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A Conceptual Framework of Eco-Blended Learning Based on Ecological Systems Theory for Indonesian Language Instruction in Higher Education

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Abstract

Indonesian language learning in higher education faces increasingly complex challenges, including low student engagement, limited integration of digital technology, and the need for instructional designs that respond to the demands of 21st-century learning. Although blended learning has been widely implemented, its application has often focused primarily on technological delivery rather than on the broader ecological context that shapes the learning process. This article aims to propose a conceptual framework of Eco-Blended Learning by integrating blended learning principles with Bronfenbrenner's Ecological Systems Theory. This study employed a conceptual review design through thematic literature synthesis of studies on blended learning, ecological systems theory, higher education, Indonesian language learning, and emerging digital technologies in education. The analysis focused on identifying conceptual relationships among these domains and mapping the five ecological systems microsystem, mesosystem, exosystem, macrosystem, and chronosystem onto relevant components of blended learning design. The findings indicate that the integration of ecological systems theory into blended learning can generate a learning model that is more holistic, contextual, flexible, and adaptive. The proposed framework positions students at the center of the learning process within an ecosystem shaped by direct interaction, inter-environmental relationships, institutional support, educational culture, and temporal change. Therefore, Eco-Blended Learning is expected to provide both a theoretical contribution to blended learning scholarship and a practical foundation for designing Indonesian language instruction in higher education.

Keywords: Eco-Blended Learning, Ecological Systems Theory, Blended Learning, Indonesian Language Learning, Higher Education, Bronfenbrenner

INTRODUCTION

Recent empirical studies show that blended learning can improve flexibility, engagement, and learning outcomes in Indonesian higher education, but its effectiveness remains uneven and strongly dependent on infrastructure readiness, lecturer competence, and students' digital literacy (Sari & Pratama, 2025b; Rahayu & Santoso, 2024). A case study of Indonesian universities found that blended learning enhanced participation and effectiveness, yet these benefits were constrained by limited internet access and insufficient lecturer training in digital tools (Wijaya & Kusuma, 2020; Kurniawan & Pratama, 2024). In parallel, a systematic review of digital-based Indonesian language learning reported rapid growth in the use of ICT, artificial intelligence, social media platforms, and interactive applications, but also identified persistent access gaps, especially in remote areas (Wahyuni, 2024; Wahyuni et al., 2026). These findings suggest that the central issue

is not whether blended learning or digital technology can support learning, but how learning should be designed within a more coherent educational ecology (Stanley & Kuo, 2022).

This issue is particularly important in Indonesian language education, where digital transformation is accelerating but implementation remains fragmented (Wahyuni, 2024; Sari & Pratama, 2025a). Recent literature shows increasing attention to AI-assisted learning, digital literacy, and online learning platforms, yet classroom practice still often relies on conventional delivery modes with limited interaction and uneven integration of technology (Wahyuni, 2024; Sari & Pratama, 2025a; Pratama & Wijaya, 2024). At the same time, Indonesian language education is expected to cultivate collaboration, communication, critical thinking, and learner autonomy, which requires more than adding online tools to existing teaching practices (Sari & Pratama, 2025b; Rahayu & Santoso, 2024). The mismatch between these expectations and current instructional realities indicates the need for a more integrated design perspective that connects pedagogy, technology, institutional conditions, and sociocultural context (Bronfenbrenner, 1979; Stanley & Kuo, 2022).

Blended learning has often been proposed as a promising response because it combines face-to-face and online instruction and can support flexibility, interaction, and accessibility in higher education (Mulyani & Surya, 2022; Wijaya & Kusuma, 2020; Yanindah et al., 2021). However, many studies still treat it mainly as a delivery mode rather than as a system shaped by multiple interacting contexts (Mulyani & Surya, 2022; Stanley & Kuo, 2022). Important influences such as institutional policy, peer relationships, academic culture, and change over time are frequently mentioned only indirectly, even though they strongly affect implementation quality (Bronfenbrenner, 1979; Stanley & Kuo, 2022). As a result, blended learning is often applied as a technical combination of modes rather than as a sustained and adaptive learning ecosystem (Wijaya & Kusuma, 2020; Mulyani & Surya, 2022).

Bronfenbrenner's Ecological Systems Theory offers a stronger basis for addressing this limitation because it explains development through interacting layers of environment: microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). In higher education research, ecological models have proven useful for understanding how student learning is shaped by immediate interactions as well as institutional and sociocultural conditions (Bronfenbrenner, 1979; Stanley & Kuo, 2022). This perspective is especially relevant for instructional design because it allows blended learning to be understood not merely as a technological arrangement, but as a contextual system influenced by relationships, policy, culture, and time (Bronfenbrenner & Morris, 2006; Stanley & Kuo, 2022).

The novelty of this article lies in its explicit integration of the five ecological systems into the design of blended learning for Indonesian language instruction in higher education (Bronfenbrenner & Morris, 2006; Stanley & Kuo, 2022). While previous studies have examined blended learning outcomes, digital literacy, or ecological theory separately, few have mapped ecological layers directly onto instructional components in a coherent conceptual framework (Wijaya & Kusuma, 2020; Mulyani & Surya, 2022). To address this gap, this article proposes Eco-Blended Learning as a new conceptual model that links ecological systems theory with blended learning principles. The model is intended to provide a more holistic, contextual, and theoretically grounded foundation for Indonesian language instruction in higher education (Sari & Pratama, 2025b; Stanley & Kuo, 2022).

Despite the growing literature on digital learning and blended instruction, a systematic framework connecting ecological systems theory to blended learning in Indonesian language education is still lacking (Wahyuni, 2024). Existing studies have not yet clearly explained how direct classroom interaction, institutional support, sociocultural context, and temporal change can be brought together within one instructional model (Mulyani & Surya, 2022; Stanley & Kuo, 2022). Therefore, this study aims to develop and conceptualize Eco-Blended Learning as a framework for Indonesian language instruction in higher education, with the

expectation that it can guide future empirical validation and instructional design (Sari & Pratama, 2025a; Sari & Pratama, 2025b).

METHOD

This article employed a conceptual review design to develop the Eco-Blended Learning framework by synthesizing relevant theoretical and empirical literature on blended learning, Bronfenbrenner's Ecological Systems Theory, higher education, and Indonesian language learning. This approach was chosen because the purpose of the article was not to test hypotheses empirically, but to formulate a new conceptual model that explains how blended learning can be situated within a broader ecological learning system.

The literature review process was conducted in several stages. First, relevant sources were identified through a focused search of journal articles, books, book chapters, and conference proceedings using keywords such as blended learning, ecological systems theory, higher education, Indonesian language learning, and artificial intelligence in language learning. Priority was given to publications from the last five years in accredited national journals and relevant international publications, while seminal works, particularly those of Bronfenbrenner, were retained as primary theoretical references.

Second, the collected sources were selected based on their thematic relevance, conceptual depth, and contribution to the development of the proposed framework. The selected literature was then classified into five analytical themes: (1) the concepts and characteristics of blended learning, (2) the core principles of Bronfenbrenner's Ecological Systems Theory, (3) the implementation of blended learning in higher education, (4) Indonesian language learning in higher education, and (5) recent developments in digital technology and artificial intelligence for language learning.

Third, the analysis was carried out through thematic literature synthesis by comparing, relating, and integrating ideas across the selected sources in order to identify conceptual connections among key components. Rather than merely summarizing previous studies, this stage was directed toward constructing a new conceptual mapping between the five ecological systems microsystems, mesosystem, exosystem, macrosystem, and chronosystem and the major elements of blended learning design. The result of this synthesis was formulated into the Eco-Blended Learning framework as a holistic, contextual, and adaptive model for Indonesian language learning in higher education.

Fourth, the conceptual robustness of the framework was strengthened by examining consistency across sources, theoretical compatibility among concepts, and gaps in previous literature. Through this procedure, the proposed model was developed not merely as a normative idea, but as a conceptually grounded framework built upon an integrated reading of the relevant literature

RESULT AND DISCUSSION

Result

Eco-Blended Learning is designed based on five main principles that integrate Bronfenbrenner's ecological systems theory with blended learning principles. These five principles form the conceptual foundation that differentiates this model from conventional blended learning models. First, this model is holistic and layered because it considers all five layers of the ecological system when designing learning (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). This approach ensures that learning does not occur in isolation but within a broader and interconnected ecological context (Stanley & Kuo, 2022).

Second, this model is student-centered and aligns with the concept of heutagogy, which emphasizes self-directed and autonomous learning (Saputra & Hidayat, 2023; Rahayu & Santoso, 2024). Students are given autonomy to regulate their learning pace, choose learning strategies, and actively participate in learning

decision-making. Lecturers serve as facilitators, mentors, and learning partners who support students' intellectual independence.

Third, this model is flexible and adaptive to changes in time, technology, and environmental context, thus aligning with the chronosystem dimension in ecological theory (Bronfenbrenner & Morris, 2006).

Fourth, Eco-Blended Learning emphasizes multidimensional collaboration, covering lecturer-student collaboration, student-student collaboration, campus-home collaboration, and inter-course collaboration (Kurniawan & Pratama, 2024; Sari & Pratama, 2025). This principle reflects the mesosystem, where interactions among learning environments create synergy that strengthens the learning experience. Fifth, this model is contextual to culture and environment because it recognizes the importance of national educational values, norms, and culture in learning (Bronfenbrenner, 1979).

To operationalize the integration between ecological systems theory and blended learning, the following is the mapping of the five ecological systems into blended learning components:

Table 1. Integration between Ecological Systems Theory and Blended Learning

Ecological System	Relevant Blended Learning Component	Implementation Description
Microsystem	Physical classroom, LMS, lecturer, students, peers	4 Direct interactions in face-to-face and online learning; class discussions, LMS assignments, lecturer feedback, group collaboration
Mesosystem	Home ↔ campus, lecturer ↔ student, between courses	Coordination between class schedules and home life; collaboration among lecturers across courses; parental involvement in learning
Exosystem	Faculty policies, campus systems, technology infrastructure	LMS access policies; budget for learning technology; WiFi infrastructure and digital devices; campus organizational culture
Macrosystem	National curriculum, educational standards, academic culture	Merdeka Belajar curriculum; BAN-PT accreditation standards; Pancasila values in learning; academic culture and scientific integrity
Chronosystem	Technological developments, learning dynamics over time	Adaptation to AI and new digital tools; student transition from early to advanced semesters; continuous evaluation and model improvement

The proposed Eco-Blended Learning framework expands the conventional understanding of blended learning from a simple combination of face-to-face and online instruction into a broader ecological learning design. By integrating Bronfenbrenner's five ecological systems into the structure of blended learning, this model positions learning as the result of dynamic interactions among students, instructional environments, institutional systems, sociocultural values, and changes over time. In this sense, Eco-Blended Learning offers a more comprehensive perspective for designing Indonesian language learning in higher education, especially in response to the increasingly complex demands of 21st-century education.

At the microsystem level, the framework emphasizes students' direct interaction with lecturers, peers, classrooms, and digital learning platforms such as LMS. This level is important because the quality of immediate learning experiences strongly influences engagement, participation, and learning outcomes. In Indonesian language learning, microsystem-based design may be reflected in interactive classroom discussion,

collaborative writing tasks, asynchronous LMS forums, and timely lecturer feedback that encourages active learning.

At the mesosystem level, the model highlights the interrelationship among learning environments, such as the connection between home and campus, one course and another, and lecturers and family support systems. This layer is significant because student learning in higher education is not shaped by a single environment, but by the synergy among multiple contexts. In practice, this means that Eco-Blended Learning supports coordination across courses, alignment between academic tasks and students' lived realities, and stronger communication among the actors who influence the learning process.

At the exosystem level, the framework recognizes the importance of institutional structures that indirectly affect students' learning experiences, including faculty policy, campus management systems, funding allocation, and technological infrastructure. The success of blended learning therefore depends not only on lecturer competence or student motivation, but also on whether the institution provides adequate LMS access, internet connectivity, digital devices, and professional development opportunities for lecturers. This dimension makes the framework especially relevant for higher education institutions seeking to implement blended learning in a more sustainable and systemic manner.

At the macrosystem level, Eco-Blended Learning takes into account the broader cultural and policy context in which learning occurs. National curriculum orientation, academic values, educational ideology, and cultural norms all shape how Indonesian language learning is designed and interpreted in higher education. By acknowledging such factors, the model aligns blended learning not only with technological innovation, but also with academic integrity, Pancasila values, and the broader goals of Indonesian higher education.

At the chronosystem level, the model underlines that learning is dynamic and evolves over time. Changes in technology, curriculum policy, student developmental stages, and social context continuously reshape the way learning should be designed and evaluated. For this reason, Eco-Blended Learning is intended as an adaptive framework that can respond to developments such as artificial intelligence, new digital tools, and changing student needs across semesters and cohorts.

Compared with conventional blended learning models, Eco-Blended Learning offers several conceptual advantages. First, it is more holistic because it does not reduce blended learning to instructional media or delivery mode alone, but connects pedagogical design with social, cultural, institutional, and temporal dimensions. Second, it is more contextual because it acknowledges that learning outcomes are shaped by the interplay of multiple environments rather than by classroom interaction only. Third, it is more adaptive because the inclusion of the chronosystem allows the model to remain relevant amid rapid technological and educational change.

This framework also contributes theoretically by extending the discussion of blended learning in higher education, particularly in Indonesian language instruction, into a bioecological perspective that has rarely been operationalized in this field. While Bronfenbrenner's theory has frequently been used in child development and educational psychology, its integration into blended learning design for higher education remains limited. Therefore, the Eco-Blended Learning model may be positioned as a conceptual bridge between ecological theory and contemporary higher education pedagogy.

Practically, the framework offers guidance for lecturers and institutions in designing more integrated learning systems. For lecturers, the model can be used to align classroom interaction, LMS activities, collaborative tasks, and feedback strategies with students' broader learning ecology. For study programs and universities, the framework provides a basis for developing supportive policies related to infrastructure, curriculum integration, lecturer training, and continuous evaluation of blended learning implementation.

Nevertheless, this article remains conceptual in nature, and the proposed model has not yet been empirically tested. Its value at this stage lies in offering a theoretical foundation and a structured model for future validation studies. Further research is therefore needed to examine the practicality, validity, and effectiveness of Eco-Blended Learning through expert review, model validation, pilot implementation, and empirical studies on student engagement, learning autonomy, digital literacy, and Indonesian language learning outcomes.

Based on the integration of Bronfenbrenner's Ecological Systems Theory and blended learning principles, Figure 1 presents the proposed conceptual framework of Eco-Blended Learning for Indonesian language instruction in higher education

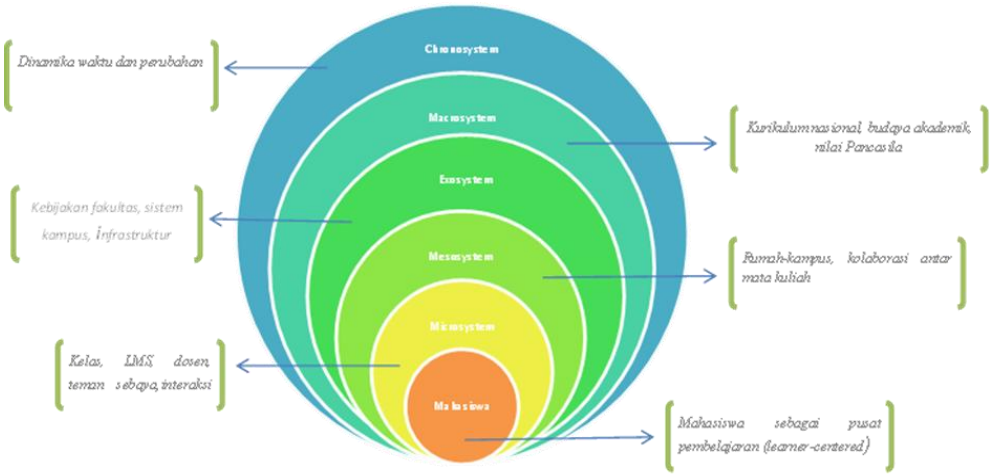

Figure 1. Conceptual Framework of Eco-Blended Learning Based on Ecological Systems Theory for Indonesian Language Instruction in Higher Education

Figure 1 illustrates the conceptual structure of Eco-Blended Learning, in which students are positioned at the center of the learning process and surrounded by five interacting layers of ecological systems. Each system layer contains relevant and interconnected blended learning components. Interactions among the system layers are dynamic and multidirectional, reflecting the complexity of the learning ecosystem (Bronfenbrenner, 1979).

The interaction flow in this model includes influence from the microsystem to broader systems, influence from the macrosystem to the microsystem, horizontal interactions among systems at the same layer, and temporal changes that affect all system layers (Stanley & Kuo, 2022; Bronfenbrenner & Morris, 2006). Thus, the Eco-Blended Learning model not only explains the structure of learning, but also the dynamic relationships that shape the quality of students' learning experiences.

Discussion

The Eco-Blended Learning framework demonstrates that blended learning should not be reduced to a technical combination of face-to-face and online instruction, but should instead be understood as a learning ecosystem shaped by multiple interacting environmental layers. This conceptual position is consistent with Bronfenbrenner's Ecological Systems Theory, which explains development as the outcome of nested and interdependent systems rather than isolated classroom events (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). In this study, the thematic synthesis shows that the microsystem, mesosystem, exosystem, macrosystem, and chronosystem each contribute distinct but interconnected influences on Indonesian

language learning in higher education. This means that the proposed framework is not simply a metaphorical extension of ecological theory, but an attempt to operationalize the theory into instructional design.

At the microsystem level, the framework emphasizes direct interaction among students, lecturers, peers, and digital platforms. This finding aligns with previous studies showing that blended learning can improve engagement and participation when immediate learning experiences are well designed and supported by active lecturer involvement (Mulyani & Surya, 2022; Sari & Pratama, 2025; Saputra & Hidayat, 2023). It also corresponds with the view that learner autonomy and self-directed learning are strengthened when students are given structured opportunities to participate actively in both face-to-face and online environments (Rahayu & Santoso, 2024). In this sense, the microsystem serves as the most immediate site where blended learning outcomes are produced.

The mesosystem further shows that learning is influenced by the relationship between contexts, such as the connection between classroom activities and independent study, or between course design and institutional support. This finding is consistent with ecological perspectives that stress the importance of interactions among settings, not just conditions within a single setting (Bronfenbrenner, 1979; Stanley & Kuo, 2022). Previous blended learning studies likewise suggest that student success depends on coordination across learning experiences, communication among lecturers, and alignment between instructional tasks and broader academic routines (Wijaya & Kusuma, 2020; Kurniawan & Pratama, 2024). Therefore, the mesosystem contributes a relational dimension that is often underdeveloped in conventional blended learning models.

At the exosystem level, the framework highlights institutional factors such as policies, infrastructure, funding, and access to digital tools. This is strongly supported by prior empirical studies showing that blended learning effectiveness is constrained when internet access is uneven or lecturers are insufficiently trained to use technology (Wijaya & Kusuma, 2020; Mulyani & Surya, 2022). The literature on digital-based Indonesian language learning also confirms that infrastructure gaps remain one of the main barriers to effective implementation, especially in remote areas (Wahyuni, 2024; Wahyuni et al., 2026). These findings show that blended learning outcomes are not only shaped by pedagogical decisions, but also by the institutional environment that enables or limits those decisions.

The macrosystem dimension underscores that Indonesian language learning is embedded in broader cultural, curricular, and policy contexts. This aligns with Bronfenbrenner's argument that learning and development are always situated within a wider normative system (Bronfenbrenner & Morris, 2006; Stanley & Kuo, 2022). In the present framework, national curriculum orientation, educational standards, and academic values are treated as part of the blended learning ecosystem because they influence how instructional goals are interpreted and enacted. This is important because previous studies on digital learning in Indonesian language education suggest that technology adoption alone is insufficient unless it is aligned with educational values and institutional expectations (Sari & Pratama, 2025; Wahyuni, 2024).

The chronosystem adds the dimension of change over time, which is especially relevant in the current digital era. The rapid development of AI, social media-based learning, and new digital platforms demonstrates that blended learning cannot remain static (Wahyuni, 2024; Sari & Pratama, 2025; Pratama & Wijaya, 2024). Consistent with ecological theory, the framework treats temporal change as a structural component rather than an external condition (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006). This allows Eco-Blended Learning to remain adaptable to shifting student needs, technological developments, and institutional transformations.

The discussion shows that the proposed framework is supported both by ecological theory and by previous research on blended learning and digital language instruction. Earlier studies have tended to focus on outcomes such as engagement, autonomy, or flexibility, but they have not fully integrated those outcomes

into a layered ecological explanation (Sari & Pratama, 2025; Rahayu & Santoso, 2024). The novelty of the present study is therefore not only the identification of multiple influences, but the conceptual mapping of those influences onto the five ecological systems. This mapping provides a more comprehensive explanation of how blended learning works in Indonesian language instruction and why its effectiveness depends on a wider learning ecology.

CONCLUSIONS

This article proposes Eco-Blended Learning as a conceptual framework that integrates blended learning with Bronfenbrenner's Ecological Systems Theory in the context of Indonesian language learning in higher education. The framework shows that blended learning should not be understood merely as a combination of face-to-face and online instruction, but as a learning ecosystem shaped by direct interaction, inter-environmental relationships, institutional structures, sociocultural values, and change over time. By incorporating the microsystem, mesosystem, exosystem, macrosystem, and chronosystem into the design of blended learning, the proposed model offers a more holistic, contextual, and adaptive approach to meeting the demands of 21st-century higher education. In theoretical terms, the model expands the discussion of blended learning through an ecological lens, while in practical terms it provides guidance for lecturers, study programs, and institutions in designing more integrated and sustainable learning environments. Therefore, further research is needed to validate the model through expert review, pilot implementation, and empirical studies examining its effects on student engagement, learning autonomy, digital literacy, and Indonesian language learning outcomes in higher education, thereby strengthening its feasibility, practicality, and contribution to the development of sustainable blended learning practices.

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AUTHOR CONTRIBUTIONS STATEMENT

All authors contributed substantially to the conception and design of the study, literature review, analysis, manuscript drafting, and final approval of the submitted version.

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