

## DIGITAL TRANSFORMATION OF ARABIC LEARNING ENVIRONMENTS IN ISLAMIC HIGHER EDUCATION

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Received: January 2026. Accepted: March 2026. Online First: May 2026. Published: June 2026.

### ABSTRACT

Rapid digitalization has expanded opportunities for language learning in higher education, however, Arabic learning in Islamic higher education often remains fragmented, lecturer-centred, and weakly supported by institutional policy, limiting its effectiveness and sustainability. This study investigates how digitalization restructures Arabic language learning environments and identifies factors influencing their coherence and long-term development. Using a qualitative interpretive-exploratory multi-site design, the research was conducted at five Islamic higher education institutions in Southeast Sulawesi, Indonesia. Data were collected through classroom observations, in-depth interviews, focus group discussions, and document analysis involving lecturers, students, and institutional stakeholders. The data were analyzed through iterative coding, thematic interpretation, and contextual synthesis. The findings indicate that in formal settings, digitalization mainly functions as a supplementary tool that improves access to learning resources and Arabic input, but has not substantially transformed classroom interaction or pedagogy. In contrast, informal digital environments, particularly student-led and community-based platforms, extend language exposure and foster learner autonomy, although they remain fragmented and weakly institutionalized. Leadership commitment, infrastructure readiness, and digital literacy emerged as key factors shaping sustainability. The study concludes that digitalization should be understood as an environmental transformation rather than mere technology adoption. It recommends that Islamic higher education institutions develop integrated digital learning ecosystems through curriculum reform, staff development, governance support, and active student participation.

**Keywords:** Arabic Language Learning, Digital Learning Environment, Islamic Higher Education, Islamic Pedagogy, Language Learning Environment

### INTRODUCTION

Arabic language education occupies a distinctive position in Islamic higher education because it functions not only as an academic subject but also as a religious-intellectual medium for accessing Islamic texts, sustaining scholarly traditions, and supporting disciplinary study (Hudzaifah et al., 2021). In Indonesian Islamic Higher Education Institutions (IHEI), Arabic is commonly positioned as a compulsory curricular component and a foundational competence for students in religious and related academic fields. Despite this strategic role, previous studies consistently report limited learning outcomes, particularly in communicative competence, fluency, and functional language use (Saad et al., 2025). These limitations are frequently associated with restricted language exposure beyond classrooms and the absence of sustainable learning environments rather than instructional methods alone (Kamal, 2025; Taha Thomure et al., 2025).

These persistent challenges have become more urgent in the context of rapid digital transformation in higher education. Digital technologies have expanded learning opportunities through online interaction, asynchronous participation, mobile access, and multimodal resources that can support learner autonomy and collaboration (Jesudas & Mohammed, 2025; Mizan et al., 2024). In language education, digital environments are increasingly recognized as important spaces for extending learning beyond scheduled classes. However, much existing research focuses

on globally dominant languages and often conceptualizes digitalization primarily as the adoption of tools, platforms, or applications. As a result, Arabic language learning in Islamic higher education remains insufficiently examined from a systemic and environmental perspective (Ritonga et al., 2021).

Within Islamic higher education, Arabic learning is ideally embedded in a comprehensive linguistic environment known as *bi'ah al-lughawiyah*, which emphasizes continuous exposure and habitual language use across academic, social, and institutional domains (Abdul Rahman & Baharudin, 2023). In practice, however, such environments are frequently weakly institutionalized and depend heavily on individual lecturers, extracurricular programs, or isolated campus units (Pan et al., 2024). These limitations are often more visible in peripheral and regional institutions, where infrastructural constraints, uneven digital literacy, and organizational limitations hinder systematic development.

Conceptually, the central challenge extends beyond merely having access to digital tools. It revolves around the lack of comprehensive, integrated strategies that effectively align digitalization efforts with the fundamental environmental logic of language learning. Presently, many initiatives are fragmented and lack coherence, functioning more as isolated supplements to traditional classroom teaching rather than as components of a transformative, cohesive ecosystem. This ecosystem should seamlessly connect formal instruction, informal language practice, and governance structures to create a sustainable and dynamic learning environment (Brega & Kruglyakova, 2024; Mayer, 2025; Yin et al., 2025). Therefore, achieving sustainable Arabic learning necessitates a thorough consideration of how pedagogy, institutional policy, learner participation, and digital mediation interact and reinforce each other within a well-designed, coherent educational framework that supports ongoing language development and cultural engagement.

Previous studies in Islamic education contexts have examined blended learning, online teaching platforms, and academic management systems, yet these works largely prioritize technical efficiency or classroom methods rather than the relationship between institutional systems and Arabic learning environments (Ismail et al., 2024; Muhid & Arifin, 2025). Consequently, little empirical research has explored how leadership, institutional capacity, and stakeholder practices collectively shape sustainable digital Arabic learning ecosystems, particularly in regional IHEI contexts (Al Jamali & Abdalla, 2025).

In response to this gap, the present study investigates the digital transformation of Arabic language learning environments in five selected IHEI in Southeast Sulawesi, Indonesia, by examining current practices, institutional challenges, and educational contributions. The study conceptualizes digitalization as an environmental transformation process linking formal pedagogy, informal learning spaces, and institutional governance. By doing so, it seeks to refine language learning environment theory while providing contextually relevant guidance for strengthening Arabic education in Islamic higher education.

## METHOD

This study employed a qualitative multi-site interpretive-exploratory design to investigate the digital transformation of Arabic language learning environments in Islamic higher education. A qualitative approach was considered appropriate because the study aimed to understand practices, meanings, and institutional dynamics shaping digitalization rather than to measure variables quantitatively. The study was guided by an integrated conceptual framework combining language learning environment theory, *bi'ah al-lughawiyah*, and technology-enhanced networked learning perspectives, which emphasize sustained language exposure, meaningful interaction, habitual language use across formal and informal settings, and supportive institutional contexts (Abdul Rahman & Baharudin, 2023; Bots & Godwin-Jones, 2023; Kamal,

2025; Mayer, 2025; Shahini, 2025). The research was conducted in five IHEI in Southeast Sulawesi, Indonesia, comprising one public institution and four private institutions located in Kendari, Kolaka, Baubau, Wakatobi, and Raha. These institutions were selected purposively because they represented varied organizational capacities, infrastructural conditions, and academic cultures relevant to the study focus.

Participants were purposively selected and included Arabic lecturers, students, academic administrators, and other institutional stakeholders directly involved in Arabic language education and digital learning practices. Data were collected from both primary and secondary sources through classroom observations, in-depth semi-structured interviews, focus group discussions, and document analysis. Observations focused on classroom interaction, technology use, and language practices, while interviews and group discussions explored participant experiences, perceptions, and institutional challenges. Secondary sources included curricula, academic regulations, policy documents, and records of digital platforms used in Arabic instruction. The use of multiple sources enabled methodological triangulation and strengthened the credibility of findings across instructional, institutional, and experiential dimensions. Prior to data collection, participants were informed about the purpose of the study and provided voluntary consent, while confidentiality was maintained through anonymization where necessary.

Data analysis followed an iterative thematic procedure. All interview recordings and field notes were transcribed, organized, and reviewed repeatedly to develop familiarity with the dataset. Open coding was first employed to identify recurring patterns related to digital practices, learning environments, and institutional conditions, followed by axial coding to generate broader analytical categories. Themes were then refined through constant comparison across institutions, participant groups, and data sources. In the final stage, findings were interpreted through the adopted framework to explain relationships among pedagogy, informal learning spaces, and governance structures. A strength, weakness, opportunity, threat (SWOT) framework was used as a complementary interpretive lens to summarize institutional strengths, weaknesses, opportunities, and threats related to sustaining digital Arabic learning environments.

## **RESULTS AND DISCUSSION**

The findings reveal that the digital transformation of Arabic language learning environments across the five selected IHEI in Southeast Sulawesi was uneven and shaped by differing institutional capacities, leadership priorities, and learning cultures. Rather than following a uniform model, digitalization developed through varied combinations of formal classroom practices, informal student initiatives, and organizational support systems. The results are presented through seven interconnected themes covering institutional patterns, pedagogical practices, informal learning spaces, governance factors, educational contributions, ecosystem gaps, and typologies of digitalization. These themes highlight the complex and multifaceted nature of digital adoption in diverse institutional contexts.

### **Institutional Overview Across IHEI**

The findings reveal that the digitalization of Arabic language learning across the five selected Islamic Higher Education Institutions (IHEI) in Southeast Sulawesi followed differentiated rather than uniform institutional trajectories as shown in Table 1. Although all institutions formally included Arabic courses within their curricula, the scope, continuity, and pedagogical use of digital tools varied considerably. Document analysis showed that Arabic instruction was generally concentrated in the early semesters, except in institutions offering Arabic Language Education programs, where courses extended into later semesters.

Table 1. Institutional Overview across IHEI

Institution Type	Location	Formal Arabic Environment	Informal Support	Digitalization Level
Public IHEI	Kendari	Strong	Limited	Moderate
Private IHEI A*	Kolaka	Moderate	Pesantren-supported	Moderate
Private IHEI B*	Baubau	Limited	BTQ/community-based	Low
Private IHEI C*	Wakatobi	Basic	Independent/student-led	Low
Private IHEI D*	Raha	Moderate	Student community	Partial

Notes: Private institutions are anonymized for confidentiality

Table 1 shows cross-source evidence from observations, interviews, and institutional documents that further indicates differences in organizational capacity. The public IHEI generally demonstrated stronger formal support through more stable infrastructure and broader curricular provision, whereas private IHEI more frequently relied on flexible community-based initiatives, pesantren networks, or student-led learning practices to sustain Arabic exposure beyond classrooms. These findings suggest that digitalization developed through adaptation to existing institutional conditions rather than through a standardized transformation model.

Three broad institutional patterns emerged from the cross-case analysis. First, some institutions displayed relatively strong formal learning systems, such as structured curricula and dedicated language courses, yet offered limited opportunities for informal Arabic usage outside scheduled classes, which may affect overall language acquisition. Second, several institutions benefited from surrounding pesantren or religious-community ecosystems that naturally reinforced Arabic exposure through daily interactions, religious practices, and community activities, thereby creating a more immersive language environment. Third, some institutions relied heavily on student initiatives, peer-learning groups, and informal networks to support language development, especially in the absence of robust institutional systems, highlighting the importance of peer support in fostering language use and competence.

As one administrator explained, *“Digital learning is already encouraged institutionally, but implementation depends on the readiness of each study program and lecturer”* (Administrator, Personal Communication, March 2025). This statement was consistent with observations showing uneven use of learning management systems, digital assignments, and online communication platforms across campuses.

### Digitalization in Formal Learning Environments

In formal instructional settings, digitalization was primarily used to support existing teaching routines rather than to transform Arabic language pedagogy. Classroom observations across the five IHEI consistently showed lecturers using presentation slides, projectors, shared PDF materials, messaging applications, and assignment submission platforms. These tools improved access to learning materials and administrative communication, but were mainly employed for content delivery rather than for interactive or communicative language learning.

Across institutions, lecturers commonly functioned as the primary linguistic models by using Arabic partially or predominantly during instruction. However, classroom interaction remained largely lecturer-centred. Students typically responded briefly, took notes, completed grammar-focused exercises, or submitted digital assignments, while opportunities for peer

discussion, collaborative speaking tasks, and digitally mediated communication were limited. This pattern suggests that digitalization increased exposure to Arabic input but did not substantially reconfigure classroom participation structures.

As one lecturer explained, *“Technology helps me provide materials and communicate with students, but speaking practice still depends on what happens directly in class”* (Lecturer, Personal Communication, April 2025). Similarly, another lecturer from a private IHEI noted, *“Most online activities are still assignment-based because students’ language ability and internet access are uneven”* (Lecturer, Personal Communication, June 2025). These accounts were consistent with observation data showing that digital tools were present regularly but used mainly in supportive and managerial ways.

Cross-case comparison also indicated differences in implementation capacity. Public IHEI generally demonstrated more stable access to classroom technology and institutional platforms, whereas several private IHEI relied more heavily on low-cost mobile applications and lecturer initiative. Document analysis further showed that although some curricula referenced post-pandemic digital adaptation, digitalization was rarely articulated as an explicit objective of Arabic language learning. As a result, implementation remained uneven and strongly dependent on individual lecturers rather than a coherent institutional strategy.

### **Informal and Extended Arabic Learning Environments**

Beyond formal classrooms, informal and extended learning environments played a significant role in sustaining Arabic language exposure across the five IHEI. Evidence from focus group discussions, student interviews, observations, and digital communication records showed that many learners used WhatsApp groups, Telegram channels, and other social media platforms to share lecture materials, ask questions, discuss assignments, and occasionally practice written Arabic. These digital spaces functioned as supplementary learning environments where academic interaction continued beyond scheduled class hours.

Students frequently engaged in self-directed learning through peer communities and online communication networks that extended learning time and widened access to academic support. Although language use in these platforms was often mixed and non-standard, participants reported that such spaces increased confidence, encouraged experimentation with Arabic, and supported learner autonomy. As one student explained, *“We often use WhatsApp to ask about vocabulary, grammar tasks, or remind each other about assignments. Sometimes we try to write in Arabic, even if it is mixed with Indonesian”* (Student, Personal Communication, May 2025). This account was consistent with observation notes and screenshots showing active peer exchanges related to Arabic coursework.

In addition to digital peer interaction, several institutions benefited from non-formal religious and community-based environments such as pesantren networks, Qur’anic recitation groups, mosque learning circles, and *Ma’had al-Jami’ah* programs. These settings extended the principles of *bi’ah al-lughawiyah* by normalizing Arabic exposure within spiritually grounded daily activities. Digital media occasionally supported these environments through recorded lectures, instructional videos, and shared online resources. A stakeholder noted, *“Students gain more confidence using Arabic in dormitory and religious activities than in formal classes because the atmosphere feels more natural”* (Stakeholder, Personal Communication, July 2025).

Overall, triangulated evidence suggests that informal environments frequently compensated for the limited interactional opportunities available in formal classrooms. However, these spaces remained loosely coordinated, highly dependent on student motivation, and only partially connected to formal curricular goals. This reliance on informal settings underscores the importance of fostering motivation and engagement among students to optimize learning experiences outside the traditional classroom structure, highlighting a need

for integrating these informal interactions more systematically into the broader educational framework.

### **Institutional Enablers and Constraints**

The sustainability of digital Arabic language learning environments was strongly shaped by institutional leadership, infrastructure readiness, lecturer competence, curriculum support, and academic culture. Cross-site evidence from interviews, observations, and document analysis showed that implementation was not determined solely by technology availability, but by the extent to which institutional systems supported coherent pedagogical use.

Across the five IHEI, public institutions generally demonstrated stronger infrastructural readiness for digital Arabic language learning through more stable internet connectivity, greater availability of computer facilities, and access to language laboratories equipped with audio-visual resources. These conditions provided a more supportive foundation for integrating technology into Arabic instruction; however, observations and interview data indicated that such resources were not always used optimally because of scheduling conflicts, maintenance problems, limited technical support, and weak pedagogical integration into routine teaching practice, as shown in Table 2.

Table 2. Institutional Enablers and Constraints

<b>Institutional Factor</b>	<b>Main Finding</b>	<b>Effect on Arabic Learning Environment</b>
Infrastructure	Uneven internet, limited labs/devices	Restricted listening and speaking practice
Lecturer Capacity	Variable digital pedagogical competence	Uneven innovation and implementation
Leadership Support	Different levels of commitment	Fragmented or coordinated digitalization
Curriculum Policy	Digital goals weakly articulated	Lecturer-dependent practices
Academic Culture	Traditional formalism persists	Limited communicative transformation

In several cases, as can be portrayed from Table 2, laboratories functioned more as symbolic facilities than as regularly embedded spaces for listening, speaking, or interactive language learning. By contrast, infrastructural constraints were more visible in several private institutions, where limited budgets and fewer institutional facilities reduced opportunities for systematic digitalization. In these contexts, lecturers often relied on personal laptops, smartphones, mobile-phone-based applications, free online platforms, and other low-cost digital tools to sustain instruction. Although this reflected lecturer adaptability and commitment, it also meant that digital practices were frequently individualized, inconsistent, and dependent on personal initiative rather than institutional systems. These findings suggest that infrastructural availability alone does not guarantee effective digital transformation; sustainable implementation requires both adequate resources and organizational mechanisms that connect facilities to meaningful Arabic language pedagogy.

Differences in lecturer capacity also influenced implementation quality. Some lecturers demonstrated creativity in using multimedia resources, recorded pronunciation models, online quizzes, and digital communication platforms. Others continued to rely primarily on grammar-oriented instruction with minimal digital integration. Students were generally familiar with digital tools, yet their ability to use them for structured Arabic learning varied considerably. As one

lecturer explained, “*We have facilities, but not all lecturers are trained to integrate them effectively into Arabic teaching*” (Lecturer, Personal Communication, February 2025).

Leadership commitment emerged as another decisive factor. Institutions with proactive administrators and clearer academic direction were more likely to support training, platform subscriptions, and extracurricular innovation. In contrast, institutions that depended mainly on short-term programs, workshops, or individual lecturer initiatives tended to experience fragmented implementation and weak institutionalization of *bi'ah al-lughawiyah* in digital contexts. Overall, the findings suggest that sustainable digitalization requires coordinated governance, staff capacity development, and alignment between technological resources and pedagogical goals.

### **Educational Contributions**

Despite uneven implementation across institutions, the findings indicate that digitalization contributed positively to Arabic language learning in several interconnected ways. Evidence from interviews, observations, and document analysis showed that digital tools broadened access to learning resources beyond scheduled class hours. Students frequently used recorded lectures, digital texts, online dictionaries, YouTube explanations, and shared files to review lessons independently, particularly in institutions with limited contact hours.

Digital platforms also created additional spaces for communication and collaboration. Messaging applications enabled faster interaction among students and between students and lecturers regarding assignments, attendance, vocabulary clarification, and course-related questions. As one student explained, “*If I do not understand in class, I can ask later through Whats.App, so learning continues*” (Student, Personal Communication, August 2025). These platforms, therefore, extended academic interaction beyond the classroom and reduced dependence on face-to-face consultation alone.

Additionally, increased exposure to language through audio-visual media significantly enhanced students' learning experience. They had the opportunity to repeatedly listen to and observe authentic Arabic pronunciation models, engage with dialogues that mimicked real-life conversations, and access religious lectures and instructional videos that enriched their cultural and linguistic understanding. These resources were especially valuable in institutions where speaking practice opportunities were limited, providing a virtual immersion environment. Furthermore, digital assignments fostered reflective learning habits by encouraging students to review materials thoroughly, revise their work, meet deadlines efficiently, and develop greater independence in their learning process. In this regard, these methods contributed to a more comprehensive and self-directed approach to language acquisition.

At the institutional level, participants also reported that digital initiatives had increased awareness of the need for more integrated Arabic language learning environments. The growing use of digital tools encouraged reflection on curriculum design, resource provision, and lecturer capacity building. However, these contributions were generally supplementary rather than transformative, as digital practices often reinforced existing instructional routines instead of fundamentally reshaping pedagogy or classroom interaction. Overall, the depth of these benefits depended heavily on institutional support and purposeful pedagogical design

### **Persistent Fragmentation and Ecosystem Gaps**

Although digital practices were visible across all five institutions, the findings also revealed persistent fragmentation in the organization of Arabic language learning environments. Formal classrooms, informal student networks, and institutional governance systems frequently operated as separate domains rather than as interconnected components of a coherent learning ecosystem. In many cases, digital tools were introduced primarily as technical additions, such as

communication platforms, online assignments, or presentation media, without parallel redesign of pedagogy, language policy, or extracurricular structures that could sustain Arabic use beyond classrooms. As a result, formal instruction often remained isolated from student-led learning initiatives and broader institutional strategies.

This fragmentation was reflected in stakeholder perceptions and institutional documents. A stakeholder explained, “*Many activities exist, but they are not connected. Classes, student communities, and campus programs run on their own*” (Stakeholder, Personal Communication, September 2025). This statement was consistent with documentary evidence showing that while several institutions had separate digital initiatives, workshops, student organizations, or language programs, few had strategic plans explicitly linking these elements into an integrated Arabic digital learning environment. In practice, coordination across academic units, student affairs divisions, and extracurricular programs remained limited, reducing opportunities for continuity between formal and informal learning spaces.

As a consequence, the sustainability of digital Arabic learning environments remained vulnerable to leadership change, staff turnover, and fluctuations in financial or technological resources. Without stronger coordination and long-term policy commitment, many initiatives risked remaining temporary, project-based, or dependent on highly motivated individuals rather than institutional systems. These findings suggest that the central challenge was not simply the adoption of technology, but the absence of ecosystem-level integration across pedagogical practice, learner communities, and governance structures. Sustainable digital transformation, therefore, requires institutions to move beyond isolated innovations toward coordinated strategies that connect classrooms, student participation, and organizational support.

### Typologies of IHEI Digitalization Models

Cross-case comparison generated four typologies of digital Arabic learning environments across the studied IHEI, reflecting different combinations of institutional capacity, pedagogical practice, and community support as shown in Table 3.

Table 3. Typologies of IHEI Digitalization Models

Typology	Core Characteristics	Institutional Pattern
Institutionally Supported Formal Model	Strong infrastructure, structured formal learning, limited informal integration	Public IHEI
Community-Integrated Hybrid Model	Formal learning supported by pesantren/religious environment	Selected private IHEI
Lecturer-Driven Partial Model	Depends on individual lecturer initiative and creativity	Mixed IHEI
Resource-Constrained Informal Model	Student-led digital learning compensates for weak facilities	Peripheral private IHEI

Table 3 presents the cross-case findings that identified four distinct typologies of digital Arabic learning environments across the studied IHEI. The Institutionally Supported Formal Model was characterized by stronger infrastructure, broader curricular provision, and relatively organized formal instruction, although opportunities for informal Arabic use outside classrooms remained limited. By contrast, the Community-Integrated Hybrid Model combined formal classroom learning with support from pesantren, dormitory, or religious-community environments that reinforced Arabic exposure through daily interaction and socially embedded practice.

A third pattern, the Lecturer-Driven Partial Model, depended largely on the creativity and initiative of individual lecturers, resulting in uneven digitalization across courses and programs. In these settings, innovation was often present but lacked broader institutional coordination. Meanwhile, the Resource-Constrained Informal Model relied heavily on student communities, mobile communication, and self-directed learning because of limited institutional facilities and weak formal support systems.

Taken together, these typologies indicate that digitalization in Islamic higher education should be understood as a context-dependent environmental transformation rather than a uniform technological process. This perspective emphasizes that the integration of digital tools and methods must be tailored to the specific cultural, social, and institutional contexts of each setting. The findings suggest that sustainable Arabic learning ecosystems require a stronger alignment between formal pedagogy, informal language practice, institutional governance, and digital mediation, recognizing that successful adaptation depends on harmonizing technological advancements with traditional educational values and practices to foster genuine engagement and effective learning outcomes.

The findings reveal several strengths, including expanded access to Arabic learning resources, flexible interaction beyond classroom hours, and increased opportunities for learner autonomy. Digital platforms also enabled hybrid learning environments that extended *bi'ah al-lughawiyah* into online spaces. However, significant weaknesses remained, particularly uneven lecturer competence, fragmented implementation, limited Arabic-specific infrastructure, and dependence on individual initiatives rather than institutional systems.

The study also identified important opportunities, such as curriculum innovation, staff development, stronger collaboration networks, and integration of formal and informal Arabic learning spaces. At the same time, threats included leadership changes, unstable funding, weak policy continuity, and the persistence of traditional pedagogical cultures that may inhibit long-term transformation. These findings suggest that successful digitalization depends less on technology itself than on coherent governance, pedagogical redesign, and sustained institutional commitment.

The findings can be interpreted through the integrated framework adopted in this study, which combines language learning environment theory, *bi'ah al-lughawiyah*, and technology-enhanced networked learning perspectives. From a language learning environment perspective, effective Arabic acquisition depends on sustained linguistic input, meaningful interaction, opportunities for authentic use, and supportive institutional contexts rather than classroom instruction alone (Shahini, 2025). The uneven digitalization observed across IHEI, therefore, suggests that where digital tools were used mainly for content delivery, their contribution remained limited because communicative engagement and active learner participation were still weak. This supports the view that technology does not automatically generate effective learning environments unless it is pedagogically aligned with interactional language use and learner involvement (Bots & Godwin-Jones, 2023; Mayer, 2025).

From the perspective of *bi'ah al-lughawiyah*, Arabic learning is strengthened when learners experience continuous exposure and habitual language use across academic, social, and informal domains (Abdul Rahman & Baharudin, 2023; Kamal, 2025). The findings show that peer networks, pesantren communities, *Ma'had al-Jami'ah* activities, and digitally mediated student spaces functioned as hybrid ecosystems in which physical and online environments jointly supported Arabic practice. In addition, technology-enhanced networked learning explains how messaging platforms, social media, and shared digital resources expanded collaboration, learner autonomy, and continuity of learning across time and place (Bots & Godwin-Jones, 2023; Mayer, 2025). However, the persistent fragmentation among pedagogy, governance, and informal learning spaces indicates that sustainable digital Arabic learning

requires stronger integration between institutional policy, learner participation, and digitally supported language environments (Yin et al., 2025).

The findings demonstrate that the digitalization of Arabic language learning environments in Islamic higher education is neither a uniform nor purely technical process, but rather a complex pedagogical and institutional transformation. The differentiated patterns identified across IHEI in Southeast Sulawesi confirm that technological adoption is mediated by organizational capacity, leadership priorities, and existing educational cultures. This supports broader arguments that digital transformation in higher education depends not merely on access to tools, but on the alignment of technology with institutional systems and learning objectives (Ismail et al., 2024; Kovalchuk et al., 2025). In the context of Arabic learning, this also reinforces the view that language development requires sustained environmental support rather than isolated classroom intervention (Fitrinto, 2023; Shahini, 2025).

The results from formal learning environments indicate that digital tools were primarily used to reinforce existing instructional routines rather than to transform pedagogy. Presentation slides, shared documents, messaging platforms, and digital assignment systems improved access to materials and administrative communication, yet classroom interaction remained largely lecturer-centred. This finding resonates with earlier studies cautioning against equating the presence of technology with pedagogical innovation (Aldawood et al., 2023; Trivedi, 2024). Although lecturers' use of Arabic during instruction may increase linguistic exposure, communicative competence is unlikely to develop fully when opportunities for meaningful interaction remain limited (Hwang et al., 2024; Kamal, 2025).

These formal classroom patterns also reveal the persistence of grammar-oriented traditions in Arabic language teaching. Several institutions continued to emphasize rule-based exercises and lecturer explanation rather than collaborative speaking practice or problem-based communication tasks. This mirrors longstanding critiques of Arabic instruction that prioritize grammatical accuracy over communicative fluency (Ritonga et al., 2021; Taha Thomure et al., 2025). Therefore, the present study suggests that digitalization alone cannot improve Arabic learning outcomes unless accompanied by pedagogical redesign that values interaction, feedback, and authentic language use.

By contrast, the findings regarding informal and extended learning environments demonstrate that students actively constructed supplementary spaces for Arabic learning beyond scheduled class hours. WhatsApp groups, Telegram channels, peer networks, and social media functioned as micro-learning environments for sharing materials, discussing assignments, and experimenting with written Arabic. This supports networked learning perspectives, which hold that digital platforms can extend language learning across time, place, and social boundaries (Bots & Godwin-Jones, 2023; Mayer, 2025). Even when language use was mixed or non-standard, such environments appeared to strengthen confidence, autonomy, and continuity of practice.

The role of religious and community-based environments was equally significant. Pesantren networks, Qur'anic recitation groups, mosque circles, and *Ma'had al-Jami'ah* activities provided culturally grounded settings in which exposure to Arabic was embedded in daily spiritual and communal practice. This finding is particularly relevant to Islamic higher education because it extends the concept of *bi'ah al-lughawiyah* beyond formal classrooms into integrated socio-religious ecosystems (Abdul Rahman & Baharudin, 2023; Hanani & Ahid, 2024). Similar studies have shown that language environments become more sustainable when linguistic practice is linked to meaningful social participation and identity formation (Rusli et al., 2024).

The interaction between formal and informal environments highlights the need to conceptualize Arabic learning as an ecosystem rather than a series of disconnected teaching events. Where classroom interaction was limited, informal environments were often

compensated for by offering additional practice opportunities. However, because these spaces were weakly coordinated and heavily dependent on student motivation, their benefits were unevenly distributed. This supports research suggesting that informal learning environments can be highly productive but require institutional recognition and linkage to formal goals to become sustainable and equitable (Pan et al., 2024; Yin et al., 2025).

Institutional enablers and constraints emerged as decisive variables shaping the coherence of digital Arabic learning environments. Public IHEI generally possessed stronger infrastructure, including internet connectivity, laboratories, and institutional platforms, while several private IHEI relied on mobile-based improvisation and personal devices. Yet infrastructure alone did not guarantee quality implementation. Some facilities remained underused because of scheduling barriers, maintenance issues, or limited lecturer training. These findings align with broader higher education literature showing that digital readiness requires both technical and human capacity (Moreira-Choez et al., 2024; Parvez et al., 2023).

Lecturer competence and leadership support were particularly influential. Institutions with proactive administrators and clearer academic direction were more likely to provide training, subscriptions, or innovation incentives. In contrast, settings dependent on individual lecturer initiative experienced fragmented implementation. This confirms that leadership functions as a mediating force between technological resources and pedagogical outcomes (Muhid & Arifin, 2025; Anwar et al., 2025). In Islamic higher education contexts, where institutional missions combine religious and academic values, leadership also determines how digitalization is interpreted within local educational culture.

The educational contributions identified in this study were meaningful but conditional. Digitalization expanded access to learning resources, enabled faster communication, increased exposure to audio-visual Arabic input, and encouraged more independent learning habits. These benefits correspond with studies emphasizing flexibility, personalization, and networked interaction as key advantages of digital education (Duarte et al., 2025; Jesudas & Mohammed, 2025). However, the present findings also show that access expansion does not automatically produce stronger learning environments. Without curricular alignment and pedagogical planning, digital tools risk functioning only as supplementary conveniences.

A particularly important contribution of this study lies in the typologies of IHEI digitalization models. The identification of institutionally supported formal, community-integrated hybrid, lecturer-driven partial, and resource-constrained informal models demonstrates that digitalization follows multiple pathways depending on contextual conditions. This finding challenges one-size-fits-all modernization narratives and instead supports context-sensitive models of educational reform (Brega & Kruglyakova, 2024; Kovalchuk et al., 2025). For Islamic higher education institutions, policy transfer without sensitivity to local resources, community ecology, and institutional mission may therefore be ineffective.

From a theoretical perspective, the findings contribute to the integration of language learning environment theory, *bi'ah al-lughawiyyah*, and digital networked learning perspectives. Rather than replacing traditional environments, digitalization appeared to expand and intensify them through hybrid arrangements where formal teaching, informal peer learning, and institutional mediation intersected (Nasution et al., 2024). This refines the concept of *bi'ah al-lughawiyyah* by situating it not only in physical immersion contexts, but also in digitally mediated institutional ecologies (Almuqayteeb, 2025; Hehsan et al., 2024). Such a synthesis responds to calls for more holistic models of digital language learning that include environmental, social, and organizational dimensions.

At the same time, persistent fragmentation across pedagogy, policy, and extracurricular systems reveals a gap between theoretical ideals and empirical realities. Many digital initiatives remained dependent on short-term programs, enthusiastic individuals, or unstable leadership

commitment. This indicates that sustainable transformation requires ecosystem-level planning rather than isolated experimentation. Strategic integration should include curriculum redesign, lecturer professional development, Arabic-specific digital resources, and stronger links between classroom learning and community language practice (Nasution et al., 2025; Ritonga et al., 2024)

Overall, the study confirms that digitalization presents both opportunity and challenge for Arabic language education in Islamic higher education. Its success depends less on technology itself than on the interaction among pedagogical vision, learner participation, institutional governance, and culturally grounded language environments. By providing evidence from regional Indonesian IHEI, the study extends international discussions on digital transformation in language education and offers a transferable framework for developing sustainable Arabic learning ecosystems in comparable religious higher education contexts.

## CONCLUSION

This study concludes that the digitalization of Arabic language learning environments in Islamic higher education should be understood not merely as the adoption of technological tools, but as a broader environmental transformation shaped by pedagogy, institutional governance, learner participation, and sociocultural context. Across the five IHEI examined, digital practices expanded access to learning resources, supported communication beyond classroom boundaries, and strengthened opportunities for learner autonomy; however, their impact remained uneven because implementation was frequently fragmented, lecturer-dependent, and weakly integrated into institutional policy. Informal digital networks, pesantren-based environments, and community religious activities often compensated for limitations in formal classrooms, highlighting the continuing relevance of *bi'ah al-lughaniyyah* in both physical and digital forms. The study, therefore, emphasizes that sustainable Arabic language learning ecosystems require stronger alignment between curriculum design, lecturer capacity development, infrastructure readiness, leadership commitment, and the integration of formal and informal learning spaces. By offering empirical evidence and institutional typologies from regional Islamic higher education in Indonesia, this study contributes a context-sensitive framework for advancing digitally supported Arabic language education in comparable settings.

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