inclusive Learning Through a Deep Learning Approach

a. Fragmentation of School Policy

The fragmentation of school policies is a major challenge facing schools in transforming inclusive learning through a deep learning approach. Research by Wejang & Nasar (2025) indicates that most schools in Indonesia lack a unified and consistent policy direction for developing deep learning as an inclusive learning approach. This finding is further supported by Amri & Adifa (2025), who assert that deep learning is not yet part of the school improvement plan, resulting in unsustainable and incidental implementation. This situation indicates that school-level policies are not yet serving as catalysts for the transformation process, but remain trapped in static managerial bureaucracy.

Internationally, this finding aligns with research by Yang & Wang (2025),

who asserted that inclusive education policies in various countries remain fragmented and lack a coherent framework, creating a gap between national policies and school-level implementation. Meanwhile, Hulme et al. (2023) found that the deregulated school system causes schools to lose collective responsibility for inclusion due to weak coordination among policymakers. Furthermore, Viennet & Pont (2017) emphasize that the success of inclusive learning transformation is heavily influenced by policy coherence, implementation capacity, and the active participation of educational actors. This means that if any of these elements is not met, school policies will stall at the level of school administrative documents.

Thus, it can be emphasized that the fragmentation of school policies in inclusive learning transformation through deep learning is not unique to the Indonesian education context but also presents a challenge globally. Therefore, strengthening school policies needs to be directed at establishing a collaborative, reflective, and adaptive policy model to pedagogical change. This allows for a balance between administrative demands and space for innovation, so that deep learning implementation can function as a transformative tool that truly supports sustainable inclusive learning.

b. Limitations of Digital Learning Infrastructure

Limited digital infrastructure is also a significant challenge facing schools in inclusive learning transformation through the implementation of deep learning approaches. A literature review shows that most schools in Indonesia still face obstacles in providing digital learning devices, internet connectivity, and technical support to operate learning platforms that

support deep learning. A study by Eryanto & Prasetyono (2025) specifically found that the implementation of the deep learning approach in the independent curriculum is still hampered by limited technological facilities and unequal access between urban and non-urban schools. Similarly,Isnayanti et al. (2025) emphasized that the lack of technological facilities and competent human resources in managing digital learning in Indonesian elementary schools poses a challenge to inclusive learning transformation. These findings indicate that inclusive learning transformation cannot solely rely on pedagogical innovation without adequate infrastructure support at the institutional level.

The above findings align with several international studies that highlight the importance of digital infrastructure as a key prerequisite for the success of inclusive learning transformation based on deep learning approaches. A study by Kyeyune et al. (2025), who asserted that digital infrastructure gaps, particularly network access and hardware, directly impact students' meaningful and collaborative learning experiences. Meanwhile, Gkrimpizi & Peristeras (2023) emphasized that inclusive schools in developing countries experience limited technological devices, unsustainable technology maintenance, and poor technical support for teachers. Thus, infrastructure barriers are not only technical but also structural and managerial, as they relate to policies and the management of school resources.

In the context of Indonesian education, this situation demands affirmative policies for equitable distribution of digital education infrastructure for all schools, including inclusive schools, to encourage full participation in the inclusive learning transformation based on deep learning approaches. Therefore, strengthening digital infrastructure is not merely a technical necessity but also a foundation for equity in the education system, ensuring that all students, including those with special needs, have equal and meaningful learning opportunities.

c. Limited Resources

Limited school resources also pose a challenge to transforming inclusive learning through a deep learning approach. Research shows that the resource limitations faced by schools relate to budget allocation, the availability of support staff, and inclusive learning technology. This finding aligns with Lee et al. (2019), who asserted that limited resources and support services are a major barrier to achieving inclusivity, including learning transformation. Meanwhile, improving facilities and educational materials in developing countries is often hampered, impacting the success of inclusive learning transformation in schools (Mendoza et al., 2024). Goldan et al. (2022), also revealed that schools with additional resources and services, such as co-teaching, teacher training, and adaptive materials, tend to have more effective success in inclusive learning transformation. Therefore, in the context of schools implementing a deep learning approach, these resource challenges are not merely technical but strategic, as the approach requires increased teacher capacity, curriculum adaptation, and systematic technology and facility support.

The implications of these limited school resources are significant for educational equity and the sustainability of transformation. Inclusive schools with limited budgets or those lacking specialized

support staff tend to delay or neglect the integration of deep learning approaches, underserving student diversity and immersive learning experiences. In the long term, this can widen the quality gap between schools. Therefore, emerging policy recommendations include developing equity-based resource allocation models and strengthening internal school capacity through training and the allocation of specialized staff.

Challenges Faced by Teachers in Transforming Inclusive Learning Through the Deep Learning Approach

a. Low Teacher Competence and Understanding

Teachers' low level of understanding of the concept and implementation of deep learning is one of the main challenges faced by teachers in the transformation of inclusive learning. Several studies confirm that most teachers do not yet understand deep learning as a pedagogical approach that emphasizes higher-order thinking, reflection, and collaborative learning. According to Amri & Adifa (2025), most teachers still understand deep learning solely as the application of artificial technology, rather than as a meaning-oriented learning strategy. This research finding is supported by the findings of Fitrah et al. (2025), who surveyed 802 teachers in Indonesia, finding that only 37% of teachers were able to integrate deep learning principles into 21st-century learning designs. This indicates that teachers' conceptual and reflective competencies are generally limited, resulting in suboptimal inclusive learning based on deep learning.

Meanwhile, Guerra-antequera et al. (2022), confirmed that the majority of teachers in various countries face gaps in digital competency and pedagogical literacy needed to implement meaningful, technology-based learning strategies. This gap directly impacts teachers' low ability to facilitate inclusive learning, as they are unable to adapt deep learning approaches to the diverse needs of learners. In this context, Dille & Røkenes (2022), emphasizes the importance of professional learning communities (PLCs) as a means for teachers to develop a conceptual understanding of transformative learning, including deep learning. However, many schools in Indonesia still lack effective professional mentoring mechanisms, while administrative burdens and curriculum demands are very high. This situation significantly impacts the development of a reflective and collaborative culture among teachers, preventing the sustainable development of deep learning-based innovations.

b. Administrative Learning Burden

The high administrative burden is also a challenge teachers face in transforming inclusive learning through a deep learning approach. Research by Saqjuddin et al. (2025), confirms that most teachers in inclusive schools in Indonesia spend the majority of their time fulfilling administrative demands such as developing lesson plans, completing assessment documents, reporting learning activities, and administering the curriculum. This situation severely limits the time that should be used for pedagogical reflection, collaborative planning, and professional development. The findings of Dewi et al. (2025) reinforce this, stating that teachers often experience "instructional overload" due to an administrative burden that is disproportionate to the resources and time available. As a result, the implementation of deep learning, which demands reflective

engagement and creative learning design, cannot be optimally implemented.

In the context of inclusive learning, the impact of teachers' administrative burden becomes increasingly complex, requiring teachers not only to manage the general learning process but also to design differentiated learning plans, document the progress of students with special needs, and coordinate with parents and other support staff. A study by Florian & Camedda (2020), in the European Journal of Special Needs Education confirms that the complexity of administrative documentation in inclusive schools often prevents teachers from focusing on reflective and empathetic learning practices. On the other hand, research by Torres et al. (2021) in Teaching Education shows that an efficient, collaboration-based school management system can reduce teacher administrative pressure and increase the time available for pedagogical innovation. Therefore, to realize a deep learning-based inclusive learning transformation, schools need to restructure teacher workload management policies, emphasizing administrative efficiency, system digitization, and empowering academic support staff so that teachers can focus their energy on meaningful pedagogical tasks.

c. Diversity of Student Learning Cultures

In Indonesia's highly pluralistic educational context, teachers are confronted with diverse social dynamics, languages, values, and learning styles among students. Therefore, the diversity of students' learning cultures presents a unique challenge for teachers in implementing a deep learning approach to transforming learning in inclusive schools. A literature review indicates that most teachers lack adequate intercultural competency to manage this diversity in the learning process (Dewi et al., 2025). As a result, designed learning strategies are often homogenous and unable to fully address the diverse backgrounds of students, especially those with special needs. In this situation, a deep learning approach that demands reflective and contextual engagement becomes difficult to implement inclusively, as teachers are not accustomed to adapting learning designs to the diversity of students' values and learning experiences.

Meanwhile, Hammond (2015), in his book, Culturally Responsive Teaching and the Brain, emphasizes that understanding differences in students' learning cultures is closely related to how the brain processes information. Therefore, teachers need to adapt deep learning strategies that are relevant to students' social and cognitive contexts. Thus, the challenge of cultural diversity in learning is not only a matter of differentiation of teaching strategies, but also relates to the transformation of teachers' paradigms in viewing differences as a source of learning strength.

Challenges Faced by Students in Transforming Inclusive Learning Through the Deep Learning Approach

a. Low Interaction Between Students

Low levels of social interaction among students is a major obstacle to implementing inclusive, deep learning-based learning. A literature review shows that students in inclusive schools often exhibit a tendency to learn individually, even in teacher-designed group activities (Setiadji et al., 2025; Irfanuddin et al., 2025). This is due to differences in academic abilities, social skills, and diverse cultural backgrounds, which make it

difficult for some students to build respectful relationships in collaborative learning. This condition hinders the implementation of deep learning principles that emphasize collaboration, dialogue, and active involvement in constructing meaning in learning together. Low levels of interaction also result in students with special needs experiencing social isolation due to the lack of equal participation from peers in cooperative learning activities. Therefore, teachers are expected to be able to create a learning ecosystem that fosters empathy, equal communication, and shared reflection so that deep learning can function optimally in a diverse context.

b. Collaborative Student Activities

Low levels of student collaborative activity are a major challenge in implementing inclusive, deep learning-based learning. In many inclusive schools, collaborative learning activities remain ineffective because students tend to participate passively or work individually in groups. Research findings indicate that differences in academic and social abilities among students often lead to unequal roles in group work, with students with high abilities dominating, while students with special needs or lower abilities tend to be excluded from the active learning process (Setiadji et al., 2025; Irfanuddin et al., 2025). Furthermore, teachers often fail to establish inclusive collaborative work structures, such as positive interdependence, shared accountability, and group reflection, which are core to deep learning. As a result, collaborative activities often remain formalistic, without generating deep and meaningful learning experiences for all students.

Within the framework of the deep learning approach, collaboration among students aims not only to produce group products but also to build shared conceptual understanding and social awareness. Zhu et al. (2016) revealed that collaborative learning designed based on deep learning principles can increase cognitive engagement, critical reflection, and empathy among students. However, this success is highly dependent on the social scaffolding provided by teachers, including providing equal roles, group reflection, and a safe communication environment for students with special needs. Therefore, the low level of collaborative student activity in the context of inclusive education is not only caused by individual characteristics, but also by weak pedagogical design and classroom culture that do not encourage reflective collaboration as the primary means of transforming learning through a deep learning approach.

CONCLUSION

Based on the results of the research data analysis, it can be concluded that the transformation of inclusive learning through a deep learning approach in the Indonesian educational context faces several obstacles grouped into three main clusters: challenges faced by schools, teachers, and students. Challenges faced by schools include fragmented school policies, limited digital infrastructure, and limited resources. Meanwhile, challenges faced by teachers include low teacher competency, administrative burdens, and the diversity of student learning cultures. Furthermore, challenges stemming from students include low student interaction and low collaborative activities.

The results of this study provide several important implications for the transformation of inclusive learning through a deep learning approach, which

can be examined from three main dimensions: education policy, pedagogical practice, and teacher professional development. In general, the results of this Systematic Literature Review indicate that the challenges faced by schools, teachers, and students are multidimensional, encompassing interconnected structural, cultural, and pedagogical factors. Therefore, the transformation of inclusive learning cannot be achieved through partial interventions but requires a systemic approach that addresses policy, learning design, and a collaborative and reflective school culture.

REFERENCE

Amri, K., & Adifa, F. (2025). Pendekatan Pembelajaran Mendalam : Potensi dan Tantangannya pada Pendidikan Indonesia. *Paidea Research: Education Science and Culture Journal*, *1*(1), 1–6.

Ananda, B., & Suranto, S. (2024). Transformasi Pembelajaran di Sekolah Menengah Kejuruan: Analisis Mendalam Fleksibilitas M-learning. *Ideguru: Jurnal Karya Ilmiah Guru*, *9*(2), 695–701. https://doi.org/10.51169/ideguru.v9i2.936

Dewi, A. C., Keterampilan, M., Siswa, M., & No, V. (2025). *Peran Pendekatan Pembelajaran Mendalam dalam Menumbuhkan Keterampilan Menulis Siswa*. *1*(7), 1–10.

Dille, K. B., & Røkenes, F. M. (2022). Teachers ' professional development in formal online communities : A scoping review. *Teaching and Teacher Education*, *105*(2021), 103431. https://doi.org/10.1016/j.tate.2021.103431

Dwijantie, J. S. (2025). Pendekatan Deep Learning Dalam Pembelajaran PAUD. *Edukasiana: Jurnal Inovasi Pendidikan*, *4*(3), 1238–1246.

https://doi.org/10.56916/ejip.v4i3.1666

Eryanto, D., & Prasetyono, H. (2025). Efektivitas Pembelajaran Mendalam dalam Implementasi Kurikulum Merdeka di SD Negeri Cikampek Selatan I. *Jurnal Evaluasi Pendidikan*, *16*(2), 88–94. https://doi.org/10.21009/jep.v16i2.60722

Fitrah, M., Sofroniou, A., Yarmanetti, N., Ismail, I. H., Anggraini, H., Nissa, I. C., Widyaningrum, B., Khotijah, I., Kurniawan, P. D., & Setiawan, D. (2025). *Are Teachers Ready to Adopt Deep Learning Pedagogy ? The Role of Technology and 21st-Century Competencies Amid Educational Policy Reform*. 1–19.

Fullan, M., & Gallagher, M. J. (2017). *Transforming Systems, Deep Learning and the Equity Hypothesis Michael Fullan and Mary Jean Gallagher April 2017 Paper prepared for the Learning Policy Institute, Stanford University*. April.

Gkrimpizi, T., & Peristeras, V. (2023). Barriers to digital transformation in higher education institutions. In *15th International Conference on Theory and Practice of Electronic Governance (ICEGOV 2022), October 04â•fi07, 2022, GuimarÃ£es, Portugal* (Vol. 1, Issue 1). Association for Computing Machinery. https://doi.org/10.1145/3560107.3560135

Goldan, J., Loreman, T., & Lambrecht, J. (2022). Resources for inclusive education – impacts of funding and provision. *International Journal of Inclusive Education*, *0*(0), 1–3. https://doi.org/10.1080/13603116.2020.1821452

Guerra-antequera, J., González-pérez, A., & González-fernández, A. (2022). *Digital Teaching Competence : A Systematic Review*. 1–15. https://doi.org/10.17605/OSF.IO/P5K

TG

Hulme, M., Adamson, C., & Griffiths, D. (2023). *Geographies of Exclusion : Rebuilding Collective Responsibility in a Fragmented School System.* https://doi.org/10.1080/15700763.2022.2160361

Irfanuddin, F., Selamat, S., & Widodo, H. (2025). Analisis Implementasi Pembelajaran Mendalam (Deep Learning) dalam Kurikulum PAI di SD Negeri 125 Ogan Komering Ulu Sumatera Selatan. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, *5*(3), 1566–1576. https://doi.org/10.53299/jppi.v5i3.1798

Isnayanti, A. N., Putriwanti, P., Kasmawati, K., & Rahmita, R. (2025). Integrasi Pembelajaran Mendalam (Deep Learning) dalam Kurikulum Sekolah Dasar: Tantangan dan Peluang. *Cokroaminoto Journal of Primary Education*, *8*(2), 911–920. https://doi.org/10.30605/cjpe.8.2.2025.6027

Jayawardana, H. B. A. (2025). Implementasi Pembelajaran Mendalam (Deep Learning) pada Jenjang Pendidikan Anak Usia Dini (PAUD). *JECIE (Journal of Early Childhood and Inclusive Education)*, *8*(2), 510–516. https://doi.org/10.31537/jecie.v8i2.2476

Kennedy, T. J., & Sundberg, C. W. (2020). *21st Century Skills BT - Science Education in Theory and Practice: An Introductory Guide to Learning Theory* (B. Akpan & T. J. Kennedy (eds.); pp. 479–496). Springer International Publishing. https://doi.org/10.1007/978-3-030-43620-9_32

Khoiri, A., Komariah, N., Utami, R. T., Paramarta, V., & Sunarsi, D. (2021). 4Cs analysis of 21st century skills-based school areas. *Journal of Physics: Conference Series*, *1764*(1), 12142.

Kyeyune, R., Engotoit, B., Katarahweire, E. A., Kasule, A., & Kituyi, M. G. (2025). *Technological readiness and integration of digital technologies for teaching in government aided primary schools in Uganda.* *3*(3), 1–13.

Lee, H., Myers, J., & Le, G. (2019). *Disability Inclusion Helpdesk Report Pilot no . 3 Inclusive education in resource-constrained environments : good practice examples and learning from implementation.* *3*, 1–15.

Mahardika, Y., & Jaya, C. A. (2025). Persepsi Guru Terhadap Penerapan Deep Learning dalam Kerangka Kerja Pembelajaran Mendalam. *Edukasiana: Jurnal Inovasi Pendidikan*, *4*(3), 1123–1139. https://doi.org/10.56916/ejip.v4i3.1748

Mendoza, M., Heymann, J., & Mendoza, M. (2024). Implementation of Inclusive Education : A Systematic Review of Studies of Inclusive Education Interventions in Low- and Lower- Middle-Income Countries Implementation of Inclusive Education : A Systematic Review of Studies of Inclusive Education Interventions in Low- and Lower- Middle-Income Countries. *International Journal of Disability, Development and Education*, *71*(3), 299–316. https://doi.org/10.1080/1034912X.2022.2095359

Saqjuddin, S., Parisu, C. Z. L., & Saputra, E. A. (2025). Exploring Deep Learning Practices in Social Studies within Inclusive Elementary Classrooms. *Jurnal Riseta Soshum*, *2*(2), 47–54. https://doi.org/10.70392/jrs.v2i2.4754

Setiadji, R. P., Rahmawati, I., & Santoso, A. M. (2025). Analisis Tahapan Aktivitas Belajar Siswa pada Pembelajaran Biologi: Studi Kasus untuk Dasar Pengembangan Desain Pembelajaran Mendalam. *Prosiding Seminar Nasional Kesehatan, Sains*

Dan Pembelajaran, *5*(1 SE-Articles), 696–700. https://doi.org/10.29407/350efc65

Suryati, Yelliza Gusti, J. (2024). Implementasi Pembelajaran Mendalam (Deep Learning) dalam Meningkatkan Efektivitas Kurikulum Berdampak di Sekolah. *Jurnal Edu Research : Indonesian Institute For Corporate Learning And Studies (IICLS)*, *6*, 28–35.

Viennet, R., & Pont, B. (2017). *Education policy implementation : A literature review and proposed framework. 162*.

Wejang, H. E. A., & Nasar, I. (2025). *Menjelajahi Peluang dan Tantangan Integrasi Pembelajaran Mendalam dalam Pendidikan Dasar : Tinjauan Literatur Sistematis. 4*(4), 1682–1690.

Wu, X.-Y. (2025). Exploring the impact of blended collaborative learning on deep learning outcomes: a structural equation modeling approach. *Education and Information Technologies*, *30*(10), 13411–13437. https://doi.org/10.1007/s10639-024-13202-z

Yang, C., & Wang, T. (2025). *Towards a Sustainable Future in Education : A Systematic Review and Framework for Inclusive Education.*

Zebua, N. (2025). *Education Transformation : Implementation of Deep Learning in 21st-Century Learning. 2*(2), 146–152.