



Adaptive Learning Design Based on Local Wisdom Texts in Indonesian Language Classes: A Literature Review

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Abstract

This study explores the conceptual integration of adaptive learning design with local wisdom-based texts in Indonesian language education. As learning technologies increasingly emphasize personalization, there remains a gap in how these adaptive systems can meaningfully incorporate Indonesia's diverse cultural contexts. The research synthesizes findings from 19 national and international studies published between 2015 and 2025 related to adaptive learning, digital literacy, and local wisdom-based pedagogy, using a systematic literature review. The analysis reveals three major dimensions of integration: technological adaptivity, pedagogical mediation, and cultural contextualization. Technological adaptivity focuses on the use of AI, big data, and learning analytics to personalize content and feedback, while pedagogical mediation emphasizes the teacher's role as a cultural interpreter and facilitator of humanistic learning. Cultural contextualization highlights the significance of local texts, values, and narratives as authentic learning materials that shape students' identity and moral development. The resulting conceptual model, termed the Culturally Adaptive Learning Framework (CALF), proposes that adaptive learning should be "adaptive by data, humanized by culture." This approach promotes a holistic view of language education that balances technological innovation with cultural values, aiming to foster literacy, inclusivity, and character formation among Indonesian elementary students.

Keywords:

Adaptive learning; Cultural pedagogy; Indonesian Language education; Local wisdom

A. INTRODUCTION

Rapid developments in educational technology and increasing diversity among students have led to a paradigm shift in classroom learning, from a uniform, teacher-centered model to a more flexible, student-centered approach. In the context of elementary schools in Indonesia, where linguistic, cultural, and social variations are very apparent, the implementation of adaptive and personalized learning is a necessity. Adaptive learning allows teachers to tailor content, pace, and learning paths to the abilities and interests of each student (Hidayat & Purwandari, 2025). This approach is in line with the Merdeka Belajar (Freedom of Learning) principle, which emphasizes differentiated and contextual learning that values the unique potential of each student (Astuti et al., 2025).

The challenges of language learning in Indonesian elementary schools are greatly influenced by the nation's cultural diversity and the individual needs of students. Cultural diversity necessitates teaching methods that are responsive to these differences, the availability of contextually relevant teaching materials, and ongoing professional development for teachers (Nisa et al., 2024). Efforts to overcome these challenges are crucial in creating an inclusive and effective learning environment for language learning.

The Culturally Responsive Teaching (CRT) approach, or culturally responsive learning, is important in adapting language teaching to the diverse cultural backgrounds of students to promote fairness and engagement in learning (ulviani, 2022). The integration of local cultural resources and recognition of student identity has been shown to improve learning outcomes (Putri & Aisyah, 2025). However, many teachers still lack adequate training in this approach, limiting their ability to manage student diversity (Rachmatika & Izzah, 2024). Therefore, continuous professional development focused on culture-based pedagogy is essential to improve the quality of learning practices (Putri & Aisyah, 2025).

In addition, the effectiveness of language learning is also influenced by the limited use of teaching materials and learning media that are interactive and relevant to the students' culture (Hendarti, 2024). The development of innovative learning media that suit the needs of students can help overcome language comprehension barriers and increase student engagement in the learning process. Although these challenges are quite significant, some educators argue that the existing language learning framework can still be adapted to better serve student diversity. This view emphasizes the importance of reform and innovation in the education system to improve language learning experiences in Indonesian elementary schools.

Adaptive learning aims to provide learning activities tailored to the needs of each student, for example, through different exercises or assignments based on their ability levels (Cui & Sachan, 2023). In the field of language and literacy education, adaptive learning has been shown to improve students' reading comprehension, engagement, and self-regulation skills. Various studies on adaptive digital systems and platforms show that when students are given flexible learning paths—with the support of teachers and technological assistance—they become more active in constructing knowledge. Thus, adaptive literacy learning not only addresses cognitive differences but also fosters students' intrinsic motivation to read and express themselves. However, most research on adaptive learning still focuses on learning English as a foreign language or general literacy skills, while the context of local languages and cultures, such as learning Indonesian in elementary schools, is still rarely studied.

Various studies show that adaptive learning is effective in increasing student motivation and language comprehension (Sari et al., 2024). Adaptive learning systems are pedagogical innovations that use algorithms to analyze student performance and behavior data, then adjust content, strategies, and learning speed individually (Hssina & Erritali, 2019). This system provides real-time feedback to teachers regarding students' difficulties in understanding certain materials and automatically recommends additional learning resources or advanced exercises (Ma et al., 2025). A number of international studies have also proven the effectiveness of this system in language learning. Sfenrianto et al. (2018) reported that students who used adaptive platforms in English language learning showed significant improvement compared to students who were taught using traditional methods.

Local wisdom encompasses traditional values, folklore, proverbs, and cultural narratives that provide a meaningful context for character education and identity formation. Local wisdom is not merely a “cultural heritage” to be preserved, but also a way of thinking and knowing (epistemology) rooted in experience, spirituality, and human relationships with nature in a particular context (Mahaswa & Syaja, 2025). The integration of texts based on local wisdom in Indonesian language learning allows students to relate the learning material to their cultural environment, thereby promoting language proficiency as well as moral understanding. Thus, local literature serves not only as reading material but also as a means of instilling ethical values and preserving cultural heritage for the younger generation.

The rapid development of learning technology, particularly in adaptive learning systems, has led to increased personalization in the learning process. Although adaptive learning systems are widely implemented in various countries, most research and implementation tends to be global and universal in nature, with a greater focus on English language learning or general literacy. The integration of local wisdom in adaptive learning design, particularly in the context of Indonesian language learning, is still rarely found in existing literature. This gap is important to fill, given that Indonesia has a very rich cultural diversity, which should be part of a relevant

and contextual learning system. Therefore, this study aims to fill this gap by integrating local wisdom into adaptive learning systems, which not only focus on data-driven personalization but also appreciate the local cultural values that shape students' identities and characters. This study proposes a conceptual framework for adaptive Indonesian language learning based on local culture, which is expected to enhance a more inclusive and meaningful learning experience for elementary school students in Indonesia.

Existing approaches to integrating local wisdom into learning are generally limited to thematic enrichment or contextual examples in textbooks. Although useful, these approaches are often uniform and fail to account for differences in students' reading abilities, interests, and learning styles. On the other hand, adaptive learning frameworks, which are increasingly used in education, are often not designed to accommodate cultural diversity or local values. This gap highlights the need to bridge two important domains: adaptive learning design and local culture-based teaching, especially in Indonesian language and literature learning at the elementary school level.

To address this research gap, this study conducted a literature review that synthesized the theoretical basis, pedagogical strategies, and previous findings related to adaptive learning and local wisdom-based education. This study aims to analyze the potential for integrating adaptive learning systems with local wisdom in Indonesian language learning, as well as proposing a conceptual framework that respects Indonesia's cultural diversity. Thus, this study contributes to the broader discourse on how personalization and cultural responsiveness can coexist in literacy learning to support students' academic achievement and character development.

B. METHODS

This study uses a systematic literature review approach to examine and synthesize various previous research results related to adaptive learning design and the integration of local wisdom texts in Indonesian language learning in elementary schools. This approach was chosen because it allows researchers to gain a comprehensive understanding of the theoretical framework, pedagogical practices, and current research trends, while also identifying knowledge gaps and offering new conceptual directions. The review process was carried out through several main stages, namely identification, screening, feasibility assessment, and literature synthesis. This process is illustrated in the modified PRISMA flow diagram below.

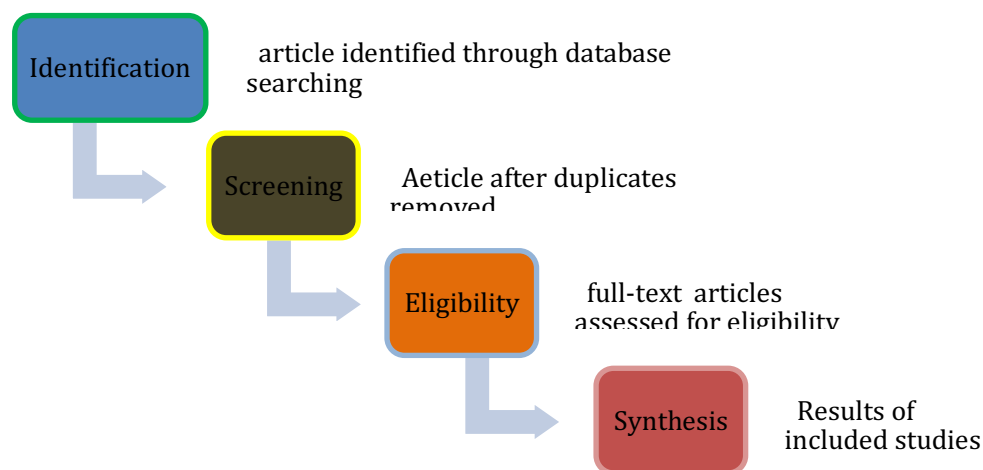


Figure 1. Prisma Flowchart

1. Identification: Relevant articles were collected from various national and international scientific databases, such as ScienceDirect, Google Scholar, Garuda, and Sinta. The search was conducted using a combination of specific keywords, such as: "adaptive learning," "personalized learning," "local wisdom," "Indonesian language education," and "elementary education." The search was conducted on publications published between 2015 and 2025 to

ensure the relevance and update of the findings.

2. Screening: The identified articles were then screened based on the relevance of their titles and abstracts. Articles that were not directly related to the topic of adaptive learning or the use of local wisdom in Indonesian language education were excluded from the list.
3. Eligibility: Articles that passed the screening stage were further examined to assess the quality of their methodology and suitability for the research objectives. Eligibility criteria included articles published in peer-reviewed journals and articles relevant to adaptive learning design and local wisdom-based education.
4. Inclusion: Articles that met the eligibility criteria were included in the analysis. Only articles that presented in-depth empirical or theoretical findings on the application of adaptive learning with local wisdom-based texts were considered for further synthesis.

To maintain the focus and quality of the study, this research applied several inclusion and exclusion criteria. The inclusion criteria included: a) articles discussing adaptive learning or personalized learning frameworks in the context of language education; b) articles researching the application of local wisdom or culture-based texts in language or literacy learning at the elementary school level; c) articles published in peer-reviewed journals or proceedings; d) articles written in English or Indonesian. The exclusion criteria included: a) articles that only discussed the use of technology in general without highlighting adaptive aspects; b) articles that were not related to language learning or literacy; and c) articles that were opinion pieces or conceptual essays without clear pedagogical relevance.

Data analysis was conducted in several stages. First, all articles that passed the selection process were carefully read and summarized based on the research objectives, methods, main findings, and theoretical perspectives. Next, the data were categorized thematically into three main dimensions, namely: a) principles and application of adaptive learning in language education, b) utilization of local wisdom and cultural texts in learning, and c) models or frameworks for integrating adaptive learning and the local cultural context. A thematic synthesis approach was used to identify patterns, similarities, and differences that emerged from various sources. The synthesis results were then organized into several conceptual clusters that formed the basis for developing a conceptual model of adaptive Indonesian language learning based on local culture. To maintain the validity and transparency of the review process, only credible scientific sources that had undergone a peer-review process were used. Each article was re-examined for its relevance to the research focus and methodological accuracy.

C. RESULT & DISCUSSION

Researchers examined various sources, including books and articles discussing adaptive learning, language learning, and local wisdom. The following table presents the results of an analysis of manuscripts discussing the theme of adaptive learning and its integration with local wisdom. This analysis was conducted to identify trends in the focus of studies, relevant key findings, and the contribution of each study to the development of an integrative model of adaptive learning based on cultural values. Through this review, it can be seen that researchers highlight various aspects ranging from the use of big data technology, algorithm-based adaptive learning systems, to the application of local cultural values in language teaching. The results of this synthesis form the basis for formulating the conceptual components of an adaptive learning model rooted in local wisdom.

Table 1. Analysis of Local Wisdom-Based Adaptive Learning

No	Source / Author	Focus / Main Topic	Relevant Findings	Contribution to the Integrative Model
1	Xia, Shin & Shin (2024) – Designing Personalized Learning Paths for Foreign Language Acquisition Using Big Data	Big data-based language learning and digital personalization	Developing a Data-Driven Personalized Learning Model (DDPLM) with real-time data analysis to customize individual learning paths and materials.	Providing a theoretical basis for data- and technology-based “adaptive learning design” components.
2	Harsono et al. (2025) – Adaptive Digital Literacy in Indonesian Language Learning	Adaptive digital literacy in Indonesian language learning	Digital-based adaptive learning increases student motivation and engagement, with teachers as the main facilitators..	Supports the concept of the teacher's mediating role in adaptive systems to remain humanistic and contextual.
3	Irfan Kumango (2024) – Implementation of Adaptive Learning in Islamic Educational Context	Adaptation of digital learning in the context of Islamic values	Demonstrates the importance of balance between digital personalization and students' religious character values.	Strengthens the ethical and cultural value dimensions in adaptive learning design..
4	Hssina & Erritali (2019) – Adaptive Learning Systems Framework	Adaptive learning system model based on algorithms	Explains the structure of a system that adjusts content and learning speed based on student performance.	Serves as a technical reference in adaptive system architecture that can be applied in the context of the Indonesian language.
5	Hatima (2025) – Pembelajaran Bahasa Responsif Budaya Lokal di Sekolah Dasar	Language teaching based on regional cultural values	The integration of folk tales and local proverbs effectively instills character values and cultural literacy.	This forms the basis for the “local wisdom content” component in the culture-based adaptive model.
6	Saputra (2025) – Nilai-Nilai Kearifan Lokal dalam Pembelajaran Bahasa Indonesia di SD	Local wisdom in language learning in elementary schools	Local cultural values such as mutual cooperation and responsibility can be integrated into reading texts and writing activities.	Support the development of adaptive content based on cultural values in accordance with the context of the students' region.
7	Mahaswa & Syaja (2025) – Epistemologi Kearifan Lokal dan Pendidikan Karakter	Philosophical basis of local wisdom	Explains that local wisdom is epistemology—a way of thinking and knowing that is rooted in culture.	Provides a philosophical and ideological basis for cultural integration in adaptive systems.
8	Sfenrianto et al. (2018) – Adaptive E-Learning for Language Education	Effectiveness of adaptive platforms on language learning outcomes	Adaptive platforms significantly improve learning outcomes compared to conventional methods.	Providing empirical evidence of the effectiveness of adaptive learning in improving literacy.

9	Çopur Bilgi (2023) – Cultural Responsiveness in Language Teaching	Culturally responsive language teaching	Culturally responsive approaches strengthen the identity and learning motivation of multicultural students.	Strengthens the argument that cultural aspects need to be explicitly integrated into adaptive design.
10	Hendarti (2024) – Interactive Media and Local Context in Language Learning	Contextual interactive media in language learning	The use of local digital media improves language comprehension and student participation.	Demonstrates that adaptive technology can be based on local content, not just global content.
11	Wang et al. (2025) Adaptive Learning Systems	LLM-based adaptive learning and data analytics	Content personalization and real-time feedback improve learning effectiveness	Providing the technological foundation and principles of personalization for adaptive Indonesian language learning systems
12	Aldyandra et al. (2024) AI in Education 5.0	AI in building adaptive learning environments	The integration of AI and predictive analytics results in flexible learning	Providing AI components for adaptive learning design that balances technology and humanism
13	Sabrina et. al. (2024) E-book Teaching English in the Digital Age	Digital and project-based approaches to language teaching	DL, ARCS, and scaffolding are effective for student differentiation	Offering adaptive learning design principles that can be applied in teaching Indonesian
14	Fadillah et. al. (2024) Strategi Desain Pembelajaran Adaptif Untuk Meningkatkan Pengalaman Belajar di Era Digital	Indonesian language learning that is responsive to culture	Inclusive and contextual learning based on student needs The use of local wisdom texts strengthens cultural literacy	Becoming a reference for an adaptive pedagogical framework that takes into account the cultural diversity of students
15	Azhar et. al (2024) Revolusi Pembelajaran Bahasa Arab di Era Digital	Language learning based on Islamic spiritual and cultural values	Integration of religious and local values into language	Providing models for integrating cultural and spiritual values into adaptive learning
16	Salim et. al. (2024) Bridging Global AI Innovations with Local ESL Classrooms: A Conceptual Framework for Adaptive Language Learning Tools	Student-centered and digital pedagogy	Adapting teaching strategies according to student autonomy and participation	Menguatkan prinsip pembelajaran adaptif yang berpusat pada siswa
17	IJSSEL (2024)	Digital literacy and language teaching innovation	Technology expands the context of language learning.	connecting digital adaptivity with local text-based learning.

18	Dewi et. al. (2024) Mewujudkan Pembelajaran Adaptif Dan Joyful di Madrasah Ibtidaiyah	Adaptation of e-learning content based on student needs	Learning analytics for individual differentiation	Providing a technical foundation for adaptive digital learning design
19	Saldivar & Fernandes (2025) Concept Analysis of Adaptive Learning Strategy in English Language Teaching (ALS-ELT)	AI-based adaptive curriculum and automated evaluation	Personalization of data-driven curriculum and learning	Becoming a digital component in an adaptive-cultural integrative model

The following table presents the results of an analysis of ten research papers that highlight the development of adaptive learning and its relationship with local wisdom values. This analysis aims to identify the focus of the study, the main findings, and the conceptual contributions of each study to the culture-based adaptive learning model.

Table 2. Synthesis of Key Studies on Adaptive Learning and Local Wisdom Integration in Indonesian Language Education

No .	Author(s) / Year	Main Topic	Key Findings	Contribution to Adaptive Learning and Ethnopedagogical Models
1	Xia, Shin, & Shin (2024)	Language Learning with Big Data	Use of real-time data to adjust learning paths based on student data.	Provides a technological foundation for data-driven adaptive learning systems to personalize learning materials.
2	Harsono et al. (2025)	Adaptive Digital Literacy in Indonesian Language Learning	Digital-based learning increases student motivation and engagement, with teachers as facilitators.	Demonstrates the role of teachers in mediating adaptive learning that still respects local cultural values in teaching.
3	Hssina & Erritali (2019)	Adaptive Learning Systems Framework	A system that adjusts content and learning pace based on student performance.	Provides a technical reference for adaptive systems architecture, applicable to Indonesian language learning.
4	Hatima (2025)	Language Teaching Based on Regional Cultural Values	Integration of folk tales and local proverbs to instill character values and cultural literacy.	Emphasizes the importance of cultural context in adaptive learning design, with local texts enriching the learning experience.
5	Fadillah (2024)	Adaptive Learning for Inclusive Language Education	Adaptive systems enhance inclusion by adjusting to students' needs and integrating local cultural values.	Contributes to the pedagogical framework by combining adaptive technology and culture-based teaching approaches.
6	Saputra (2025)	Local Wisdom in Indonesian Language Learning	Local cultural values like mutual cooperation and responsibility are integrated into reading and writing activities.	Supports the development of adaptive content based on local cultural values within the context of students' region.

7	Mahaswa & Syaja (2025)	Epistemology of Local Wisdom and Character Education	Local wisdom is epistemology—a way of thinking rooted in culture that shapes character education.	Provides a philosophical basis for integrating local wisdom into adaptive learning systems, aligning with ethnopedagogical values.
8	Sfenrianto et al. (2018)	Adaptive Learning for English Language Learning	Adaptive platforms significantly improve learning outcomes compared to conventional methods.	Provides empirical evidence on the effectiveness of adaptive learning systems in improving literacy.
9	Çopur Bilgi (2023)	Cultural Responsiveness in Language Teaching	Culturally responsive approaches strengthen identity and learning motivation for multicultural students.	Reinforces the argument that cultural aspects must be explicitly integrated into adaptive learning design.
10	Hendarti (2024)	Interactive Media and Local Context in Language Learning	The use of local digital media improves language comprehension and student participation.	Shows that adaptive technology can be based on local content, not just global content, enhancing student engagement.
11	Wang et al. (2025)	Adaptive Learning Systems with LLM and Data Analytics	Content personalization and real-time feedback improve learning effectiveness.	Provides the technological foundation and personalization principles for adaptive Indonesian language learning systems.
12	Aldyandra et al. (2024)	AI in Adaptive Learning Environments	Integration of AI and predictive analytics results in flexible learning environments.	Contributes AI components for adaptive learning design that balances technology and humanism.
13	Sabrina et al. (2024)	E-books in Language Teaching in the Digital Age	Digital and project-based approaches effectively differentiate students.	Offers adaptive learning design principles that can be applied in teaching Indonesian.
14	Fadillah et al. (2024)	Adaptive Learning Design for Enhancing Learning Experience	Learning based on students' needs is inclusive and contextual.	Provides a reference for an adaptive pedagogical framework that considers students' cultural diversity.
15	Azhar et al. (2024)	Arabic Language Learning Based on Islamic Cultural Values	Integration of religious and local values into language learning.	Provides models for integrating cultural and spiritual values into adaptive learning.
16	Salim et al. (2024)	Bridging Global AI Innovations with Local ESL Classrooms	Adapting teaching strategies based on student autonomy and participation.	Strengthens the principle of student-centered adaptive learning in language teaching.
17	IJSSEL (2024)	Digital Literacy and Language Teaching Innovation	Technology expands the context of language learning.	Links digital adaptability with local text-based learning, enriching the learning experience.
18	Dewi et al. (2024)	Implementing Adaptive and Joyful Learning in Madrasah Ibtidaiyah	Adaptive learning content based on student needs using learning analytics for individual differentiation.	Provides the technical foundation for adaptive digital learning design.
19	Saldivar & Fernandes (2025)	Concept Analysis of Adaptive Learning Strategy in ESL	Data-driven curriculum personalization and automated evaluation for language teaching.	Contributes a digital component to an integrative adaptive-cultural model.

Through this synthesis process, a comprehensive picture of the direction of research development in the field of adaptive education is obtained, both from a technological perspective and from the perspective of integrating local values. Thus, this table serves as the basis for formulating a conceptual model of adaptive learning that is not only oriented towards technology-based personalization, but also towards the preservation and internalization of regional cultural values.

Table 2. Synthesis of Analysis Results Against Research Objectives

Research Objectives	Synthesis of Manuscript Findings	Supporting Sources	Implications / Principles of the Conceptual Model
Identifying principles and strategies for adaptive learning	Adaptive learning focuses on personalization based on student performance data, abilities, and interests. Big data and AI technologies enable teachers to monitor student progress in real time and adjust learning paths. However, the role of teachers remains important as facilitators of reflection and human values.	(Xia et al., 2024); (Harsono et al., 2025); (Hssina & Erritali, 2019); (Sfenrianto et al., 2018)	Principle: "Adaptivity with Humanity", adaptive systems are combined with teacher guidance to ensure a balance between technology and human values.
	Adaptive learning emphasizes personalization, flexibility, and responsiveness to students' learning needs. Technology (AI, LLM, data analytics) enables teachers to customize content, methods, and learning speed in real-time. The principles of UDL, ARCS, and student-centered learning strengthen student engagement and motivation.	(Wang et al., 2025); (Aldyandra et al., 2024); (Fadillah, n.d.); (Sabrina Sabrina et al., n.d.); (Salim et al., 2025)	The conceptual model places pedagogical and technological adaptability as the main pillars. Indonesian language learning needs to be personalized, data-driven, and provide room for exploration according to students' abilities and learning styles.
Exploring the integration of texts based on local wisdom	Local wisdom includes folklore, proverbs, and cultural values that are relevant to students' lives. Integrating local content improves students' language comprehension, emotional engagement, and character building. However, culture-based teaching materials are still limited and have not been adapted digitally.	(Hatima, 2025); (Saputra et al., 2025); (Mahaswa & Syaja, 2025); (Bilgi, 2025); (Hendarti, 2024)	Principle: "Cultural Contextualization" learning content is adapted to the local culture so that it is meaningful and shapes students' character.
	The integration of local texts strengthens cultural identity, moral literacy, and the relevance of the learning context. Local wisdom texts (folktales, legends, rhymes, and regional traditions) can be adapted according to students' abilities and used as a means of reflecting on values. Local culture-based learning encourages emotional engagement and cross-cultural understanding.	(Fadillah, n.d.); (Azhar et al., 2025); (Sabrina Sabrina et al., n.d.); (Saldivar & Fernandez, 2024)	The conceptual model emphasizes the cultural-contextual dimension: local texts are used adaptively and multimodally to instill moral and social values and strengthen students' cultural literacy.

Proposing a conceptual framework for adaptive learning based on local culture	The integration of adaptive learning and local wisdom has resulted in the conceptual model *Adaptive Learning with Local Wisdom Integration (AL-LWI)*. This model includes three main components: (1) Adaptive Design (adjustment of activities and content), (2) Local Wisdom Content (enrichment of local cultural values), and (3) Cultural Feedback Loop (reflection of cultural values in learning).	(Xia et al., 2024); Harsono et al. (2025); Irfan (2024); Hssina & Erritali (2019); Sfenrianto et al. (2018); Hatima (2025); Saputra (2025); Mahaswa & Syaja (2025); Çopur Bilgi (2023); Hendarti (2024)	Concept: AL-LWI Model, combining digital personalization with cultural contextualization to improve literacy, character, and inclusivity.
	The synthesis results indicate the need for a Culturally Adaptive Learning Framework (CALF) model that combines technological adaptability, pedagogical flexibility, and local cultural values. Culturally adaptive Indonesian language learning not only adjusts to students' abilities but also respects their social, spiritual, and cultural contexts.	Wang et al., 2025; Aldyandra et al., 2024; Fadillah et.al (2024); Azhar et.al. (2024); Sabrina (2024); Saldivar & Fernandes (2024)	The CALF model is based on four dimensions: (1) Pedagogical-Adaptive, (2) Cultural-Contextual, (3) Technological-Analytical, (4) Humanistic-Empathetic. This combination forms a system of Indonesian language learning that is relevant, flexible, and rooted in the nation's culture.

The analysis of manuscripts shows that the current research trend in adaptive learning is moving towards the integration of digital technology and cultural values. Most studies focus on efforts to optimize algorithm-based learning technology and big data to create a more personalized learning experience. This approach demonstrates how modern learning systems are able to tailor materials, strategies, and evaluations based on the abilities and needs of learners. However, the personalization of this technology cannot be understood separately from the socio-cultural context in which learners exist.

Several studies, such as those conducted by Hatima, (2025) emphasize the importance of incorporating local wisdom as an integral part of adaptive learning content. Regional cultural values, folklore, and local proverbs serve not only as contextual teaching materials but also as a medium for instilling character and cultural identity. This shows that technology-based adaptive learning is not merely technical in nature, but also has affective and social dimensions that strengthen learners' sense of attachment to their culture.

From a technological perspective, research conducted by (Xia et al., 2024) and (Hssina & Erritali, 2019) highlights the importance of algorithm-based systems and data analytics in managing student learning profiles. Such systems enable real-time adaptive feedback that can improve learning effectiveness. However, the synthesis results show that a purely technological approach tends not to adequately consider cultural values and context. Therefore, the integration of artificial intelligence with value-based educational principles is an important direction in the future development of adaptive learning models.

In addition, research by Harsono et al. (2025) and Lestari et al., (2024) shows that effective adaptive learning requires the active role of teachers as mediators. Teachers serve to connect digital adaptive systems with the affective needs of students, including interpreting local values to remain relevant to the global context. This approach positions teachers not only as technology facilitators but also as guardians of meaning and cultural values in the learning process.

Overall, the results of the review show that adaptive learning integrated with local wisdom has great potential to build a holistic education model. This model not only promotes data-driven personalization but also fosters cultural awareness, ethical values, and character in students. Therefore, the future development of adaptive learning should prioritize a balance between artificial intelligence and cultural intelligence, so that technology can serve as a tool that

reinforces, rather than replaces, human values in education.

The Concept of Adaptive Learning in Language Learning

A review of various literature shows that adaptive learning is a learner-centered approach, where the learning process, material, and experience are tailored to individual needs, abilities, and interests. In the context of language education, this approach focuses on providing dynamic feedback and differentiating learning based on students' linguistic abilities.

Several studies (e.g., on English language learning and digital literacy) confirm that adaptive systems allow students to learn at their own pace and in their own learning style. Educational technologies such as learning analytics and adaptive digital platforms play a role in adjusting the level of text difficulty, types of exercises, and learning strategies according to student profiles. Teachers function as facilitators who adjust teaching strategies based on feedback from the system and direct observation in the classroom.

In the context of elementary schools, adaptive learning contributes to increased learning motivation, emotional engagement, and reading comprehension. This approach encourages students to become independent and reflective learners from an early age. However, most existing studies still focus on technological aspects and have not discussed the socio-cultural context of Indonesian students. Thus, although adaptive learning has high potential in improving language competence, its application still needs to be adapted to local characteristics to be more culturally and contextually meaningful.

Local Wisdom as Content for Indonesian Language Learning

A literature review shows that local wisdom encompasses cultural values, folklore, proverbs, legends, and social practices that have been passed down from generation to generation in Indonesian society. In Indonesian language learning, local wisdom texts play a strategic role as learning resources that enrich literacy, character, and national identity.

Several studies in the field of basic education confirm that the use of local texts can improve students' understanding of contextual meaning, cultural empathy, and critical thinking skills. Folktales and local cultural texts also contribute to fostering a sense of belonging to the Indonesian language and strengthening moral values such as honesty, mutual cooperation, and social responsibility.

These findings are relevant to the context of Indonesian language learning in elementary schools. When the principle of adaptivity is combined with texts based on local wisdom, such as Banjar folk tales, Malay pantuns, or Kalimantan legends, students not only learn language structure but also the moral and social values embedded in the culture. In other words, the adaptive system can be modified to focus not only on linguistic achievement but also on strengthening students' character and cultural identity (Rehman, 2025).

However, the results of the study also indicate that the implementation of local wisdom in the classroom is often still thematic and uniform, not yet taking into account the diverse learning needs of students. Culture-based material is often presented in a single narrative form without any adjustments to the reading ability, interests, or learning styles of the students. This is where an adaptive approach is important—to make local wisdom texts more inclusive, challenging, and relevant to the needs of each student.

Integration of Adaptive Learning with Local Culture: A Conceptual Model

The synthesis of the ten research papers analyzed shows that adaptive learning and local wisdom have strong common ground in building a contextual, personalized, and meaningful education system. Adaptive learning is fundamentally oriented towards the needs and characteristics of individual students, while local wisdom emphasizes the cultural, ethical, and social values that form the foundation of community life. The integration of the two results in a conceptual model of learning that not only adapts content and strategies based on students' learning abilities, but also links them to the cultural context in which they grow and interact.

This conceptual model is built on three main dimensions, namely technological

adaptability, pedagogical, and cultural dimensions. The technological adaptability dimension includes the use of data-based systems, algorithms, and artificial intelligence to dynamically identify individual learning styles, abilities, and preferences. Through this system, students gain a personalized and flexible learning experience. However, this model emphasizes that technological adaptability must be directed towards supporting educational goals rooted in human values, not merely algorithmic efficiency.

The pedagogical dimension places teachers as learning mediators who bridge the interaction between technology and students. Teachers interpret the results of adaptive system analysis, adjust learning strategies, and ensure that cultural values remain present in every learning activity. In this context, the role of teachers cannot be replaced by digital systems; instead, technology serves as a tool that enriches the teaching and learning process.

The cultural dimension focuses on integrating elements of local wisdom into learning materials and activities. Folklore, oral traditions, proverbs, social values, and local cultural practices can be used as learning resources that are relevant to the context of learners' lives. This integration enables learners to not only understand academic material, but also build identity awareness, social empathy, and cultural responsibility. Thus, culture-based adaptive learning not only shapes cognitive competencies but also strengthens character and national values.

Overall, this integrative conceptual model describes a learning system that is “adaptive by data, humanized by culture” — technologically adaptive yet still oriented towards human values. Implementing this model requires synergy between system developers, educators, and local cultural communities so that every aspect of the technology can be contextualized to the needs and characteristics of the community. Through this approach, adaptive learning no longer functions solely as a technological innovation, but also as a strategy for preserving and transforming cultural values in 21st-century education.

D. CONCLUSION

This study introduces the Culturally Adaptive Learning Framework (CALF), which integrates three key dimensions: technological adaptivity, pedagogical mediation, and cultural contextualization. By utilizing AI, big data, and learning analytics, the framework personalizes learning while also ensuring that local cultural values are embedded in the educational process. The teacher’s role as a mediator between technology and culture is crucial, as it ensures that adaptive systems are not just focused on cognitive learning but also support students’ moral and cultural development.

Future research should focus on developing an adaptive learning system prototype that integrates local wisdom texts such as folktales and proverbs into Indonesian language learning. This system should be tested in real classroom settings to assess its effectiveness in enhancing language comprehension, motivation, and character development among students. By incorporating local cultural content, the system would align with the cultural diversity of students and improve their learning experience.

Furthermore, integrating cultural feedback loops into adaptive learning systems will enable continuous refinement based on students' experiences with cultural content. Future studies should explore how this feedback can be used to make the learning process more relevant and meaningful for diverse learners. This approach aligns with the goals of Merdeka Belajar by offering a personalized, inclusive, and culturally responsive education that celebrates Indonesia’s rich cultural heritage.

REFERENCES

- Aldyandra, A., Irvan, I. A., & Annur, S. (2024). Enhancing Personalized Learning Through Artificial Intelligence (AI) in Education 5.0: A Framework for Adaptive Learning Environments. *Proceedings ICES*, 1, 670–680.

- Astuti, M., Agustin, L., Alhusaini, M. Y., Anggraini, T., & Adellia, S. (2025). Pembelajaran Berdiferensiasi Perspektif Kurikulum Merdeka. *Indo-MathEdu Intellectuals Journal*, 6(1), 66–76. <https://doi.org/10.54373/imeij.v6i1.2326>
- Azhar, M., Destia Yolanda, Angga Frananda, M. Ripani Saputra, Resy Mulyani, & Siti Nurdinah. (2025). Revolusi Pembelajaran Bahasa Arab Di Era Digital: Analisis Peran Artificial Intelligence Dalam Pengembangan Kompetensi Berbahasa. *AL-MA'LUMAT: JURNAL ILMU-ILMU KEISLAMAN*, 3(2), 58–81. <https://doi.org/10.56184/jam.v3i2.506>
- Bilgi, A. C. (2025). AI-enhanced differentiated instruction: Leveraging technology to support multiple intelligences in language education settings. *International Journal of New Trends in Social Sciences*, 9(1), 1–13. <https://doi.org/10.18844/ijss.v9i1.9773>
- Cui, P., & Sachan, M. (2023). Adaptive and Personalized Exercise Generation for Online Language Learning. In A. Rogers, J. Boyd-Graber, & N. Okazaki (Eds.), *Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)* (pp. 10184–10198). Association for Computational Linguistics. <https://doi.org/10.18653/v1/2023.acl-long.567>
- Fadillah, Y. A. (n.d.). *Strategi Desain Pembelajaran Adaptif Untuk Meningkatkan Pengalaman Belajar di Era Digital*.
- Harsono, A. M. B., Nafisah, A., Noorhapizah, N., Agusta, A. R., & Pratiwi, D. A. (2025). Peluang dan tantangan implementasi Personalisasi Pembelajaran berbasis Artificial Intelligence di Sekolah Dasar. *Borobudur Educational Review*, 5(2), 18–34. <https://doi.org/10.31603/bedr.14845>
- Hatima, Y. (2025). Integrasi Kearifan Lokal Dalam Pembelajaran Bahasa Indonesia Untuk Menumbuhkan Karakter Siswa Sekolah Dasar. *Journal of Humanities, Social Sciences, and Education*, 1(3), 24–39. <https://doi.org/10.64690/jhuse.v1i3.47>
- Hendarti, H. (2024). Problematika Pembelajaran Bahasa Indonesia Di Sekolah: Faktor Guru, Siswa, Serta Media Pembelajaran. *Inspirasi Dunia: Jurnal Riset Pendidikan Dan Bahasa*, 3(4), Article 4. <https://doi.org/10.58192/insdun.v3i4.2864>
- Hidayat, A., & Purwandari, R. D. (2025). Sistematisasi Review: Differentiated Learning Models for Diverse Students in Primary Schools. *Proceedings Series on Social Sciences & Humanities*, 25, 254–260.
- Hssina, B., & Erritali, M. (2019). A Personalized Pedagogical Objectives Based on a Genetic Algorithm in an Adaptive Learning System. *Procedia Computer Science*, 151, 1152–1157. <https://doi.org/10.1016/j.procs.2019.04.164>
- Lestari, F. Y., Rokhmawan, T., Aisyah, A., Makhrisa, R., & Amaliah, K. (2024). Revitalisasi Budaya Lisan Legenda Kiai Sepuh Desa Gentong Untuk Meningkatkan Kepekaan Siswa Sekolah Dasar. *Jurnal Pengabdian Sosial*, 1(11), Article 11. <https://doi.org/10.59837/ch4xwy73>
- Ma, Y., Tang, X.-J., & Huang, X. (2025). AI-Powered Adaptive English Language Learning Systems: Leveraging Deep Learning Algorithms and Natural Language Processing for Personalized Teaching Approaches. *IEEE Access*, 13, 153189–153198. <https://doi.org/10.1109/ACCESS.2025.3603602>
- Mahaswa, R. K., & Syaja, A. (2025). Questioning local wisdom in Indonesian Indigenous research. *Studies in History and Philosophy of Science*, 112, 170–178. <https://doi.org/10.1016/j.shpsa.2025.07.001>
- Nisa, K., Zahira, H., Hidayatullah, M. R., & Yaqien, M. Z. N. (2024). Menggali potensi Pembelajaran Bahasa Indonesia di Sekolah Dasar: Tantangan dan Inovasi. *Jurnal Ilmiah Madrasah*, 1(3). <https://doi.org/10.1886/jimad.v1i3.26259>

- Putri, A. Y., & Aisyah, D. L. (2025). Eksplorasi Pendekatan Culturally Responsive Teaching dalam Pembelajaran Bahasa Indonesia Kelas 2 di Sekolah Dasar. *Mutiara: Jurnal Ilmiah Multidisiplin Indonesia*, 3(3), 88–102. <https://doi.org/10.61404/mutiara.v3i3.413>
- Rachmatika, D., & Izzah, N. (2024). Interculturalism in Indonesian ELT. *New Language Dimensions*, 5(2), 115–122. <https://doi.org/10.26740/nld.v5n2.p115-122>
- Rehman, S. U. (2025). Adaptive Learning Systems for Personalized Language Instruction in Transnational Higher Education. In *Bridging Global Divides for Transnational Higher Education in the AI Era* (pp. 165–190). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-7016-2.ch008>
- Sabrina Sabrina, M.AppLing, Endah Anisa Rahmah, Jusnaini Hasni, Dedy Kurniawan, Teti Sumarni, Siswoyo, Elviani, M., Irsyadi, T., AlFath, M. S., & Mahlil. (n.d.). *TEACHING ENGLISH IN THE DIGITAL AGE Technology Integration and Contextual Approaches*. CV. EUREKA MEDIA AKSARA.
- Saldivar, J. M. N., & Fernandez, B. L. (2024). Concept Analysis of Adaptive Learning Strategy in English Language Teaching (ALS-ELT). *International Journal of Social Sciences and English Literature*, 8, 45–56. <https://doi.org/10.55220/2576683x.v8.231>
- Salim, N. S. M., Rajan, A., & Yunus, M. M. (2025). Bridging Global AI Innovations with Local ESL Classrooms: A Conceptual Framework for Adaptive Language Learning Tools. *Semarak Proceedings of Computer Science and Engineering*, 1(1), 41–56. <https://doi.org/10.37934/spcse.1.1.4156a>
- Saputra, E. E., Kasmawati, K., & Parisu, C. Z. L. (2025). Peran Kearifan Lokal dalam Meningkatkan Kompetensi Literasi Bahasa Indonesia Siswa Sekolah Dasar. *Journal of Character and Elementary Education*, 4(3), 13–23. <https://doi.org/10.35508/jocee.v4i3.22934>
- Sari, H. E., Tumanggor, B., & Efron, D. (2024). Improving Educational Outcomes Through Adaptive Learning Systems using AI. *International Transactions on Artificial Intelligence*, 3(1), 21–31. <https://doi.org/10.33050/italic.v3i1.647>
- Sfenrianto, S., Hartarto, Y. B., Akbar, H., Mukhtar, M., Efriadi, E., & Wahyudi, M. (2018). An Adaptive Learning System based on Knowledge Level for English Learning. *International Journal of Emerging Technologies in Learning (ijET)*, 13(12), 191–200. <https://doi.org/10.3991/ijet.v13i12.8004>
- ulviani, maria. (2022). *Bahan ajar*. insan cedekia mandiri.
- Wang, J., Nong, R., Liu, J., & Evans, L. (2025). *Adaptive Learning Systems: Personalized Curriculum Design Using LLM-Powered Analytics*. Research Square. <https://doi.org/10.21203/rs.3.rs-7210109/v1>
- Xia, Y., Shin, S.-Y., & Shin, K.-S. (2024). Designing Personalized Learning Paths for Foreign Language Acquisition Using Big Data: Theoretical and Empirical Analysis. *Applied Sciences*, 14(20), 9506. <https://doi.org/10.3390/app14209506>