Jurnal
Kiprah Pendidikan
Volume 4 Nomor 4 Oktober 2025, Hlm. 725-732

ISSN 2810-0443 (print) | 2827-8909 (online)
https://kpd.ejournal.unri.ac.id
https://doi.org/10.33578/kpd.v4i4.p725-732

FROM EPISTEMOLOGY TO PEDAGOGY: PHILOSOPHICAL FOUNDATIONS FOR DEEP LEARNING IN THE MERDEKA CURRICULUM

DARI EPISTEMOLOGI KE PEDAGOGI: LANDASAN FILSAFAT UNTUK PEMBELAJARAN MENDALAM DALAM KURIKULUM MERDEKA

Kamalia Fikri[1], Mastini[2], I Ketut Mahardika[3], Joko Waluyo[4], Bambang Soepeno[5]

[1,3,4,5]Department of Science Education, University of Jember
[2]Junior High School 16 Malang

*Email:*kamalia.fkip@unej.ac.id[1], mastini54@admin.smp.belajar.id [2], ketut.fkip@unej.ac.id [3], jokowaluyo.fki@unej.ac.id [4], bambangsoepeno@unej.ac.id [5]

Submitted
12 September 2025

Accepted
17 September 2025

Revised
2 Oktober 2025

Published
30 Oktober 2025

Kata Kunci:
Epistemologi; Pedagogi; Landasan Filosofis; Pembelajaran Mendalam; Kurikulum Merdeka.

Keyword:
Epistemology; Pedagogy; Philosophical Foundations; Deep learning; Merdeka Curriculum

Abstrak

Di Indonesia, Kurikulum Merdeka diperkenalkan sebagai respons terhadap tantangan, tetapi keberhasilan implementasinya sangat bergantung pada integrasinya dengan pendekatan pembelajaran mendalam. Penelitian ini bertujuan untuk menganalisis hubungan antara epistemologi, pedagogi, dan pembelajaran mendalam dalam Kurikulum Merdeka melalui tinjauan pustaka berbasis kajian filosofis. Hasil analisis menunjukkan bahwa epistemologi berfungsi sebagai landasan konseptual yang menentukan perspektif tentang hakikat pengetahuan, pedagogi menjadi jembatan implementatif yang menerjemahkan landasan filosofis ke dalam strategi pembelajaran, sementara pembelajaran mendalam merupakan tujuan akhir berupa pemahaman konseptual, refleksi kritis, hubungan antarkonsep, dan penerapan pengetahuan dalam konteks nyata. Dengan demikian, pembelajaran mendalam merupakan transformasi epistemologis dan pedagogis yang berkontribusi terhadap pembentukan peserta didik yang reflektif, kritis, dan berkarakter dalam menghadapi dinamika kehidupan abad ke-21.

Abstract

In Indonesia, the Independent Curriculum (Kurikulum Merdeka) was introduced as a response to challenges, but its successful implementation depends heavily on its integration with a deep learning approach. This study aims to analyze the relationship between epistemology, pedagogy, and deep learning in the Independent Curriculum through a philosophically based literature review. The analysis shows that epistemology serves as a conceptual foundation that determines perspectives on the nature of knowledge, pedagogy serves as an implementation bridge that translates philosophical foundations into learning strategies, while deep learning is the ultimate goal of conceptual understanding, critical reflection, interconceptual relationships, and the application of knowledge in real contexts. Thus, deep learning is an epistemological and pedagogical transformation that contributes to the formation of reflective, critical, and character-based students in facing the dynamics of 21st-century life.

Citation :
Fikri, Kamalia, dkk. (2025). From Epistemology to Pedagogy: Philosophical Foundations for Deep Learning in the Merdeka Curriculum. *Jurnal Kiprah Pendidikan, 4* (4), 725-732. DOI: **https://doi.org/10.33578/kpd.v4i4.p725-732.**

ISSN 2810-0443 (print) | 2827-8909 (online)
https://doi.org/10.33578/kpd.v4i4.p725-732
Jurnal Kiprah Pendidikan
Volume 4 Nomor 4 Oktober 2025, Hlm. 725-732

INTRODUCTION

The twenty-first century is marked by technological advances, global integration, and social change. In the context of education, the curriculum must be able to adapt to these changes by emphasizing the development of relevant skills such as critical thinking, creativity, collaboration, and communication skills (Cahyaningsih, et. al, 2025). According to Zuo & Wang (2021), in order to produce competent human resources who are responsive to the developments of the times, a curriculum that is in line with the needs of the twenty-first century is crucial. In Indonesia, curriculum adjustments to the demands of the times are implemented through the Merdeka Curriculum.

The Merdeka Curriculum offers many learning opportunities, giving teachers and students the freedom to explore teaching materials in an interesting way, focusing on important topics and developing student character. The Merdeka Curriculum emphasizes differentiated learning, where teachers are expected to be able to design learning experiences that are responsive to students' diverse interests, learning styles, and readiness levels (Halimah, et. al., 2025). In addition, through the Pancasila Student Profile Strengthening Project (P5), students are required not only to master cognitive aspects but also to build character: to be faithful and devout, globally diverse, cooperative, creative, critical thinkers, and independent (Yumarna, et. al., 2025)).

The deep learning approach is considered both an improvement and a solution in evaluating the implementation of the Merdeka Curriculum. These two concepts share a common goal, which is to free learning from a rigid theoretical approach and move towards contextual, relevant, and meaningful learning. The integration of deep learning with the Merdeka Curriculum shows great potential in improving the quality of education (Rosiyati, et al., 2025).

Deep learning has emerged as a major focus, especially in triggering a shift in learning methods that are not only memory-oriented but also focused on comprehensive conceptual understanding and critical and analytical thinking skills (Mahardika & Jaya, 2025). Deep learning in education refers to a learning approach centered on technology-based investigation, data processing, and problem solving, which enables learners to understand the structure, correlation, and application of concepts in various life situations (McPhail, 2021).This approach is not only significant in contemporary learning environments, but also plays a role in advancing lifelong learning and improving effective teaching outcomes across all levels of education (Billingsley, et. al., 2024).

However, a crucial question arises: can deep learning be achieved solely through technical modifications in the classroom? If deep learning is viewed merely as an instructional strategy, then its application risks being reduced to a mere methodological variation without epistemological transformative power (Biggs & Tang, 2011). In fact, deep learning actually requires a change in perspective on the nature of knowledge (epistemology). It is not only about how to teach, but also what knowledge is, how knowledge is understood, and how knowledge is constructed.

A number of previous studies have highlighted the importance of deep learning in improving the quality of science learning. However, most studies still focus on pedagogical strategies or instructional models (e.g., problem-based learning, inquiry learning, or project-based learning), without linking them deeply to epistemological foundations. This is where there is an academic gap: a lack of philosophical reflection that bridges epistemology with pedagogical practice. This article aims to fill this gap by emphasizing that deep learning cannot be separated from the philosophy of knowledge that supports it.

METHOD

This study uses a library research approach with a philosophical-critical approach. This method was chosen because the issues examined are conceptual and reflective in nature, namely analyzing the relationship between epistemology, pedagogy, and deep learning in the context of the Merdeka Curriculum. The focus of this research is not on collecting empirical data in the field, but on critically analyzing the ideas, principles, and theories developed by philosophers and educational thinkers.

This type of research falls under philosophical-critical studies in the field of education, which aims to examine the logical coherence and practical relevance between epistemological foundations

Jurnal Kiprah Pendidikan
Volume 4 Nomor 4 Oktober 2025, Hlm. 725-732
ISSN 2810-0443 (print) | 2827-8909 (online)
https://doi.org/10.33578/kpd.v4i4.p725-732

and their application in contemporary pedagogy. This approach emphasizes the exploration of fundamental ideas, conceptual meaning analysis, and rational argumentation to construct a complete theoretical synthesis of deep learning.

Research data was obtained through a review of secondary literature in the form of educational philosophy books, international and national academic journals, and scientific publications relevant to the topics of epistemology, pedagogy, and deep learning. The analysis process was carried out in three stages, namely:

1. Literature identification – selecting key sources relevant to the issue of the relationship between epistemology and pedagogy.
2. Categorization of main ideas – grouping key concepts based on schools of thought (rationalism, empiricism, and constructivism).
3. Critical analysis and conceptual synthesis examining the logical consistency between concepts and formulating theoretical relationships between epistemology, pedagogy, and deep learning.

This philosophical approach is expected to produce a deeper understanding of how epistemological principles can form the conceptual basis for pedagogy oriented towards deep learning in the implementation of the Merdeka Curriculum.

RESULTS AND DISCUSSION

Epistemology as the Foundation of Knowledge

Epistemology, etymologically derived from the Greek words epistēmē (knowledge) and logos (study), is a branch of philosophy that focuses on the nature of the sources, limitations, and validity of knowledge. In the context of the philosophy of education, epistemology plays a vital role because every pedagogical practice is always based on certain assumptions about the definition of knowledge, how to acquire knowledge, and how to justify it.

In other words, epistemology is not an abstract realm of philosophy but influences the direction, objectives, and strategies of learning (Sengul, 2024). The science of epistemology provides a basis for understanding that scientific knowledge is not merely static facts but dynamic intellectual constructions through the processes of inquiry, verification, and critical discussion (Maryani et al., 2024).

Recent research shows that without a strong epistemological foundation, deep learning practices have the potential to become methodological variations without true philosophical meaning (Chen & Singh, 2023). As facilitators of the learning process, teachers translate their epistemological views into classroom practice, whether they emphasize memorization, discovery, or reflective dialogue. Therefore, it is important to build an understanding of epistemology so that students can see science as a process rather than just a product (Lising & Elbi, 2005).

Epistemology questions three main things, namely what can be known, how can it be known, and to what extent can knowledge be justified? In the world of education, these questions determine what curriculum is considered important to teach, what methods are used to teach it, and how to validate student understanding. For example, if we view science as something absolute and universal, then lessons tend to be transmission-based. Conversely, if science is viewed as a social construct, then lessons emphasize collaborative dialogue and critical reflection (Dinata et al., 2024).

Recent research shows that the main challenge in implementing deep learning in Indonesia is the epistemological gap, namely the lack of philosophical understanding among teachers, which often results in its implementation stopping at the procedural level (Dinata et.al., 2024). Therefore, understanding science must be taken seriously so that teachers do not carry out teaching practices mechanically without realizing the basic epistemological assumptions.

ISSN 2810-0443 (print) | 2827-8909 (online)
https://doi.org/10.33578/kpd.v4i4.p725-732
Jurnal Kiprah Pendidikan
Volume 4 Nomor 4 Oktober 2025, Hlm. 725-732

There are three main types of epistemological schools of thought that have made significant contributions to the world of education:

1. Rationalism

Rationalism was conceived by figures such as René Descartes, who emphasized reason as the primary source of all knowledge and promoted deductive logic in the search for truth. The contribution of rationalism is clearly seen in the teaching and learning process, which introduces conceptual structures, logical order, and basic scientific principles. Recent studies also reveal that epistemological aspects such as clarity, certainty, and emergence can be used as a basis for designing current learning modules, for example in learning that focuses on artificial intelligence (Kampourakis & McGrath, 2024).

2. Empiricism

Empiricism emphasizes the importance of sensory experience as explained by John Locke through the concept of tabula rasa, which states that the human mind is born as a blank slate that is then filled with experience. Empiricism produces a method that emphasizes direct experience, observation, and experimentation. Education in science is greatly influenced by empiricism, because the scientific method is based on observation and empirical evidence. However, pure empiricism also has limitations because it can produce fragmented knowledge without an adequate conceptual framework. Recent reviews show that deep learning based on direct experience can increase student motivation and participation in learning, although it still faces obstacles in measurement standardization (Chen & Singh, 2023).

3. Constructivism

Constructivism emerged as a critical evaluation of rationalism and empiricism. Great figures such as Jean Piaget argued that individuals actively construct their own knowledge through interactions between internal cognitive structures and external experiences. Lev Vygotsky also argued that cultural language in social interactions helps shape the way people understand reality. Modern schools today widely use the constructivist approach due to its ability to appreciate diversity of perspectives. In education, constructivism serves as the main foundation for deep learning, as it focuses on conceptual understanding, the relationships between different pieces of knowledge, and critical reflection. Recent studies show that the constructivist approach plays an important role in building real deep understanding, especially when integrated with innovative approaches such as simulation-based learning (Darling-Hammond et al., 2024).

These three approaches, despite differences in ontology and methodology, contribute significantly to science education. Rationalism emphasizes the importance of structure and logical consistency, empiricism highlights the importance of real experience, while constructivism emphasizes the active involvement of students in constructing meaning. By combining these three approaches in a balanced manner, science learning can achieve a deeper and more authentic level of understanding.

From Epistemology to Pedagogy

If epistemology is the conceptual foundation of the nature of knowledge, then pedagogy is the concrete practice that translates this foundation into teaching and learning activities (Billingsley, et. al., 2024). Thus, pedagogy is the operational manifestation of learning theories in the world of education. This is because every methodological choice is always rooted in certain beliefs about how knowledge is acquired and interpreted. Teachers who understand their epistemological position will be more careful in designing learning strategies (Thomas, 2021).

Jurnal
Kiprah Pendidikan
Volume 4 Nomor 4 Oktober 2025, Hlm. 725-732
ISSN 2810-0443 (print) | 2827-8909 (online)
https://doi.org/10.33578/kpd.v4i4.p725-732

Pedagogy cannot be separated from epistemology because every teaching approach depends on epistemology about how students learn. The knowledge transmission approach, for example, stems from objectivist epistemology, and the constructivist approach emphasizes how students discuss and collaborate. According to Schleppegrell & Moore (2022), deep learning can only be achieved if the learning process is directed towards building comprehensive and detailed understanding.

The role of teachers in the learning process depends on their epistemological perspective. In the rationalist epistemological perspective, teachers are considered the main authority in learning, where students passively receive information. Meanwhile, in an empirical perspective, learning emphasizes direct experience, so teachers act as facilitators to provide opportunities for observation and experimentation. Meanwhile, in social constructivism, which is heavily influenced by Vygotsky's thinking, teachers are positioned as mediators and scaffolders, where students are positioned as active subjects who construct meaning through social interaction (Ozkan, 2022). Therefore, epistemology is very important in 21st-century learning because it paves the way for a paradigm shift in the roles of teachers and students towards a participatory, reflective, and collaborative learning model (Salimova, et. al., 2025).

The principles of epistemology can be translated into pedagogical strategies oriented towards deep learning:

1. Inquiry Based Learning : Inquiry emphasizes the search for knowledge through questioning, exploration, and reflection. This strategy reflects empirical and constructivist epistemology, because knowledge is obtained through observation and experience that is interpreted critically. Recent research shows that inquiry-based learning can improve students' critical thinking and science literacy skills (Kurniawati,et. al., 2022).
2. Problem-Based Learning (PBL): PBL is part of constructivism that emphasizes the connection between knowledge and real-world contexts. Students acquire knowledge through solving real-world problems. Recent research emphasizes that project-based learning is effective in improving collaboration and complex problem-solving skills, which are characteristics of deep learning (Darling-Hammond et al., 2024).
3. Dialogical and Reflective: The principles of social-constructivist epistemology emphasize the importance of language, communication, and social interaction. Thus, dialogical learning methods which provide opportunities for students to discuss, debate, and reflect on ideas—are a direct application of this epistemology. Systematic analysis indicates that dialogical pedagogy contributes significantly to the development of scientific argumentation and critical awareness among students (Kumpulainen & Rajala, 2023).

Therefore, epistemology is not limited to the abstract level of theory, but also finds its relevance in education as a real practice. This relationship ensures that learning methods are not merely procedural steps, but have a solid philosophical foundation.

Deep Learning as a Goal

Deep learning refers to an educational approach that emphasizes conceptual understanding, interconnections between concepts, and students' ability to transfer knowledge to new contexts (Fullan et al., 2020; Levin, 2024). The main characteristics of deep learning can be summarized as follows:

1. Conceptual understanding, where students not only know what, but also why and how.
2. Connections between concepts, where students are able to integrate knowledge across disciplines, forming a complete network of meaning.
3. Critical reflection, where students reflect on their thinking processes, question assumptions, and assess the validity of arguments.
4. Real-world application, where students are able to use their knowledge to solve authentic problems in everyday life and in broader social contexts (Martínez-Hernández et al., 2021).

ISSN 2810-0443 (print) | 2827-8909 (online)
https://doi.org/10.33578/kpd.v4i4.p725-732
Jurnal Kiprah Pendidikan
Volume 4 Nomor 4 Oktober 2025, Hlm. 725-732

Epistemology provides a conceptual foundation for the nature of knowledge, pedagogy serves as an implementative strategy, while deep learning is the ultimate goal of the interaction between the two (Nieminen & Ketonen, 2024). If epistemology answers the questions "what is knowledge and how is it obtained?", then pedagogy answers "how is knowledge taught and learned?". Ultimately, deep learning answers "what is knowledge used for in real life?" (Zhao, 2022). Thus, deep learning is not just a matter of technical methodology, but a philosophical goal rooted in epistemology and bridged by pedagogy (Özkan, 2022). Deep learning is not merely a pedagogical jargon, but a philosophical goal rooted in epistemology, realized through pedagogy, and resulting in real transformations in how students understand the world and actively participate in it.

Deep learning cannot be separated from three main philosophical foundations: epistemology, ontology, and axiology.

1. Epistemology emphasizes the nature of knowledge: how knowledge is acquired, validated, and internalized. In the context of education, epistemology guides teachers and students to understand that learning is not merely memorizing facts, but a process of reflective meaning construction (Boon, et. al., 2022)
2. Ontology discusses the nature of reality and existence. In learning, ontology guides teachers and students to understand that knowledge is contextual and dynamic, depending on social, cultural, and individual experiences. This supports the principle of situated learning, which emphasizes the connection between academic concepts and the real world (Lave & Wenger, 2021).
3. Axiology highlights the values and goals of education. Axiology answers the questions "why is learning important?" and "how is knowledge used ethically and productively?" In practice, axiology encourages teachers to develop learning that is relevant, contributory, and shapes students' character as responsible citizens (Thomas, 2021).

By understanding the relationship between epistemology, ontology, and axiology, teachers and students can optimize deep learning. Teachers design strategies that are in line with the nature of knowledge and the reality of students, while students become active learners who are able to connect theory with practice. These implications show that education is not merely the transmission of information, but rather a continuous transformation of intellectual and ethical experiences (Zeidler & Sadler, 2023).

CONCLUSION AND RECOMMENDATIONS

Based on philosophical studies and current literature, it can be concluded that:

1. Epistemology as a conceptual basis
   Epistemology provides a foundation for understanding the nature of knowledge, how knowledge is acquired, and how its validity can be assessed. This understanding enables teachers and students to view learning as a constructive, reflective, and critical process, rather than merely an accumulation of facts.
2. Pedagogy as an epistemological bridge to practice
   Pedagogy functions as an implementative channel of epistemology, translating philosophical assumptions into concrete learning strategies. Approaches such as inquiry, problem-based learning, and dialogic learning reflect the adaptive application of epistemology to the context, needs, and experiences of students.
3. Deep learning depends on a philosophical foundation
   Deep learning cannot be achieved solely through pedagogical techniques or methods. The success of deep learning depends on deep conceptual understanding, interconnections between concepts, critical reflection, and the ability of students to transfer knowledge to real-life situations, all of which must be rooted in the philosophical foundations of education.

Jurnal
Kiprah Pendidikan
Volume 4 Nomor 4 Oktober 2025, Hlm. 725-732
ISSN 2810-0443 (print) | 2827-8909 (online)
https://doi.org/10.33578/kpd.v4i4.p725-732

Based on the results of the above study, it is recommended that education policymakers and the government not only focus on the technical aspects of the Merdeka Curriculum, but also ensure that there is a solid philosophical basis for achieving consistency in deep learning. Teachers need to deepen their epistemological knowledge so that the teaching strategies they apply are not only procedural but also reflect a philosophical view of the nature of knowledge. Educational institutions and universities must also organize training that emphasizes the importance of integrating epistemology, pedagogy, and deep learning, as well as encouraging further research that explores the alignment between curriculum policy, teacher understanding, and classroom implementation. With these steps, it is hoped that deep learning can be realized as a complete epistemological and pedagogical transformation that is relevant to the challenges of education in the 21st century.

BIBLIOGRAPHY

Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). Open University Press / McGraw-Hill Education

Billingsley, B., Riga, F., Gordon, A. J., & Windsor, M. (2024). Embedding epistemic insight (EI) in teacher training programmes in English universities: barriers and how to overcome them. *Teacher development*, *28*(2), 195-214. https://doi.org/10.1080/13664530.2023.2236056

Boon, M., Orozco, M., & Sivakumar, K. (2022). Epistemological and educational issues in teaching practice-oriented scientific research: roles for philosophers of science. *European journal for philosophy of science*, *12*(1), 16. https://doi.org/10.1007/s13194-022-00447-z

Cahyaningsih, A., Aulia, H., Ramadhani, L., & Alwi, N. A. (2025). Transformasi Kurikulum dalam Menghadapi Tantangan Pendidikan Abad 21. *Jurnal Nakula: Pusat Ilmu Pendidikan, Bahasa Dan Ilmu Sosial,* 3. https://doi.org/10.61132/nakula.v3i3.1845

Chen, X., & Singh, C. (2023). Epistemological beliefs and instructional practices in science education. *Science Education*, 107(4), 789–808. https://doi.org/10.1002/sce.21725

Darling-Hammond, L., Schachner, A. C., Wojcikiewicz, S. K., & Flook, L. (2024). Educating teachers to enact the science of learning and development. *Applied Developmental Science*, *28*(1), 1-21. https://doi.org/10.1080/10888691.2022.2130506

Dinata, A., Prasetyo, Z. K., & Hidayat, T. (2024). Epistemological beliefs and challenges in implementing deep learning in Indonesian classrooms. *Journal of Philosophy of Education*, 58(2), 233–250. https://doi.org/10.1111/1467-9752.12890

Fullan, M., Quinn, J., & McEachen, J. (2020). *Deep learning: Engage the world, change the world*. Corwin Press.

Halimah, S., Nurwahidin, M., & Sari, S. R. (2025). Managing Independence in Curriculum Design to Optimize Differentiated Learning: A Systematic Review. *Journal of Educational Management Research*, *4*(6), 2081-2094.

Kumpulainen, K., & Rajala, A. (2023). Dialogic pedagogy for critical and creative learning: A systematic review. *Learning, Culture and Social Interaction, 37*, 100662. https://doi.org/10.1016/j.lcsi.2023.100662

Kurniawati, I., Sari, R., & Widodo, A. (2022). Inquiry-based science learning to foster students' scientific literacy: Evidence from Indonesian secondary schools. *Journal of Science Learning, 5*(3), 193–201. https://doi.org/10.17509/jsl.v5i3.12345

Lave, J., & Wenger, E. (2021). *Situated learning: Legitimate peripheral participation* (30th anniversary ed.). Cambridge University Press.

Levin, O. (2024). Simulation as a pedagogical model for deep learning in teacher education. Teaching and Teacher Education (Vol. 143): Article 104571. https://doi.org/10.1016/j.tate.2024.104571

ISSN 2810-0443 (print) | 2827-8909 (online)
https://doi.org/10.33578/kpd.v4i4.p725-732
Jurnal Kiprah Pendidikan
Volume 4 Nomor 4 Oktober 2025, Hlm. 725-732

Lising, L., & Elby, A. (2005). The impact of epistemology on learning: A case study from introductory physics. American journal of physics, 73(4), 372-382. https://doi.org/10.1119/1.1848115

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

Martínez-Hernández, C., Ponte, J. P., & Torregrosa, G. (2021). Deep learning in STEM higher education: A review of research trends. *International Journal of STEM Education, 8*, 24. https://doi.org/10.1186/s40594-021-00291-4

Maryani, M., Siregar, I., Syukriss, A., & Munte, R. S. (2024). Kontruksi Epistemologi Ilmu Pengetahuan. *Jurnal Genta Mulia*, *15*(2), 211-223. https://doi.org/10.23887/jfi.v4i3.35503

McPhail, G. (2021). The search for deep learning: A curriculum coherence model. *Journal of Curriculum Studies*, *53*(4), 420-434. https://doi.org/10.1080/00220272.2020.1748231

Nieminen, J. H., & Ketonen, L. (2024). Epistemic agency: a link between assessment, knowledge and society. *Higher Education*, *88*(2), 777-794. https://doi.org/10.1007/s10734-023-01142-5

Nurdiana, S. (2024). Teachers' epistemological understanding and its impact on deep learning pedagogy in Indonesian higher education. *Indonesian Journal of Educational Research, 12*(1), 45–59.

Ozkan, E. Ç. (2022). Scaffolding as Teachers' Guidance Role in the Context of Constructivist Learning Approach. *Journal of Educational Issues*, *8*(1), 399-419. : https://doi.org/10.5296/jei.v8i1.19690

Rosiyati, D., Erviana, R., Fadilla, A. U., & Sholihah, U. (2025). Pendekatan Deep Learning Dalam Kurikulum Merdeka. *Al-Irsyad Journal of Mathematics Education*, *4*(2), 131-143. https://doi.org/10.58917/ijme.v4i2.270

Salimova, R., Nurmanbetova, J., Kozhamzharova, M., Manassova, M., & Aubakirova, S. (2025). Philosophy of education in a changing digital environment: an epistemological scope of the problem. *AI & SOCIETY*, *40*(3), 1655-1666. https://doi.org/10.1007/s00146-024-01928-w

Schleppegrell, M. J., & Moore, J. (2022). Deep learning and language in subject area classrooms. *Journal of Curriculum Studies, 54*(5), 623–640. https://doi.org/10.1080/00220272.2022.2053401

Sengul, O. (2024, March). Epistemological beliefs and classroom practices of experienced physics teachers: are they related?. *In Frontiers in Education* (Vol. 9, p. 1362426). Frontiers Media SA. https://doi.org/10.3389/feduc.2024.136242

Thomas, G. (2021). Educational research: an unorthodox introduction: by Gert Biesta, London, Bloomsbury, 2020, 169 pp.,£ 24.99 (paperback), ISBN-10: 1350097977;£ 75 (hardback), ISBN-13: 978-1350097971. *Educational Review*, *73*(2), 252-256.

Yumarna, Y., Kusumawati, Y., & Fuaddudin, F. (2025). Strengthening the Pancasila Student Profile Project to Develop Student Innovation and Creativity. *Journal of Instructional and Development Researches*, *5*(2), 150-158. DOI:10.53621/jider.v5i2.506

Zeidler, D. L., & Sadler, T. D. (2023). Exploring and expanding the frontiers of socioscientific issues. In *Handbook of research on science education* (pp. 899-929). Routledge. https://doi.org/10.4324/9780367855758-33

Zuo, M., & Wang, J. (2021). Higher education curriculum evaluation method based on deep learning model. *Computational Intelligence and Neuroscience*, *2021*(1), 9036550. https://doi.org/10.1155/2021/9036550