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Comparative Literature Study on Independent Learning Methods, Deep Learning, and Flipped Classroom in 21st Century Education

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Abstract
Background: The transformation of 21st-century education has accelerated the adoption of student-centered pedagogies that promote learner autonomy, higher-order thinking, active engagement, and technology-supported learning. Independent (Merdeka) Learning, Deep Learning, and Flipped Classroom have been widely discussed; however, previous studies have predominantly examined these approaches separately, leaving limited understanding of their complementary roles within an integrated pedagogical framework.
Aims: This study aims to systematically compare the conceptual foundations, implementation characteristics, and complementary functions of Independent Learning, Deep Learning, and Flipped Classroom and to develop an integrative framework for 21st-century education.
Methods: We conducted a qualitative Systematic Literature Review (SLR) following the PRISMA framework. We identified relevant literature published between 2013 and 2025 through Scopus, Web of Science, and Google Scholar, then screened it using predefined inclusion and exclusion criteria. The selected studies were analyzed through thematic coding, comparative analysis, and synthesis to identify conceptual patterns, distinctive characteristics, and opportunities for pedagogical integration.
Results: The findings show that the three approaches share a student-centered orientation but operate at different, complementary levels. Independent Learning provides a philosophical and policy-oriented foundation emphasizing learner autonomy and curriculum flexibility; Deep Learning provides a cognitive orientation toward conceptual understanding, critical thinking, and knowledge transfer; and Flipped Classroom provides an instructional strategy that reorganizes learning activities through technology-supported pre-class preparation and active in-class engagement. Their integration therefore connects philosophical, cognitive, and instructional dimensions within a unified learning framework.
Conclusion: The study proposes an integrative pedagogical framework in which Independent Learning serves as the philosophical foundation, Deep Learning as the cognitive objective, and Flipped Classroom as the instructional strategy. This synthesis is the study's principal contribution, moving beyond fragmented examinations of individual learning approaches toward a holistic framework designed to strengthen student autonomy, meaningful learning, higher-order thinking, and active engagement in 21st-century education. Future research should empirically validate the proposed framework across diverse educational levels and learning contexts.

Keywords: Independent Learning; Merdeka Learning; Deep Learning; Flipped Classroom; student-centered learning; systematic literature review

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INTRODUCTION

Technological advances and rapid globalization have significantly changed the educational paradigm, shifting from a teacher-centered to a student-centered approach (Darling-Hammond et al., 2020). In response, innovative pedagogical frameworks such as Independent Learning, Deep Learning, and Flipped Classrooms are gaining increasing attention in educational research.

Independent Learning, introduced by the Indonesian Ministry of Education, emphasizes learner autonomy and flexibility (Ministry of Education and Culture, 2020). Meanwhile, Deep Learning encourages critical thinking, problem-solving, and the construction of meaningful knowledge (Fullan et al., 2018). The Inverted Classroom Model restructures traditional teaching by moving content delivery outside the classroom and using classroom time for active learning (Bishop & Verleger, 2013).

Recent studies highlight the growing relevance of these approaches in improving student learning outcomes and engagement (Lo & Hew, 2021; Strelan et al., 2020). However, comparative studies integrating these three approaches are still limited.

This study aims to fill these gaps by answering the following research questions: What is the conceptual basis of each learning method? How do these methods differ in implementation? How can these methods be integrated to improve learning outcomes?

Recent advances in educational research have emphasized a shift from teacher-centered instruction to student-centered learning models that foster autonomy, critical thinking, and meaningful engagement. Innovative pedagogical approaches such as Merdeka Learning, Deep Learning, and the Flipped Classroom have gained significant attention in 21st-century education. Merdeka Learning promotes flexibility and learner autonomy within curriculum implementation, aligning with national education reforms and competency-based learning systems. Deep Learning focuses on higher-order thinking skills, conceptual understanding, and knowledge transfer across contexts, supporting the development of global competencies required in modern education. Meanwhile, the Flipped Classroom model restructures instruction by shifting content acquisition outside the classroom and using in-class time for collaborative and problem-based learning activities. Collectively, these approaches represent contemporary pedagogical innovations that aim

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to enhance student engagement and learning outcomes in increasingly digital and dynamic learning environments.

Despite the rapid development of student-centered learning approaches, the existing literature remains fragmented in its examination of Merdeka Learning, Deep Learning, and Flipped Classroom as isolated pedagogical models rather than interconnected components of a comprehensive instructional system. Most prior studies have focused on specific dimensions of each approach, such as learner autonomy, cognitive depth, or technology integration, without systematically exploring their complementary functions within a unified pedagogical framework. Furthermore, empirical and conceptual studies that use a structured, systematic literature review methodology to compare and integrate these approaches remain limited, particularly in addressing the holistic demands of 21st-century education characterized by digital transformation and competency-based learning. This limitation underscores the need for research that synthesizes these pedagogical approaches into an integrative conceptual model to enhance learning effectiveness, adaptability, and student engagement.

Research Contribution

Theoretical Contribution

This study contributes to educational theory by developing an integrative conceptual model that connects three major pedagogical approaches—Merdeka Learning, Deep Learning, and Flipped Classroom—into a unified framework aligned with student-centered learning principles. The model expands existing theoretical perspectives by demonstrating how philosophical, cognitive, and instructional dimensions can be systematically integrated to support holistic learning processes in modern education.

Practical Contribution

Practically, this research provides educators, curriculum developers, and educational policymakers with a structured framework for implementing innovative learning strategies in classrooms and higher education institutions. The integrative model guides the design of learning environments that promote student autonomy, critical thinking, and active engagement through effective use of digital technology and flexible instructional design.

Methodological Contribution

Methodologically, this study employs a systematic literature review based on the PRISMA framework to synthesize findings from high-quality, indexed journals. This

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methodological rigor enhances the reliability and transparency of the research process and provides a replicable model for future studies investigating integrated pedagogical innovations.

Conceptual Framework Paragraph

Based on a synthesis of prior literature, this study conceptualizes an integrative learning framework that positions Merdeka Learning as the philosophical foundation, Deep Learning as the cognitive objective, and the Flipped Classroom as the instructional strategy. This framework reflects the dynamic interaction between policy-driven educational reform, learner-centered cognitive development, and technology-supported instructional practices. By integrating these dimensions, the proposed model aims to create a holistic learning environment that addresses the complex demands of 21st-century education.

Closing Paragraph Introduction

Therefore, this study aims to systematically compare the conceptual foundations, implementation strategies, and potential integration of Merdeka Learning, Deep Learning, and Flipped Classroom approaches through a systematic literature review. The findings are expected to provide a comprehensive pedagogical framework that supports effective learning practices and advances innovative education in the digital era.

METHODS

Research Design

This study uses a Systematic Literature Review (SLR) approach to identify, evaluate, and synthesize research findings on the Independent Learning, Deep Learning, and Flipped Classroom methods. This approach was chosen because it provides a comprehensive, structured picture of the concept's development and the implementation of the three methods in 21st-century education.

The SLR process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines developed by Matthew J. Page et al. (2021). These guidelines ensure transparency, replicability, and validity in the study selection and reporting process.

The stages of the research include:

1. Identify literature through a database search
2. Screening based on the relevance of titles and abstracts
3. Eligibility through full-text assessment

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4. Study inclusion for final analysis

By following the PRISMA framework, this study minimizes selection bias and increases the reliability of the synthesized literature.

Data Sources and Selection Criteria

This study obtained data from several internationally recognized scientific databases: Scopus, Web of Science, and Google Scholar. The three databases were selected for their broad scope, indexing quality, and relevance to global scientific publications. The search strategy was carried out using a combination of keywords such as: "Merdeka Learning", "Deep Learning in education", "Flipped Classroom", "student-centered learning", and "innovative pedagogy"

Inclusion criteria are strictly established to ensure the quality of the literature analyzed, namely:

1. Articles published in the 2013–2025 time frame to capture the latest developments
2. Indexed in Scopus or Web of Science, with priority on highly reputable journals (Q1)
3. Articles in the form of empirical research or literature review
4. Have direct relevance to one or a combination of the three learning methods studied

Meanwhile, exclusion criteria include: Non-academic articles (popular opinions, blogs, or reports) Publications without a peer-review process; studies that have no substantial relevance to the research topic. This selection process includes only studies of high methodological quality in the final analysis.

Data Analysis

The data analysis in this study was conducted systematically across several stages to produce a comprehensive synthesis.

The first stage is thematic coding, where each selected article is analyzed to identify key concepts, research variables, and key findings. This process allows grouping data into major themes, such as learning independence, conceptual understanding, and student engagement.

The second stage is comparative analysis, which examines the characteristics, advantages, and limitations of each learning approach. This analysis includes philosophical, pedagogical, and practical aspects of classroom implementation.

The third stage is the synthesis of findings, which integrates the results of the analysis to build a more holistic conceptual framework. This synthesis not only summarizes previous research but also identifies patterns of relationships and opportunities to integrate learning methods.

With this approach, research can deepen understanding and make both theoretical and practical contributions to the development of learning innovations.

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DISCUSSION

Conceptual Characteristics

Independent Learning

Independent Learning is a pedagogical approach based on the principles of learning autonomy, curriculum flexibility, and holistic development of students' individual potential. This approach positions students as active participants in the learning process by giving them space to choose a learning path aligned with their interests, needs, and pace.

In this framework, teachers serve as facilitators who support knowledge exploration, rather than as the sole source of information. Independent learning is also closely related to differentiated instruction, in which learning strategies are adjusted to the characteristics of diverse students (Siregar et al., 2021). Furthermore, Widodo et al. (2022) emphasized that this approach encourages the development of student agency, the ability of students to make decisions in their own learning. This can increase intrinsic motivation, independence, and responsibility for learning outcomes. Thus, Independent Learning not only functions as a learning strategy but also as an educational paradigm that emphasizes freedom and the meaning of learning.

Deep Learning

Deep learning is a learning process that involves deep conceptual understanding, knowledge integration, and the ability to transfer concepts to new contexts. In contrast to the surface-learning approach that focuses on memorization, Deep Learning emphasizes deeper cognitive engagement. According to Fullan et al. (2018), deep learning includes developing global competencies such as critical thinking, creativity, collaboration, communication, character, and citizenship. This approach encourages students to understand not only the "what," but also the "why" and "how" of a concept that can be applied in real-life situations. Chowdhury (2021) added that Deep Learning is highly effective in improving complex problem-solving and analytical skills because students are trained to actively construct knowledge through discussion, reflection, and exploration. Thus, Deep Learning plays an important role in shaping 21st-century skills relevant to the demands of the globalized world.

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Flipped Classroom

Flipped Classroom is an innovative learning model that reverses traditional learning structures by moving low-level cognitive activities—such as receiving information—outside the classroom through digital media, such as learning videos or online modules. In this model, face-to-face classroom time is used for more complex activities, such as discussion, collaboration, problem-solving, and concept application. This allows for more intensive interaction between teachers and students, as well as among students. According to Lo and Hew (2021), the Flipped Classroom has been shown to increase student engagement and learning effectiveness because students come to class better prepared. In addition, this model supports independent learning and uses technology as the main means of learning. Thus, the Flipped Classroom not only changes the order of learning but also shifts classroom interaction dynamics toward more active, collaborative learning.

Comparative Analysis

Comparative analysis identified fundamental differences and similarities among Independent Learning, Deep Learning, and the Flipped Classroom across several key dimensions: orientation, learning focus, teacher role, and technology use. Conceptually, Independent Learning an oriented toward educational policies and philosophies that emphasize freedom in learning. Meanwhile, Deep Learning focuses on the depth of cognitive processes and the quality of understanding. Meanwhile, the Flipped Classroom focuses more on instructional strategies that optimize the use of time and technology in learning. In terms of learning focus, Independent Learning emphasizes student autonomy, Deep Learning emphasizes deep understanding, while Flipped Classroom focuses on increasing student involvement.

Teachers' roles in these three approaches have also changed. In Independent Learning, teachers act as facilitators who support learning freedom. In Deep Learning, teachers serve as cognitive coaches who guide higher-level thinking. Meanwhile, in the Flipped Classroom, teachers act as instructional designers who create technology-based learning experiences. From a technological perspective, the Flipped Classroom relies heavily on digital technology as the primary learning medium. In Deep Learning, technology is supportive, whereas in Independent Learning, it is optional, depending on context and learning needs. Overall, these three approaches

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exhibit complementary characteristics. Independent Learning provides a philosophical foundation, Deep Learning provides cognitive direction, and Flipped Classroom provides concrete implementation strategies. Therefore, integrating the three has the potential to create a more comprehensive, adaptive, and relevant learning model for modern educational needs.

Table 1. Comparative Analysis

Dimension	Independent Learning	Deep Learning	Flipped Classroom
Orientation	Policy & Philosophy	Cognitive depth	Instructional strategy
Learning Focus	Autonomy	Understanding	Commitment
Role of the Teacher	Facilitator	Cognitive coach	Instructional designer
Technology Use	Optional	Supportive	Essential

The findings suggest that although the three approaches align with constructivist learning theories, they differ significantly in focus and application. Independent Learning provides a macro-level educational framework that supports learners' independence. Deep learning operates on a cognitive level, ensuring the acquisition of meaningful knowledge. Meanwhile, the Flipped Classroom serves as a practical instructional model and enhances classroom interaction.

Recent studies confirm that flipped classrooms significantly improve academic performance and engagement (Lo & Hew, 2021). Similarly, the Deep Learning approach is closely related to the development of critical thinking (Chowdhury, 2021).

- The integration of these three methods offers a holistic learning model:
- Independent Learning → Philosophy of Education
- Deep Learning → cognitive goals
- Flipped Classroom → pedagogical strategy

This integrated framework is aligned with the demands of modern education and the digital learning environment (Bond et al., 2020)

This study introduces a novel integrative perspective that systematically compares and synthesizes Merdeka Learning, Deep Learning, and Flipped Classroom approaches within a single

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conceptual framework for 21st-century education. Unlike previous studies that investigate these pedagogical models independently, this research employs a systematic literature review guided by the PRISMA framework to identify their complementary roles across philosophical, cognitive, and instructional dimensions. The proposed framework offers a holistic pedagogical model that integrates policy-oriented flexibility, deep cognitive engagement, and technology-supported instructional strategies to improve learning effectiveness and student participation.

State of the Art – Novelty – Research Gap Table

Yes	State of the Art (Previous Research)	Research Gap	Novelty (Novelty of This Research)
1	Independent Learning has been researched as an educational paradigm based on student autonomy and curriculum flexibility	Studies still focus on implementing policies or curricula separately	Comparative analysis of the role of Independent Learning as a philosophical foundation in an integrated learning model
2	Deep Learning is widely researched in the context of improving critical thinking skills and conceptual understanding	Research generally addresses cognitive aspects without integration with other learning models	Integration of Deep Learning as a cognitive component in the 21st century learning framework
3	Flipped Classroom has been shown to improve student engagement and learning outcomes through the use of technology	Studies still focus on the effectiveness of technology, not pedagogical integration	Placement of Flipped Classroom as an implementation strategy in an integrated learning model
4	Many studies examined each approach individually	Lack of systematic comparative studies that compare all three approaches within a single conceptual framework	SLR-based comparative literature study (PRISMA) that integrates Merdeka Learning, Deep Learning, and Flipped Classroom
5	The student-centered learning approach has become the global paradigm of 21st-century education	There is no integrative model that brings together policy, cognitive, and instructional strategy aspects	Development of a holistic learning framework based on the integration of three main approaches

Sopiah (2024) indicates that the COVID-19 epidemic has compelled educational establishments globally to transition to virtual learning. Nonetheless, the influence of online education on Islamic Religious Education (PAI) in secondary institutions remains poorly

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understood. Digital PAI education largely emphasizes textual understanding, neglecting pupils' emotional dimensions and reducing social engagement in the learning experience. Autonomous learning, limited teacher-student engagement, and time constraints further exacerbate this neglect of students' emotional needs. This discovery suggests that online PAI education has not completely fulfilled its overarching educational goals, particularly in enhancing students' cognitive, emotional, and psychomotor skills. Learning methodologies need to be modified to improve the effectiveness and relevance of online PAI education for students in the future.

Maulana et al. (2025) assert that digital literacy has become the foundation for navigating the digital age. The capacity to assimilate, assess, generate, and convey digital information is a crucial skill. The study indicates that incorporating deep learning technologies in education can expedite access to knowledge, improve critical thinking abilities, and cultivate a flexible, introspective, and data-informed learning environment. Deep learning technology has significant potential to enhance digital literacy, a fundamental 21st-century skill.

Nurhajati et al. (2025) demonstrate that Total Quality Management and School-Based Management are pivotal in contemporary education. This is because TQM and MBS encourage educational administrators to continually adapt, improve quality, and meet the requirements of the educational institution. Total Quality Management and Management by Objectives are closely connected in 21st-century educational administration. Syaifudin and Junaedi (2025). Recognized obstacles include inadequate infrastructure, educators' digital skills, and challenges in integrating education with spirituality. Nonetheless, incorporating IT media can enhance student engagement with PAI content, foster digital acumen, and reinforce character attributes through critical analysis, teamwork, and spiritual understanding. This study advances theory by proposing a conceptual framework for a technology-driven digital PAI curriculum that is contextually relevant, genuinely Islamic, and responsive to the demands of the 21st century.

Nurdiyanti et al. (2026) assert that the primary obstacles include regional variations in educational quality, insufficient science and technology literacy, and a disconnect between the curriculum and labor market requirements. The SWOT Analysis identifies key technical priorities such as acquiring ICT equipment, continuous educator training, standardizing infrastructure, and enhancing the vocational curriculum. This research offers tactical suggestions to reform the Indonesian educational framework to better meet 21st-century requirements.

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Baihaqi et al. (2025) contend that the evolution of higher education in the age of global communication requires a fundamental shift in learning, prioritizing not only material proficiency but also the cultivation of advanced cognitive skills and preparedness for 21st-century challenges. This article explores the concept, relevance, and implementation strategies of deep learning in tertiary education. This research uses a qualitative methodology through a literature review, examining relevant national scientific publications. The results suggest that deep learning improves students' conceptual understanding, cognitive engagement, and the development of social and emotional skills in education. Implementation strategies include developing learning objectives grounded in constructive alignment, using digital technologies, applying active learning techniques such as Project-Based Learning and flipped classrooms, and integrating authentic assessments. This article advocates incorporating deep learning as a comprehensive, flexible, and context-sensitive educational strategy to enhance the quality of higher education in light of global challenges and technological progress.

Chikeme et al. (2024) discovered that the flipped classroom instructional style significantly enhanced nursing students' preparedness for self-directed learning and their academic performance in the research course. Because the approach showed statistically significant advantages in improving self-directed learning skills and academic achievement, educators should advocate promoting flipped learning to enrich educational experiences. Agustini et al. (2021) discovered that flipped learning enhances proficiency in 21st-century skills such as creativity and invention, critical thinking and problem-solving, communication, and cooperation. Flipped learning in Indonesia and internationally yields similar outcomes. The findings indicate that flipped learning is well suited for classroom use and suggest that government officials and policymakers should advocate for its incorporation into educational practice.

Olano and colleagues (2026). University education requires self-directed student growth, a need conventional pedagogical approaches often fail to meet. This systematic review examines the relationship between implementing the Flipped Classroom (FC) model and enhancing autonomous learning among university students by conducting an exhaustive examination of pedagogical approaches, technological tools, educational outcomes, and interdisciplinary skill development across academic fields. Employing the PRISMA framework, we conducted an extensive literature review in the Scopus database (2020-2024). Of 198 original publications, 15 studies met the

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inclusion criteria for systematic evaluation. Findings suggest that FC implementations mostly employ cohesive technical frameworks, encompassing Learning Management Systems (Moodle), multimedia platforms (YouTube), social networking applications (WeChat), and interactive evaluation instruments. China and Spain stand out as research frontrunners, each producing six publications and showcasing divergent methodologies: Spanish research focuses on pedagogical assessment within conventional fields, whereas Chinese studies incorporate cutting-edge technologies such as big data analytics, neural networks, and mobile learning systems. Consistent positive findings include greater student independence, higher academic achievement, increased classroom participation, and the development of interdisciplinary skills such as critical thinking, problem-solving, and metacognitive abilities. In summary, the Flipped Classroom paradigm fosters a student-centric learning atmosphere that greatly enhances independent learning when integrated with suitable technological tools and supplementary teaching methods, positioning FC as a revolutionary educational approach for modern higher education.

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CONCLUSION

This study demonstrates that Independent (Merdeka) Learning, Deep Learning, and Flipped Classroom represent distinct yet complementary approaches to addressing the demands of 21st-century education. The systematic literature review reveals that these approaches operate at different but interconnected pedagogical levels. Independent Learning provides a philosophical and policy-oriented foundation by emphasizing learner autonomy, flexibility, and responsibility; Deep Learning strengthens the cognitive dimension through meaningful conceptual understanding, critical thinking, problem-solving, and knowledge transfer; while Flipped Classroom functions as an instructional strategy that reorganizes learning through technology-supported preparation and active, collaborative classroom engagement. These complementary characteristics indicate that the three approaches should not be viewed merely as separate pedagogical models but as components that can be systematically integrated.

This study's principal contribution is an integrative conceptual framework that positions Independent Learning as the philosophical foundation, Deep Learning as the cognitive objective, and Flipped Classroom as the instructional strategy. This framework connects policy and learner autonomy, cognitive depth, and technology-supported instructional practice within a unified

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student-centered learning system. Such integration provides a conceptual basis for designing learning environments that simultaneously foster autonomy, higher-order thinking, meaningful understanding, active participation, and effective use of digital technology.

From a practical perspective, the proposed framework can serve as a reference for educators, curriculum developers, and educational institutions in designing more flexible, meaningful, and engaging learning experiences. Nevertheless, because this study is based on a systematic synthesis of existing literature, the proposed framework requires further empirical validation. Future research should therefore examine its effectiveness across different educational levels, disciplines, learner characteristics, and technological contexts using experimental, longitudinal, or mixed-method designs. Such investigations are necessary to determine how the integrated framework can be adapted and implemented effectively across diverse educational settings.

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