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Higher Education Management in Promoting the Implementation of Deep Learning in the Digital Age

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Abstrak

Perkembangan teknologi digital dan kebijakan nasional seperti Merdeka Belajar–Kampus Merdeka menuntut perguruan tinggi Indonesia untuk bertransformasi dari pembelajaran berorientasi konten menuju pembelajaran mendalam yang berpusat pada mahasiswa. Penelitian ini bertujuan menganalisis peran manajemen pendidikan tinggi dalam mendorong implementasi pembelajaran mendalam di era digital melalui pendekatan systematic narrative literature review. Literatur akademik dan kebijakan pendidikan periode 2019–2024 ditelaah untuk mengidentifikasi strategi kelembagaan, peran kepemimpinan, penguatan kapasitas dosen, dukungan teknologi, dan praktik penjaminan mutu pembelajaran. Hasil kajian menunjukkan bahwa keberhasilan pembelajaran mendalam dipengaruhi oleh kepemimpinan transformasional, struktur kurikulum berbasis learning outcomes, asesmen autentik, serta dukungan teknologi pembelajaran seperti LMS, learning analytics, dan platform kolaboratif. Namun, tantangan masih muncul berupa keterbatasan kapasitas pedagogis dosen, kesiapan mahasiswa, kesenjangan akses digital, dan orientasi penjaminan mutu yang masih administratif. Penelitian ini merekomendasikan penguatan pusat pengembangan pembelajaran, pelatihan pedagogi digital bagi dosen, penyediaan infrastruktur teknologi yang merata, serta kemitraan dengan industri untuk memperkaya pengalaman belajar mahasiswa. Temuan ini memberikan kontribusi pada pengembangan model manajemen pendidikan tinggi yang mendukung pembelajaran mendalam secara sistemik dan berkelanjutan di Indonesia.

Kata Kunci: manajemen pendidikan tinggi, pembelajaran mendalam, transformasi digital, kebijakan pendidikan, MBKM

Abstract

The rapid advancement of digital technologies and policy reforms such as Indonesia's Merdeka Belajar Kampus Merdeka initiative require higher education institutions to shift from content-oriented instruction to deep learning practices driven by student-centered pedagogy. This study analyzes the role of higher education management in promoting deep learning implementation in the digital era using a systematic narrative literature review approach. Academic literature and educational policy documents published between 2019 and 2024 were examined to identify institutional strategies, leadership roles, faculty capacity building, technological support, and quality assurance mechanisms. Findings reveal that successful deep learning implementation relies on transformational leadership, outcome-based curriculum design, authentic assessment, and digital learning infrastructure including LMS platforms, learning analytics, and collaborative learning systems. However, challenges persist in the form of limited faculty pedagogical readiness, variations in student learning cultures, digital access disparities, and administrative-oriented quality assurance systems. This study recommends strengthening teaching and learning centers, implementing continuous digital pedagogy training, expanding technological infrastructure, and enhancing industry partnerships to support experiential and interdisciplinary learning. The findings contribute to a comprehensive model of higher education management that fosters sustainable and systemic deep learning implementation in Indonesia.

Keywords: *Deep Learning, Higher Education Management, Digital Transformation, Educational Policy, Indonesia*

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Introduction

Digital transformation in higher education has brought fundamental changes to the paradigms of learning, institutional management, and the roles of academic stakeholders. Developments in digital technology, ranging from artificial intelligence (AI), big data, learning analytics, to adaptive online

Volume 2 Issue 2 (November,2025) Pages 1-8
Gestion Educativa : Jurnal Manajemen Pendidikan
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learning systems, have enabled universities to adapt quickly in order to remain relevant in facing the needs of society, industry, and the globalization of knowledge. Amidst this dynamic, the concept of deep learning has become a strategic focus, not only as a pedagogical method, but as a goal for the transformation of higher education. Deep learning refers to a learning process that emphasizes conceptual understanding, critical and reflective thinking skills, the application of knowledge in real contexts, and the development of character and academic ethics (Biggs & Tang, 2020). In the context of the digital age, deep learning is becoming increasingly important because the world of work requires graduates who not only master technical knowledge but also have adaptive, collaborative, innovative, and advanced digital literacy skills (UNESCO, 2022).

Indonesia, as one of the countries with the largest student population in Asia, is currently undergoing a transformation in higher education. Data from the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) shows that in 2023 there will be more than 8.9 million students spread across more than 4,500 universities (Kemendikbudristek, 2023). The implementation of the Merdeka Belajar–Kampus Merdeka (MBKM) policy is an effort to respond to the demands of changing times by providing space for students to learn flexibly, contextually, and collaboratively through learning experiences outside the classroom, project-based activities, industrial internships, community service, and research (Nizar & Aminah, 2022). This concept is in line with deep learning practices that emphasize active student participation, knowledge construction, and real-world problem-based learning.

However, the implementation of deep learning in Indonesian higher education institutions has not always been smooth. Research by Budiharto and Wijaya (2023) shows that there is still a gap between the MBKM policy vision and classroom learning practices, where most higher education institutions still apply a content-oriented learning model (surface learning), with minimal reflection and little room for critical exploration. This challenge is exacerbated by a passive learning culture that is still ingrained in some students who are accustomed to waiting for instructions from lecturers, as well as the limited digital pedagogical competencies of some teaching staff (Rahardjo & Setiawan, 2022). These conditions indicate that the transformation towards deep learning requires a strategic role for higher education management in providing a conducive ecosystem that supports a paradigm shift in learning.

In global studies, several higher education management models emphasize the importance of transformational leadership, adaptive academic policies, technology investment, and lecturer capacity building to support deep learning (Sang et al., 2021; Zawacki-Richter et al., 2020). This approach also includes data-driven governance through the use of learning analytics to monitor student learning activities, identify academic support needs, and intervene in a timely manner (Ifenthaler & Yau, 2023). Thus, deep learning in the digital era is not only the responsibility of individual lecturers, but also a structural mandate that requires institutional strengthening, institutional policies, infrastructure support, and sustainable human resource management strategies.

In Indonesia, the implementation of digital learning systems has been further strengthened in the wake of the COVID-19 pandemic, which has accelerated the adoption of online and hybrid learning technologies. A study by Suryadinata and Amiruddin (2023) found that more than 80% of higher education institutions in Indonesia now adopt online learning platforms such as campus LMS, Google Classroom, Moodle, and SIBI. However, the study also emphasized that the use of LMS is often limited to providing materials and collecting assignments, rather than facilitating in-depth learning such as reflective discussions, peer reviews, learning portfolios, and project-based learning. This indicates the need for managerial strategies that direct the use of technology to encourage active, collaborative, and competency-oriented learning.

In addition to internal institutional challenges, external environmental factors also influence expectations of higher education institutions in producing globally competitive graduates. The World Economic Forum (2022) report states that the key competencies of the 21st century include critical thinking, problem solving, communication, collaboration, creativity, and digital literacy, which can only be developed through in-depth learning experiences. Higher education institutions need to transform from mere formal learning institutions into centers of innovation, research, and technology-based human resource development. Therefore, the perspective of higher education management should not only focus on academic administration but also on the design of a learning ecosystem that supports exploration, interdisciplinary collaboration, and authentic performance-based learning evaluation.

This study aims to address the urgent gap related to the implementation of deep learning in Indonesian higher education institutions. Although there are studies on MBKM and online learning, there are still few comprehensive studies that focus on the role of higher education management in ensuring the success of deep learning in the digital era. Some studies highlight aspects of curriculum and teaching strategies (Budiharto & Wijaya, 2023; Rahardjo & Setiawan, 2022), but have not explored aspects of academic governance, strengthening the quality of lecturers, technology development, and student mentoring strategies comprehensively. Therefore, this study offers conceptual and practical contributions through literature review and empirical reflection on Indonesian universities to understand management strategies in building an inclusive, adaptive, and sustainable deep learning culture.

The purpose of this study is to analyze the role of higher education management in promoting the implementation of deep learning in the digital era, with an emphasis on academic governance, lecturer capacity building, provision of learning technology, and campus ecosystem support. In addition, this study aims to formulate managerial recommendations that can support the sustainability of higher education

transformation in Indonesia in line with the demands of technological developments and the needs of the modern world of work.

The implementation of deep learning in Indonesian higher education requires a strong managerial foundation, especially in ensuring that all academic elements move in line with a learning vision that places students as active subjects in the process of knowledge construction. The experiences of countries with advanced education systems, such as Finland, South Korea, and Singapore, show that higher education institutions that successfully implement deep learning are always supported by responsive, collaborative, and innovation-based academic governance (Hwang & Kim, 2022; Tan & Koh, 2021). The same principle can be applied in Indonesia, where the success of the Merdeka Belajar (Freedom to Learn) strategy requires comprehensive and long-term campus management intervention. Universities cannot rely solely on individual lecturers' initiatives; implementation must be structured through academic policies, monitoring systems, training, and systemic learning support (Nizar & Aminah, 2022).

In the digital age, deep learning also requires the integration of technology that is not only administrative in nature but also supports the creation of meaningful learning experiences. Technologies such as learning management systems, learning analytics, collaborative platforms, and artificial intelligence devices have expanded the horizons of modern pedagogy (Ifenthaler & Yau, 2023; Zawacki-Richter et al., 2020). However, technology alone does not guarantee the success of deep learning without an academic leadership strategy that facilitates adaptation, teaching innovation, and the use of digital platforms for reflective, collaborative, and project-based activities. Suryadinata and Amiruddin (2023) explain that the effectiveness of LMS use in Indonesian universities still varies greatly, with institutions that implement data-based education policies and intensive support for lecturers being more successful in developing active and meaningful learning environments.

In the context of Indonesian academic culture, a paradigm shift in education requires adaptation not only at the institutional level but also in the mindsets of lecturers and students. A study by Hasanah and Ramadhan (2023) highlights that some lecturers still tend to use traditional lecture approaches because they lack confidence in using learning technology or have not been trained in implementing active learning strategies. Meanwhile, some students are still oriented towards achieving grades without intrinsic awareness of the learning process, so they are not yet fully prepared to participate in deep learning that requires analytical, collaborative, and productive skills (Budiharto & Wijaya, 2023). This condition emphasizes the need for comprehensive and sustainable faculty and student capacity building programs.

In addition to lecturer competence and student readiness, the aspect of learning evaluation is an important factor in measuring the success of deep learning implementation. Traditional evaluations that are oriented towards multiple-choice exams or memorization tests tend to encourage surface learning. Therefore, universities need to develop performance-based assessment models, such as project-based assessment, portfolio-based assessment, research-based assessment, and critical reflection (Biggs & Tang, 2020; Sang et al., 2021). Such evaluation mechanisms can encourage students to develop higher-order thinking skills and self-reflection as part of the learning process.

A supportive ecosystem also plays an important role in creating a deep learning environment. A campus environment that supports collaborative learning—through the provision of discussion rooms, fast internet access, digital laboratories, student creativity centers, and academic counseling services—contributes to the formation of an expressive and reflective learning culture (UNESCO, 2022). Universities such as the University of Indonesia, ITB, and Malang State University have demonstrated innovative learning ecosystem models that support student research activities, academic competitions, and the use of digital technology in teaching (Rahardjo & Setiawan, 2022). It is important for ecosystems such as these to be replicated across all higher education institutions, especially regional campuses, in order to achieve equitable quality in deep learning.

On the other hand, the digitization of education and deep learning cannot be separated from the urgency of digital inclusion and accessibility. The challenge of the digital divide still exists in several universities in Indonesia, especially those located in areas with limited digital infrastructure and learning resources (Kemendikbudristek, 2023). Thus, higher education management strategies must include the development of digital infrastructure, capacity building for campus technical staff, and policy support to reduce access gaps. This approach is consistent with the OECD (2022) recommendation that emphasizes the importance of digital equity in education transformation.

Conceptually, this study reinforces the argument that deep learning in the digital age is the result of synergy between academic leadership, educational technology, learning culture, and strategic policies. Higher education management acts as an enabler that creates systems, structures, and institutional values to support meaningful learning. With the support of capacity building, innovative evaluation, and the wise use of technology, higher education institutions can produce graduates with deep intellectual abilities, strong character, and readiness to face global challenges. Thus, this article provides a scientific and practical basis for the development of sustainable and transformative higher education management strategies in Indonesia.

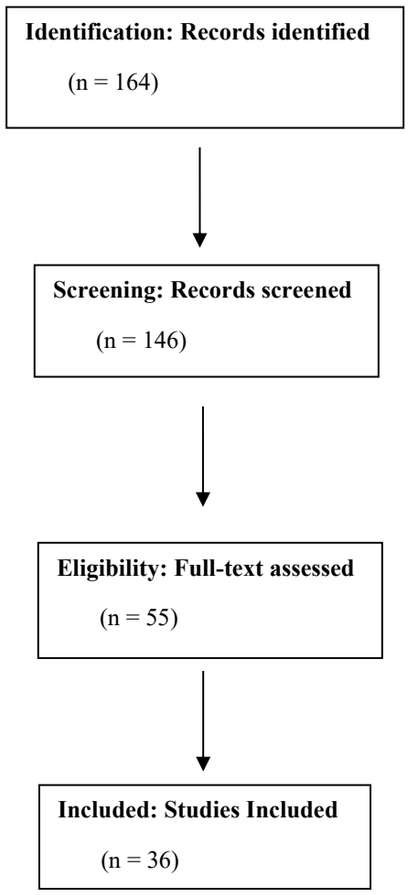
Method

This study uses a systematic narrative literature review approach to analyze the role of higher education management in promoting the implementation of deep learning in the digital age. This approach was chosen because it is suitable for evaluating the development of concepts, institutional policies, and empirical findings related to learning transformation in higher education without collecting primary data (Snyder, 2019; Creswell, 2021). A systematic narrative review allows

researchers to critically integrate the results of previous studies and develop a conceptual synthesis based on thematic patterns that emerge from the literature (Zawacki-Richter et al., 2020).

The literature search was conducted systematically through the Scopus, SINTA, Google Scholar, and Web of Science databases using the keywords: deep learning pedagogy, higher education management, digital learning transformation, student-centered learning in higher education, and Merdeka Belajar – Kampus Merdeka. The inclusion criteria included: articles published between 2019 and 2024, peer-reviewed, relevant to the context of higher education, and discussing educational management strategies and the implementation of deep learning. Meanwhile, non-academic research, opinion articles, and publications prior to 2019 were excluded. Literature selection was carried out in stages of identification, title-abstract screening, feasibility evaluation, and synthesis, referring to the PRISMA principles (Snyder, 2019).

The data were analyzed using thematic analysis to identify the main themes regarding institutional policy, lecturer capacity, learning technology support, and academic culture in higher education (Miles, Huberman, & Saldaña, 2020). The validity and credibility of the study results were strengthened through triangulation of sources between scientific articles, official policy reports (Ministry of Education, Culture, Research, and Technology, UNESCO, OECD), and evidence of higher education practices in Indonesia. With this approach, the study produced a comprehensive understanding of higher education management strategies in promoting continuous deep learning in the digital era (Ifenthaler & Yau, 2023).



Results and Discussion

The Deep Learning Paradigm in Higher Education in the Digital Age

Deep learning in higher education refers not only to the mastery of academic concepts, but also to students' ability to connect knowledge to real-world contexts, perform critical analysis, generate creative solutions, and demonstrate deep reflection on their learning process. Biggs & Tang (2020) explain that deep learning involves the integration of cognitive, metacognitive, and affective dimensions that enable students to build a solid structure of understanding and relevant practical applications. In the context of modern education, deep learning is important because the contemporary world of work demands graduates who are adaptable, technologically literate, and able to think critically and independently in complex situations (UNESCO, 2022).

The development of digital technology further reinforces the urgency of deep learning. Advances in artificial intelligence, machine learning, and learning analytics have enabled higher education to shift

from a knowledge transmission approach to a personalized, adaptive, and student-centered learning model (Ifenthaler & Yau, 2023). Technology allows lecturers to monitor student progress in real-time and provide precise pedagogical interventions. For example, the learning analytics dashboard provides information on student participation, learning patterns, and performance indicators that can be used to design reflective and interactive learning strategies (Zawacki-Richter et al., 2020). Thus, the digital ecosystem is not merely a medium for delivering content, but a transformative tool for strengthening student engagement in learning.

In the context of Indonesian higher education, the urgency of deep learning has become increasingly prominent since the implementation of the Merdeka Belajar–Kampus Merdeka (MBKM) policy. This program provides space for students to learn through direct experiences outside of conventional classrooms, including internships, research, entrepreneurial activities, social projects, and student exchanges (Kemendikbudristek, 2023). According to Nizar & Aminah (2022), MBKM creates opportunities for students to interact with industry, society, and the innovation ecosystem, thereby strengthening the cognitive, social, and moral competencies that are essential in deep learning. In this framework, universities play a role in providing flexible curriculum structures, performance-based assessments, and technological support that encourage collaboration and creativity.

Although national regulations support deep learning, various studies reveal that the practice of deep learning in Indonesian higher education institutions is still uneven. Budiharto & Wijaya (2023) found that most lecturers still use the traditional lecture model, while student involvement in collaborative and reflective projects is still limited. This is often due to lecturers' low digital pedagogical literacy, an academic culture that is still teacher-centered, and an evaluation system that emphasizes memorization over problem solving. These obstacles are reinforced by a study by Rahardjo & Setiawan (2022), which shows that some students still view learning as an activity of completing tasks, rather than a meaningful process of intellectual exploration.

In addition to academic cultural challenges, the issue of the digital divide is a factor that affects the success of deep learning in Indonesia. Although many universities have implemented learning management systems and digital infrastructure, students' ability to access devices, internet networks, and learning platforms is still uneven (Suryadinata & Amiruddin, 2023). This creates disparities in learning experiences, especially for students from rural areas or families with economic limitations. The OECD (2022) emphasizes that equal access to technology is a prerequisite for deep learning, because without access to technology, students cannot take advantage of digital learning resources that support exploration, independent research, and global collaboration.

Theoretically, the success of deep learning in higher education requires a pedagogical approach that includes active learning, inquiry-based learning, project-based learning, and reflective practice (Sang et al., 2021). This pedagogical model requires students to become independent and collaborative learners. In this context, lecturers function as facilitators, academic mentors, and reflection process guides, not merely as deliverers of material. This shift in roles is important to ensure that students understand the learning process and realize their intellectual responsibilities as future professionals and ethical global citizens (Biggs & Tang, 2020).

Based on the above findings, it can be concluded that the deep learning paradigm in Indonesian higher education is in a transitional phase towards a technology- and experience-based transformational learning model. Universities that are able to create an inclusive digital learning ecosystem, with a culture of reflection and supported by progressive academic leadership, will be better prepared to produce graduates who are multidimensionally competent and relevant in the midst of global competition. However, to achieve this, higher education management strategies must include strengthening faculty capacity, investing in technology, designing curricula based on learning outcomes, and implementing authentic assessment systems that encourage deep thinking and continuous reflection (Ifenthaler & Yau, 2023; UNESCO, 2022).

The Role of Higher Education Management and Leadership in Ensuring Deep Learning

The implementation of deep learning in higher education cannot occur organically or be left entirely to develop at the individual lecturer level. It requires the strategic role of institutional management and leadership to build a structural framework, academic culture, and resource support that enables deep learning to take place consistently and sustainably. Biggs & Tang (2020) emphasize that *institutional alignment*, namely the alignment between institutional vision, academic policy, teaching practices, and student assessment, is the foundation for successful deep learning. This means that higher education organizations need to ensure that all academic units, from the rectorate to the study programs, move in one direction with policies oriented towards the comprehensive development of student competencies, not just administrative achievements or curriculum completion.

Higher education leadership acts as a visionary and driver of learning culture change. The most relevant leadership model in the context of learning transformation is transformational leadership, which encourages lecturers and educators to adopt innovation, explore new teaching practices, and take responsibility for improving the quality of learning (Sang et al., 2021). In the context of Indonesian higher education, rectors, deans, and program chairs play a central role as leaders of change who must be able to articulate the urgency of deep learning, set learning outcome-based academic standards, and facilitate pedagogical discussion spaces among lecturers. Tan & Koh (2021) emphasize that universities that successfully promote deep learning usually have leaders who actively promote a culture of learning innovation and provide clear institutional support.

Volume 2 Issue 2 (November,2025) Pages 1-8
Gestion Educativa : Jurnal Manajemen Pendidikan
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In addition, the lecturer development system is a key instrument in ensuring the readiness of teaching staff to implement deep learning strategies. In Indonesia, lecturers are still more focused on fulfilling research and publication requirements, while innovative pedagogy has not yet become a major focus in the performance appraisal system (Hasanah & Ramadhan, 2023). In fact, learning transformation requires continuous professional development programs that are not only related to learning technology, but also pedagogical content knowledge (PCK), technological pedagogical content knowledge (TPACK), and skills in facilitating project-based learning, collaboration, and reflection. Ifenthaler & Yau (2023) found that universities that provide systematic digital pedagogy training tend to be more successful in implementing deep learning than institutions that only provide technical training on the use of LMS.

In addition to strengthening lecturer capacity, universities need to develop a learning support system for students. The digital environment opens up opportunities to provide various academic services such as learning support centers, writing clinics, tutoring programs, and learning analytics mentoring to help students overcome academic difficulties and support independent learning (Zawacki-Richter et al., 2020). The University of Indonesia, for example, has developed a learning development center and a career center that help students develop soft skills while supporting project-based learning and research (Kemendikbudristek, 2023). Other universities, such as ITS and Malang State University, have also developed technology-based learning hubs that support creative discussion, academic consultation, and student innovation development (Suryadinata & Amiruddin, 2023). This approach is consistent with UNESCO's (2022) recommendation that 21st-century higher education must integrate academic, psychological, and digital support to encourage meaningful learning.

In addition, the curriculum structure plays a crucial role in guiding students' learning experiences. Deep learning requires a curriculum based on learning outcomes that can be translated into active learning activities such as problem-based learning, project-based learning, service-learning, and research-based learning (Biggs & Tang, 2020). Curriculum reform must also be in line with MBKM, where students are given the flexibility to explore cross-disciplinary and real-world learning experiences. However, curriculum flexibility cannot work without an academic quality assurance mechanism that ensures external learning experiences remain in line with institutional learning objectives (Nizar & Aminah, 2022). Thus, the role of study program management and quality assurance units is very important in establishing guidelines, assessment rubrics, and monitoring mechanisms that ensure the quality of student learning experiences.

Learning assessment is also a strategic aspect in encouraging deep learning. Evaluations that focus only on written tests or multiple-choice questions tend to reinforce surface learning, which is a learning pattern that pursues grades without deep understanding (Biggs & Tang, 2020). Therefore, universities must adopt authentic assessments such as project-based assessments, portfolio assessments, research result presentations, peer assessments, and critical reflections. Sang et al. (2021) show that performance-based assessments encourage students to reflect on the learning process, solve complex problems, and integrate interdisciplinary knowledge. In Indonesia, several universities have begun to implement these alternative assessments, but not evenly, especially in study programs with limited lecturer capacity and digital infrastructure (Rahardjo & Setiawan, 2022).

It is also important to understand that learning transformation requires not only policies but also an academic culture that supports the courage to experiment, accepts failure as part of the learning process, and values the process of reflection. Universities must build an academic culture that supports a love of learning, digital literacy, open dialogue, and scientific integrity (Hasanah & Ramadhan, 2023). A campus environment that encourages creativity through innovation competition programs, business incubators, digital laboratories, and research-based student activities will strengthen deep learning and connect theory with real-world practice. The OECD (2022) emphasizes that universities should be centers of social, technological, and economic innovation, not merely spaces for knowledge transfer.

For clarity, the following table illustrates the differences between the characteristics of deep learning and surface learning in the context of higher education:

Tabel 1. Characteristics of Deep vs Surface Learning in Higher Education

Dimension	Deep Learning	Surface Learning
Learning Orientation	Understanding and meaning-making	Memorization and task completion
Cognitive Level	Higher-order thinking, analysis, synthesis, reflection	Recall, basic comprehension
Student Role	Active, self-regulated learner	Passive recipient of information
Teaching Approach	Inquiry-based, collaborative, project-based	Lecture-driven, content-transmission
Assessment	Performance-based, portfolio, peer review	Objective test, rote assessments
Motivation	Intrinsic, curiosity-driven	Extrinsic, grade driven
Learning Outcomes	Transferable knowledge, creativity, problem-solving	Fragmented knowledge, minimal retention

sources: Biggs & Tang (2020); Sang et al. (2021); UNESCO (2022)

Volume 2 Issue 2 (November,2025) Pages 1-8
Gestion Educativa : Jurnal Manajemen Pendidikan
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This table illustrates that deep learning requires comprehensive changes to the learning system: active students, facilitator lecturers, flexible curricula, and authentic assessments. Without systemic management intervention, this shift is difficult to achieve because deep learning is not a technical change but an academic paradigm shift.

Thus, it can be asserted that higher education management holds the key to the successful implementation of deep learning. The role of strategic leadership, lecturer capacity building, academic quality assurance, investment in learning technology, and the formation of an innovative academic culture are the main determining factors. Universities that can integrate deep learning policies, practices, and culture will have a competitive advantage in producing excellent graduates who are ready to contribute to the global digital society.

Challenges in Implementation and Strategies for Accelerating Deep Learning in Higher Education

Although the urgency of deep learning is increasingly recognized in academic policy and discourse, its implementation in Indonesian higher education faces various structural, pedagogical, and cultural challenges. These challenges arise from both the institutional and academic sides, so acceleration strategies must be designed comprehensively and systematically. UNESCO (2022) emphasizes that the success of deep learning requires a holistic learning ecosystem, including innovative policies, technological infrastructure, a reflective academic culture, and competent human resource support. In the Indonesian context, this complexity is further exacerbated by the diversity of higher education institutions' capacities, disparities in technology access, and variations in the readiness of lecturers and students for technology-based learning transformation (Suryadinata & Amiruddin, 2023).

One of the main challenges is the pedagogical unpreparedness of some lecturers in designing and implementing deep learning. Many lecturers still focus on knowledge transfer because they are accustomed to a teacher-centered approach and have not received adequate training in digital pedagogy, active learning, or authentic assessment (Rahardjo & Setiawan, 2022). In addition, the academic career system in Indonesia still places greater emphasis on research output than on teaching innovation, so that lecturers' motivation to invest in improving pedagogy is often not commensurate with the demands of quality learning (Hasanah & Ramadhan, 2023). The findings of Biggs & Tang (2020) confirm that without a reward system for learning innovation, pedagogical transformation will be slow even if the infrastructure is available. Thus, universities need to develop lecturer professional development policies that encourage deep learning, such as innovative pedagogy workshops, teaching mentoring, digital teaching certification, and incentives for learning innovation.

The second challenge relates to students' mental and cultural readiness to learn. The traditional academic culture that places lecturers as the main source of knowledge still influences the way some students learn. They tend to focus on completing assignments and achieving grades without exploring critical thinking and self-reflection (Budiharto & Wijaya, 2023). Deep learning requires self-regulated learning, collaboration skills, perseverance, and a high level of curiosity. However, some students do not yet have these skills optimally. In such conditions, mentoring strategies, learning coaching, and academic advising are important for developing independent and reflective learning characters, as emphasized by Ifenthaler & Yau (2023). The role of supporting institutions such as learning centers, academic writing clinics, and learning counseling can help students who have difficulty adapting to the demands of deep learning.

The next challenge is the digital infrastructure gap and unequal access to technology, especially in regional universities and among students from economically vulnerable backgrounds. Digital transformation cannot be inclusive without adequate support facilities such as fast internet, digital devices, modern e-learning platforms, and virtual learning laboratories. The OECD (2022) shows that institutions that do not have adequate technological investment will lag behind in efforts to modernize higher education. In Indonesia, although many universities have developed LMS and digital platforms, the quality of their implementation is uneven, reinforcing the learning experience gap between large and small campuses (Kemendikbudristek, 2023). Therefore, higher education digital transformation policies must include strategies for equitable and sustainable digital infrastructure improvement.

Another dimension that needs attention is the academic quality assurance model, which is often still administratively oriented rather than focused on learning quality. Learning evaluation in many universities still focuses on the delivery of syllabi and fulfillment of lecture hours, rather than the quality of interactive processes and the achievement of in-depth learning outcomes. In fact, deep learning requires process-based quality assurance, not just input (Sang et al., 2021). Universities need to modernize their learning monitoring and evaluation systems through evidence-based faculty performance evaluations, the use of learning analytics, student portfolio assessments, and collective reflection-based pedagogical audits. This approach allows institutions to assess the extent to which deep learning is actually implemented in the classroom, not just in curriculum documents.

In addition to internal issues, external challenges also need to be considered, including the demands of a highly dynamic world of work. The World Economic Forum (2022) emphasizes that future college graduates must have adaptive competencies such as critical thinking, problem solving, creativity, digital mindset, and global collaboration skills. However, if the higher education system is unable to transform from a theory-oriented to an applied learning experience-oriented approach, graduates will experience a competency gap with industry needs. The implementation of deep learning is crucial to bridge this gap by

Volume 2 Issue 2 (November,2025) Pages 1-8
Gestion Educativa : Jurnal Manajemen Pendidikan
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instilling the integration of theory and practice, applied research, and industry collaboration during the study period.

To overcome these challenges, universities need to implement acceleration strategies based on leadership, technology, adaptive curricula, and systemic learning support. Sang et al. (2021) suggest that universities develop an institutional teaching and learning framework to guide the design of deep learning across all faculties. In Indonesia, this model can be strengthened by incorporating MBKM elements, so that deep learning occurs not only in the classroom but also through internship programs, social projects, business incubation, and student research (Kemendikbudristek, 2023). The application of this model will broaden students' learning experiences and improve their readiness to face the real world.

To clarify the strategy for accelerating the implementation of deep learning, the following table summarizes the higher education management-based approach:

Strategic Area	Key Focus	Institutional Strategies
Leadership & Governance	Vision, policy alignment	Strategic roadmap, incentive system for teaching excellence, MBKM integration
Academic Capacity	Faculty teaching competence	Pedagogy training, TPACK framework, peer-mentoring, teaching innovation grants
Learning Infrastructure	Digital tools & ecosystem	LMS enhancement, learning hubs, digital library, simulation & lab technology
Student Support	Academic & digital readiness	Academic advising, learning coaching, writing labs, digital literacy programs
Assessment System	Authentic learning evaluation	Project-based assessment, portfolio peer-review, learning analytics on performance
Culture & Values	Learning mindset & collaboration	Innovation culture, research groups, interdisciplinary projects, reflective practice
Equity in Access	Inclusivity & digital equality	Device subsidies, campus internet access, blended learning support, regional outreach

Sources: Biggs & Tang (2020); Ifenthaler & Yau (2023); UNESCO (2022); Kemendikbudristek (2023)

The table illustrates that the implementation strategy for deep learning is multi-layered and requires cross-unit collaboration. There is no single policy that can be the solution; each institution must implement a comprehensive management approach that combines vision, operational policies, faculty training, student support, and digital infrastructure modernization. In the digital age, the success of higher education transformation depends heavily on the ability of institutions to innovate, adapt to technological dynamics, and develop a learning culture that encourages critical thinking, creativity, and global collaboration.

Thus, the challenges of implementing deep learning are not permanent obstacles, but rather momentum to improve the quality of Indonesian higher education towards global standards. Higher education leadership must view this transformation as a long-term strategic investment. When management strategies are applied consistently and supported by continuous evaluation, higher education institutions can create a generation of students who are not only academically intelligent but also mature in creativity, integrity, and collaborative skills, ready to face the complexities of the 21st century.

Conclusion

The transformation of higher education towards deep learning is a strategic requirement to prepare graduates who not only master theoretical knowledge but also possess the critical thinking, creativity, independent learning, and collaborative skills necessary to face the dynamics of the digital social and economic world. Deep learning, as an approach that places students at the center of the learning experience, requires comprehensive support from university management. Research findings show that the successful implementation of deep learning is greatly influenced by visionary academic leadership, institutional policies that are in line with modern pedagogical approaches, authentic assessment systems, and the use of adequate digital learning technologies. Although national policies such as Merdeka Belajar–Kampus Merdeka (Freedom of Learning–Freedom of Campus) have provided the basis for transformation, its implementation in various Indonesian universities still faces challenges in the form of limited pedagogical competence of lecturers, student readiness in managing independent learning, digital infrastructure inequality, and an academic quality assurance system that is still administratively oriented.

In this context, a comprehensive managerial strategy is needed to strengthen the quality of in-depth learning processes in higher education. The development of teaching and learning centers is an important step in providing space for pedagogical innovation, continuous training for lecturers, and academic assistance for students. In addition, digital transformation must be accompanied by infrastructure improvements, equitable internet access, and the provision of inclusive technological resources so that all students, including those

from areas with limited digital access, can enjoy a quality learning experience. Higher education institutions also need to strengthen project-based authentic assessment systems, portfolios, and reflective assessments to ensure that the learning process truly encourages deep understanding, not just task completion. Partnerships with industry and the wider community are essential to ensure that students' learning experiences are relevant to real-world needs and capable of fostering professional skills and social ethics.

The success of deep learning transformation ultimately depends on the institution's commitment to fostering an academic culture that supports innovation, critical reflection, and intellectual integrity. Higher education institutions need to view this transformation not as a short-term program, but as a sustainable strategic agenda to build an academic generation that is superior, adaptive, and contributive to the development of science and national development. With a visionary, data-driven, and collaborative management approach, Indonesian higher education has a great opportunity to become a regional force in facing the dynamic era of global economy and technology.

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