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Interactive Multimedia-Supported Indonesian Language Learning among Korean University Students

Agus Agus Sulaeman

agus.sulaeman@umt.ac.id

Universitas Muhammadiyah Tangerang

Kim Dong Hoon

Hankuk University of Foreign Studies

Frimadhona Sjafri

Semarang State University, Indonesia

Unpris Yastanti

. Bina Sarana Informatika University, Jakarta, Indonesia

Abed Tri Gumono

Pelita Harapan University, Indonesia

Goziyah Goziyah

Universitas Muhammadiyah Tangerang

Research Article

Keywords: interactive multimedia, Indonesian language learning, multimodal learning, Korean university students, technology-enhanced learning

Posted Date: November 19th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11394626/v1

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Additional Declarations: No competing interests reported.

Abstract

This study examined the learning performance of Korean university students in an interactive multimedia-supported Indonesian language learning course. The study employed a quantitative descriptive design involving 41 Korean university students enrolled in an Intermediate Indonesian Language course at a university in Korea. Interactive multimedia integrated text, images, audio, and video into the instructional process. Data were obtained from four assessment components: assignments, midterm examination (UTS), final examination (UAS), and attendance. Descriptive statistics and Pearson correlation analysis were used to examine students' performance patterns and relationships among assessment components. The results showed relatively high assignment performance (M = 87.95, SD = 15.42) and high attendance (M = 97.00, SD = 5.99), while the mean scores for UTS and UAS were 76.07 and 78.54, respectively. The strongest relationship was found between UTS and UAS scores (r = .877), whereas attendance showed weak relationships with assignment, UTS, and UAS scores. Overall, 68.3% of students received an A and 12.2% received a B. The findings suggest that students demonstrated generally strong and varied learning performance within the interactive multimedia-supported learning environment. However, the descriptive design does not establish a causal effect of multimedia on achievement. The study contributes empirical evidence to technology-enhanced and multimodal Indonesian language learning in Korean higher education.

1 Introduction

The rapid development of digital technologies has transformed higher education from predominantly text-based instructional environments into increasingly multimodal and technology-mediated learning spaces. Digital technologies now influence not only how instructional materials are delivered but also how learners access information, interact with content, construct knowledge, and demonstrate learning outcomes. In language education, this transformation has been particularly significant because language learning involves multiple modes of representation, including written text, visual information, audio input, video, and interaction. Consequently, technology-enhanced language learning has developed into an important interdisciplinary field connecting language education, educational technology, cognitive learning, and digital literacy [1, 2].

The integration of technology into language learning, however, should not be understood simply as replacing conventional instructional materials with digital media. Technology becomes pedagogically meaningful when its affordances are connected to learning objectives, instructional design, learner characteristics, and the nature of the content being taught. Chun [1] argues that technology changes not only the tools available to language teachers but also the contexts and forms of language use, teaching, and learning. Similarly, Shadiev and Yang [2], in their review of 398 studies of technology-enhanced language learning and teaching, demonstrated the breadth of technologies employed in language education while also identifying considerable variation in target languages, language skills, technological applications, and learning contexts. These findings indicate that technology-supported language learning

should be examined within specific educational and linguistic contexts rather than treated as a uniform pedagogical phenomenon.

Interactive multimedia represents one important form of technology-supported learning. Unlike conventional text-based materials, multimedia can combine written language, images, sound, animation, and video in an integrated learning environment. The theoretical basis for this approach can be linked to the Cognitive Theory of Multimedia Learning, which proposes that learners process information through partially independent verbal and visual channels and that meaningful learning occurs when learners actively select, organize, and integrate information with prior knowledge [3]. The theory provides a useful conceptual foundation for understanding why appropriately designed combinations of verbal and visual information may support learning. Nevertheless, multimedia design must also take account of cognitive processing limitations because excessive or poorly organized information can increase cognitive demands rather than facilitate learning.

Research in language education provides empirical support for the pedagogical relevance of multimedia while simultaneously demonstrating the importance of instructional design. Schmid [4], for example, examined multimedia use in English language classrooms supported by interactive whiteboard technology and showed that multimedia can provide important pedagogical affordances while also presenting potential drawbacks. Similarly, Tsai [5] demonstrated how multimedia courseware could be integrated into English for Specific Purposes instruction, with the design grounded in multimedia learning theory and language-learning principles. Liu et al. [6] further examined multimedia input among university-level ESL students and demonstrated that the relationship between multimedia design principles and learning is not necessarily straightforward. Such findings suggest that multimedia should be considered a pedagogical environment whose value depends on how different modes of representation are selected, combined, and integrated with instructional purposes.

Recent research has expanded this discussion from multimedia toward broader technology-enhanced language learning. A recent meta-analysis of 35 studies conducted between 2003 and 2025 reported positive overall effects of technology-enhanced L2 learning on academic achievement, while also identifying the importance of technology type and intervention duration as moderating conditions [7]. Likewise, reviews of mobile-assisted language learning have shown that technology can provide opportunities for flexible, contextualized, and learner-centered language learning, but methodological quality, learner readiness, accessibility, and instructional design remain important considerations [8, 9, 10].

The significance of technology becomes particularly relevant in foreign-language education, where learners often encounter limitations in their exposure to the target language outside the classroom. Digital multimedia can provide additional representations of the target language and create opportunities for learners to encounter language through authentic or semi-authentic combinations of text, sound, image, and video. Captioned video research, for example, has demonstrated that multimedia-supported input can contribute to L2 listening comprehension and vocabulary learning,

although the magnitude of the benefit varies according to proficiency level and assessment characteristics [11]. Digital multimodal composing research similarly indicates that language learning increasingly involves the production and interpretation of multimodal texts rather than exclusively conventional written texts [12, 13].

Despite the expansion of research on technology-enhanced language learning, a substantial proportion of the literature remains concentrated on English as a foreign or second language. Shadiev and Yang [2] found that English was by far the most frequently investigated target language in their review. Research on digital multimodal composing in post-secondary L2 contexts has likewise identified an underrepresentation of non-English language classrooms [12]. This creates an important research opportunity for less frequently investigated languages, including Indonesian as a foreign language.

Indonesian language education for international learners has expanded internationally through Bahasa Indonesia bagi Penutur Asing (BIPA), or Indonesian for Foreign Speakers. BIPA research has examined instructional methods, learning materials, cultural content, and learner needs. Fitria [14], for example, identified teaching methods, learners, instructional processes, media, and materials as important components and challenges in Indonesian language instruction for foreign learners. More recent bibliometric research has demonstrated increasing scholarly attention to BIPA and its international development, while also indicating opportunities for further research into instructional innovation and international learning contexts [15]. Research on industry-oriented BIPA materials has similarly emphasized the need to connect Indonesian language instruction with learners' communicative and contextual needs [16].

The Korean higher-education context provides a particularly meaningful setting for investigating Indonesian language learning because Korean university students encounter Indonesian not as their first language but as an additional language within an international educational environment. In such a context, instructional media may provide important opportunities to make linguistic forms, meanings, pronunciation, cultural references, and communicative situations more accessible. Nevertheless, the specific intersection of interactive multimedia and Indonesian language learning among Korean university students remains insufficiently represented in the international literature.

Accordingly, the present study positions interactive multimedia not merely as an instructional accessory but as a technology-supported learning environment for Indonesian language education. The study focuses on Korean university students learning Indonesian and examines their learning performance across multiple course assessment components within a higher-education context. Rather than claiming a causal effect of multimedia, the study provides empirical evidence from an authentic university learning environment and interprets the observed achievement patterns through the theoretical perspectives of multimedia learning, technology-enhanced learning, and digital language education.

The study therefore addresses an underexplored intersection between educational technology and Indonesian language education. By examining interactive multimedia-supported Indonesian language learning among Korean university students, the study contributes an international and interdisciplinary

perspective to the literature on technology-enhanced language education. It also extends the geographical and linguistic diversity of research that has traditionally focused heavily on English-language learning.

The aim of this study is to examine learning performance in an interactive multimedia-supported Indonesian language learning environment among Korean university students and to interpret the observed patterns in relation to technology-enhanced language learning and multimedia learning perspectives.

2 Literature Review

Technology-Enhanced Learning in Higher Education

Technology-enhanced learning refers broadly to the purposeful integration of digital technologies into learning and teaching processes. In higher education, such integration can involve multimedia, learning management systems, mobile devices, online platforms, digital storytelling, virtual environments, and other technology-mediated resources. The central issue is not simply the presence of technology but the pedagogical relationship between technology, content, learning activities, and learners.

Chun [1] conceptualized technology in language education broadly, emphasizing that technological media influence language use, communication, teaching practices, and learning processes. This perspective is particularly relevant to higher education because university students increasingly encounter learning resources through multimodal and digitally mediated environments. Shadiev and Yang [2], after reviewing 398 technology-enhanced language learning studies, showed that the field encompasses a wide range of technologies and language-learning purposes. Their review also demonstrated that research remains unevenly distributed across languages and skills, with English receiving substantially greater attention than other target languages.

The development of technology-enhanced learning also requires consideration of teachers' technological and pedagogical knowledge. Research on Technological Pedagogical Content Knowledge (TPACK) in language teaching indicates that successful technology integration requires more than technological competence alone. Tseng et al. [17], reviewing 51 studies, found that technology integration in language teaching is closely related to teachers' pedagogical knowledge, content knowledge, and ability to integrate technological tools meaningfully. Thus, technology should be regarded as part of an instructional system rather than an independent intervention.

Digital literacy is another important dimension. University learners increasingly need to access, interpret, evaluate, and communicate information through digital media. Pertiwi and Rojab Siti [18] found that digital literacy constitutes an important dimension of university-level language learning, while more recent higher-education research has connected digital literacy with pedagogical innovation, student engagement, and institutional conditions [19]. These perspectives strengthen the argument that

technology-supported language education belongs within broader discussions of educational technology and digital learning.

At the same time, technology does not automatically guarantee improved learning. Reviews of technology-supported language learning repeatedly identify challenges involving learner readiness, technological accessibility, teacher competence, connectivity, and the pedagogical appropriateness of digital tools. Metruk [20], for instance, identified internet connectivity, learner and teacher readiness, device limitations, and uneven development across language skills as recurring challenges in smartphone-based language learning. Consequently, technology-enhanced learning should be evaluated in relation to the specific learning environment in which it is implemented.

Interactive Multimedia and the Cognitive Theory of Multimedia Learning

Interactive multimedia is particularly relevant to language learning because language itself can be represented through multiple modes. A multimedia learning environment may combine written explanations, images, audio recordings, video demonstrations, animation, and interactive presentation elements. These modes can provide complementary information and potentially support learners in constructing connections between linguistic forms and meanings.

Mayer's Cognitive Theory of Multimedia Learning provides one of the principal theoretical foundations for understanding multimedia-based instruction. Mayer [3] explains multimedia learning in terms of learners' construction of mental representations from words and pictures. The theory assumes that humans possess separate but interacting channels for processing verbal and pictorial information and that each channel has limited processing capacity. Meaningful learning therefore depends on learners' active cognitive processing, including selecting relevant information, organizing it into coherent representations, and integrating it with prior knowledge.

The implications of this framework are especially relevant to foreign-language learning. Language learners may need to establish connections between unfamiliar linguistic forms and meanings. Visual representations can potentially provide contextual support for vocabulary and concepts, while audio and video can provide pronunciation, intonation, and contextualized language use. However, multimedia design must avoid unnecessary information and excessive cognitive load.

Empirical research demonstrates that multimedia effects depend on the form of representation and the characteristics of learners. Schmid [4] showed that multimedia use in language classrooms can provide pedagogical benefits but also create challenges. Liu et al. [6] found that established multimedia principles such as modality and redundancy cannot necessarily be generalized across all university ESL learners and learning situations. These findings are important because they discourage a simplistic assumption that adding more media automatically improves learning.

The development of interactive multimedia also extends beyond static presentation. Interactive materials may allow learners to navigate content, access audiovisual representations, repeat

explanations, and connect different forms of information. Such affordances may be particularly useful for foreign-language learning, where repetition, contextualization, and multiple representations can facilitate exposure to target-language input.

Recent evidence continues to support the importance of examining multimedia design conditions. Cromley and Chen [21], in a meta-analysis of multimedia learning research, found that the effects of multimedia design principles vary according to factors such as domain, learner characteristics, media type, and learning outcomes. This reinforces the view that multimedia learning should be interpreted contextually rather than as a universally uniform intervention.

Multimedia-Supported Language Learning

Language learning provides a particularly suitable context for multimedia because language is inherently multimodal. Learners may need to simultaneously process written forms, spoken language, visual context, gestures, and communicative situations. Multimedia can therefore create richer representations of language than text-only instructional materials.

Research on video-supported L2 learning provides evidence for this potential. Montero Perez et al. [11] conducted a meta-analysis of captioned video research and found measurable effects on L2 listening comprehension and vocabulary learning, while also identifying the importance of moderators such as test type and learner proficiency. This suggests that audiovisual materials can contribute to language learning when their design is aligned with learning objectives.

Multimedia can also support more active and productive forms of language learning. Tsai [5] demonstrated the use of multimedia courseware in ESP instruction, combining multimedia learning principles with language-specific instructional design. Similarly, digital storytelling research has shown that technology-supported multimodal production can integrate language learning with digital skills and collaboration [22]. Digital storytelling therefore illustrates a broader movement from learners as consumers of multimedia toward learners as participants in multimodal learning processes.

Digital multimodal composing is another important development. Zhang et al. [12], reviewing 60 empirical studies in tertiary L2 settings, found substantial interest in digital multimodal composing but also identified an underrepresentation of non-English language classrooms. Jiang and Hafner [13] consequently argued for a research agenda that recognizes digital multimodal composing as an increasingly important practice in L2 classrooms. These findings are highly relevant to the present study because they identify both the expansion of digital multimodality and a persistent gap concerning language diversity.

Technology-supported language learning also encompasses mobile and digital applications. Kukulska-Hulme and Shield [23] described the development of mobile-assisted language learning from content delivery toward interaction and collaboration, while Kukulska-Hulme [8] emphasized the potential of mobile learning to connect formal language learning with learners' surrounding environments. Mihaylova

et al. [9], through a meta-analysis of mobile-assisted language learning applications, reported positive effects on learning achievement but also identified concerns regarding risk of bias and the quality of evidence. More recent methodological research has continued to emphasize the importance of research design and statistical quality in technology-enhanced language learning [10, 24].

These findings collectively suggest that technology can support language learning through several mechanisms: multimodal input, contextualization, repetition, learner interaction, flexibility, and access to digital resources. Nevertheless, the pedagogical value of technology depends on the relationship between the technological affordances and the instructional objectives.

Digital Multimodality and Higher Education Language Learning

Higher education is an increasingly important context for multimodal language learning because university students are expected to engage with complex information through diverse media. Digital multimodality expands language learning beyond traditional textbook-centered instruction and can provide opportunities for learners to connect linguistic knowledge with visual, auditory, and contextual information.

Zhang et al. [12] found that tertiary digital multimodal composing research has been dominated by English-language contexts and that video-based projects are particularly common. Their findings suggest that digital multimodal learning is developing rapidly but that the linguistic diversity of research remains limited. This imbalance is important for the present study because Indonesian represents a less frequently researched target language within technology-enhanced language education.

Technology-mediated language learning also increasingly intersects with learner engagement and participation. Research on technology-mediated task-based language teaching indicates that technology can create meaningful contexts for language use, although challenges remain regarding access, teacher preparation, and learner engagement [25, 26]. Similarly, digital storytelling has been shown to connect language development with digital competence and collaborative learning [22]. Therefore, the use of interactive multimedia in higher education should be understood as part of a broader transformation toward multimodal, technology-mediated learning environments.

Indonesian Language Learning for Foreign Learners

Indonesian language learning for foreign learners presents a distinctive research context within the broader field of technology-enhanced language learning. The BIPA program has developed as an important mechanism for expanding Indonesian language education internationally. However, compared with English language education, international research on technology-supported Indonesian language learning remains comparatively limited.

Fitria [14] describes BIPA as a field involving diverse instructional approaches and challenges, including teaching methods, learners, instructional processes, media, and learning materials. This indicates that media selection is not a secondary consideration in BIPA but forms part of the instructional

environment. Syafruddin et al. [15], through bibliometric analysis, further documented the increasing scholarly attention to BIPA and the growing international relevance of Indonesian language education.

Recent studies have also emphasized the need for contextual and learner-oriented Indonesian language instruction. Yundayani et al. [16], for example, identified the importance of developing Indonesian language materials that respond to learners' professional and communicative needs. Other research has highlighted the role of cultural content and contextualization in BIPA instruction. Haliq et al. [27] examined culture-based Indonesian language programs and emphasized the relationship between language learning and contextual cultural knowledge.

However, these studies do not sufficiently address the intersection of interactive multimedia, higher education, and Indonesian language learning among Korean university students. This creates an opportunity to connect BIPA research with the wider international literature on educational technology.

Korean University Students and the Internationalization of Indonesian Language Education

The Korean higher-education context adds an important international dimension to Indonesian language learning. Korean university students learning Indonesian encounter a linguistic and cultural environment different from their first-language experience. Technology-supported multimedia can potentially provide contextualized representations that are difficult to reproduce through text-only instruction.

Research on technology-supported language learning in Asian contexts demonstrates that technology adoption is influenced by learner attitudes, digital readiness, perceived usefulness, and the characteristics of the learning environment. Faiqoh and Ashadi [28], for example, examined Indonesian university EFL learners' attitudes toward virtual learning environments through the Technology Acceptance Model. Metruk [29] similarly examined university EFL learners' perceptions of smartphone use in higher education and found that mobile technologies provide opportunities for language learning beyond conventional classroom settings.

The Korean context is therefore relevant not simply because students are technologically familiar but because technology-mediated language learning must operate across linguistic, cultural, and educational contexts. The present study does not assume that Korean students constitute a homogeneous group of technology users. Instead, their learning performance is examined within an actual Indonesian language course supported by interactive multimedia.

3 Methodology

Research Design

This study employed a quantitative descriptive research design to examine the learning performance of Korean university students participating in an interactive multimedia-supported Indonesian language course. The study was conducted within an authentic higher-education learning environment rather than under an experimental or controlled condition. Interactive multimedia was integrated into classroom

instruction throughout the semester through a combination of textual, visual, audio, and video materials designed to support Indonesian language learning. The study therefore focused on describing students' academic performance and identifying patterns among assessment components within the technology-supported learning environment.

A descriptive quantitative design was selected because the available data consisted of students' course assessment scores rather than pre-test/post-test measurements or experimental and control-group comparisons. Consequently, the study does not attempt to establish a causal effect of interactive multimedia on learning achievement. Instead, it provides empirical evidence concerning students' performance in an authentic multimedia-supported Indonesian language learning context.

Participants and Learning Context

The participants were 41 Korean university students enrolled in an Intermediate Indonesian Language course at a university in Korea. The course was delivered during one academic semester and incorporated interactive multimedia as part of the instructional process. The multimedia materials combined text, images, audio, and video within interactive presentation-based learning materials.

The course was designed to provide students with opportunities to engage with Indonesian language content through multiple modes of representation. The use of multimedia was integrated into regular classroom activities and was not introduced as a separate experimental intervention. Accordingly, all participants experienced the same general instructional context and assessment structure.

Data Sources and Assessment Components

The dataset consisted of students' scores obtained from four assessment components: assignments, midterm examination (UTS), final examination (UAS), and attendance. The assessment components were weighted according to the course assessment scheme as follows:

Assessment component	Weight
Assignment	20%
Midterm examination (UTS)	30%
Final examination (UAS)	40%
Attendance	10%
Total	100%

The final course score was calculated according to the institutional assessment scheme by combining the four components using their respective weights. Because the final score is mathematically derived from these components, the study does not treat the final score as an independent variable when

examining relationships among assessment components. This approach avoids statistical circularity and ensures that the interpretation of relationships is based on distinct assessment measures.

Data Analysis

The data were analyzed using descriptive and correlational statistical procedures. Descriptive statistics were calculated for each assessment component, including the mean, standard deviation, minimum, median, and maximum scores. These statistics were used to characterize the distribution of students' performance across assignments, UTS, UAS, and attendance.

The distribution of students' final achievement categories was also examined to provide a more interpretable description of overall course performance. Frequencies and percentages were calculated for each grade category. Pearson's product moment correlation coefficient was subsequently used to examine relationships among the four assessment components. Correlations were calculated only among the distinct assessment components Assignment, UTS, UAS, and Attendance and not between these components and the mathematically derived final score. This analysis was intended to identify patterns of association among different dimensions of course assessment rather than to establish causal relationships.

The results were presented using descriptive tables, correlation analysis, and graphical representations of students' performance distributions. The interpretation emphasized patterns within the multimedia-supported learning environment and was linked to the theoretical perspectives of multimedia learning and technology-enhanced language learning.

4 Results

Overview of Students’ Learning Performance

The analysis included assessment data from 41 Korean university students enrolled in the Intermediate Indonesian Language course. Students’ learning performance was examined across four assessment components: assignments, the midterm examination (UTS), the final examination (UAS), and attendance. The assessment components were weighted at 20%, 30%, 40%, and 10%, respectively. The descriptive analysis focused on the distribution of scores across these components to identify general patterns of student performance within the interactive multimedia-supported learning environment.

Table 1
Descriptive Statistics of Students' Assessment Scores (N = 41)

Assessment component	Weight	Mean	SD	Minimum	Median	Maximum
Assignment	20%	87.95	15.42	0	90.00	100
UTS	30%	76.07	20.64	0	80.00	100
UAS	40%	78.54	21.24	0	88.00	98
Attendance	10%	97.00	5.99	71	100.00	100

The results indicate that students demonstrated relatively strong performance in assignments, with a mean score of 87.95. The median assignment score was 90, indicating that at least half of the students achieved scores at or above this level. Assignment performance ranged from 0 to 100, with a standard deviation of 15.42. The zero score represents an observed value in the original assessment data and was retained in the analysis rather than being reclassified as missing data.

The mean UTS score was 76.07 (SD = 20.64), while the mean UAS score was 78.54 (SD = 21.24). Compared with assignments, both examination components displayed greater score variability. The median UTS score was 80, whereas the median UAS score was 88, suggesting that the distribution of UAS performance was relatively concentrated toward higher scores despite the presence of several low scores. The maximum UAS score was 98.

Attendance showed the highest mean score among all assessment components (M = 97.00, SD = 5.99). The median attendance score was 100, and the maximum was also 100. Overall, the attendance data showed substantially less variability than the examination and assignment scores.

Distribution of Final Grades

The final grade distribution provides an additional description of students' overall course performance. As shown in Table 2, 28 of the 41 students (68.3%) received an A, five students (12.2%) received a B, seven students (17.1%) received a C, and one student (2.4%) received an E.

Table 2
Distribution of Final Grades (N = 41)

Final grade	Frequency	Percentage
A	28	68.3%
B	5	12.2%
C	7	17.1%
E	1	2.4%
Total	41	100.0%

The distribution shows that the largest proportion of students achieved an A grade. A and B grades together accounted for 80.5% of the students, whereas 19.5% received either a C or E. The pattern indicates substantial variation in overall course achievement, although the distribution was concentrated in the upper grade categories.

Relationships Among Assessment Components

Pearson correlation analysis was conducted to examine relationships among the four distinct assessment components. The final course score was excluded from this correlation analysis because it is mathematically derived from the same assessment components and therefore does not constitute an independent measure.

Table 3
Pearson Correlations Among Assessment Components

Assessment component	Assignment	UTS	UAS	Attendance
Assignment	1.000	.647	.696	.077
UTS	.647	1.000	.877	.153
UAS	.696	.877	1.000	.212
Attendance	.077	.153	.212	1.000

The strongest relationship was observed between UTS and UAS scores (r = .877), indicating a strong positive association between students' midterm and final examination performance. Students who obtained relatively high scores on the midterm examination tended also to obtain relatively high scores on the final examination.

A moderately strong positive relationship was also observed between assignment and UAS performance (r = .696), followed by the relationship between assignment and UTS performance (r = .647). These

patterns indicate that students' performance across assessed academic tasks tended to be positively associated.

In contrast, attendance showed relatively weak relationships with the three academic assessment components. The correlation between attendance and assignment scores was r = .077, while correlations with UTS and UAS were r = .153 and r = .212, respectively. Thus, within this dataset, attendance varied relatively independently from examination and assignment performance.

Overall Pattern of Assessment Performance

Taken together, the descriptive findings reveal three notable patterns. First, assignment performance was relatively high, with a mean of 87.95. Second, examination scores were lower on average than assignment scores and exhibited greater variability, particularly for the UAS (SD = 21.24). Third, attendance was consistently high, with a mean of 97.00 and a median of 100.

The correlation findings further demonstrate that academic assessment components were not equally related to one another. The strongest association occurred between UTS and UAS scores (r = .877), whereas attendance demonstrated only weak positive associations with the academic performance measures. This suggests that examination performance was more closely aligned across the two examination occasions than with attendance.

The boxplot in Fig. 4 further illustrates the differences in score distributions and variability among the assessment components. In particular, the examination scores show broader dispersion than attendance, while assignment scores are generally concentrated in the upper score range.

Overall, the results provide a descriptive profile of learning performance within the interactive multimedia-supported Indonesian language course. The findings demonstrate substantial participation and generally high achievement across the class, while also revealing meaningful variation in examination and assignment performance. These empirical patterns provide the basis for interpreting how interactive multimedia-supported learning may be understood within broader research on technology-enhanced and multimodal language education.

5. Discussion

The findings provide an empirical profile of Korean university students' learning performance in an interactive multimedia-supported Indonesian language course. Three patterns are particularly noteworthy: the relatively high performance on assignments, the strong positive relationship between midterm and final examination scores, and the comparatively weak relationships between attendance and the academic assessment components. These patterns should be interpreted within the

characteristics of technology-enhanced and multimodal learning rather than as evidence of a direct causal effect of interactive multimedia. The findings are particularly relevant to understanding how multimedia-supported instructional environments may provide multiple forms of representation and engagement in foreign-language learning.

High Assignment Performance and Multimodal Learning

The first notable finding concerns the relatively high level of assignment performance. Students obtained a mean assignment score of 87.95 (SD = 15.42), with a median of 90. This performance was higher than the mean scores obtained on both the UTS (M = 76.07) and UAS (M = 78.54). Although the present design does not allow this pattern to be attributed directly to multimedia use, the finding is consistent with theoretical perspectives emphasizing the value of presenting learning content through multiple representational modes.

Interactive multimedia combines textual, visual, auditory, and video information within an integrated learning environment. From the perspective of the Cognitive Theory of Multimedia Learning, appropriately coordinated verbal and visual representations can support learners in selecting, organizing, and integrating relevant information [3]. The potential value of multimedia therefore does not simply arise from the presence of technology, but from how different modes are organized to support meaningful learning processes.

The relatively high assignment performance observed in this study may be interpreted in relation to this multimodal learning environment. Assignments potentially provide students with greater opportunities to revisit instructional materials, process information at their own pace, and apply language knowledge through contextualized tasks. Previous research on multimedia and technology-supported language learning has similarly emphasized the potential of digital materials to provide learners with access to multiple forms of linguistic input and opportunities for repeated engagement [4, 11, 23].

This interpretation is also consistent with research emphasizing the importance of multimodality in language education. Multimedia environments can expose learners to combinations of written language, visual information, spoken language, and audiovisual contexts that are difficult to reproduce through text-only instruction [1, 20, 29]. In the context of Indonesian language learning, such multimodal representation may be particularly relevant because foreign-language learners encounter not only vocabulary and grammatical structures but also contextual meanings, pronunciation, interactional patterns, and sociocultural information.

The finding should nevertheless be interpreted cautiously. A high assignment mean does not demonstrate that interactive multimedia itself produced higher assignment performance. Assignment scores may also reflect students' prior knowledge, task characteristics, instructional support, motivation, or opportunities for revision. The contribution of the present finding is therefore descriptive: it demonstrates that students generally performed strongly on assignment-based assessment within the multimedia-supported course.

Examination Performance and Continuity of Learning

The second important finding is the strong positive correlation between UTS and UAS scores (r = .877). This was the strongest association among all pairs of assessment components. The result suggests substantial consistency in students' examination performance across the semester. Students who performed relatively well in the midterm examination tended also to perform relatively well in the final examination.

This pattern can be understood in relation to the cumulative nature of language learning. Language development generally involves the continued accumulation and integration of previously learned linguistic knowledge. Vocabulary, grammatical knowledge, comprehension, and communicative competence are not entirely independent skills; consequently, performance at one point in a course may be related to subsequent performance.

Technology-enhanced learning environments may support this continuity by providing learners with repeated access to instructional representations. Digital and multimedia materials can allow students to encounter related content through different modes and at different points during the learning process. Research on technology-supported language learning has emphasized the importance of learner access, repeated exposure, and flexible engagement with digital materials [5, 6, 8]. Similarly, research on technology-enhanced language learning has reported that digital environments can facilitate continued interaction with language input beyond a single classroom encounter [17, 24].

The strong UTS–UAS relationship may therefore indicate continuity in individual learning performance within the course. However, this interpretation should not be confused with evidence that multimedia caused students' examination performance. The correlation indicates association, not causation. Moreover, because the UTS and UAS are both formal examinations administered within the same course, their strong relationship may partly reflect relatively stable individual differences in students' academic preparation and language proficiency.

The result nevertheless has pedagogical significance. It indicates that students' performance was relatively coherent across two major examination points. The finding is also compatible with the view that technology-supported instruction is most useful when multimedia resources are integrated continuously into the broader learning process rather than treated as isolated technological additions. Interactive materials become pedagogically meaningful when they are connected to instructional objectives, classroom activities, and assessment practices.

Relationships Between Assignment, UTS, and UAS Performance

In addition to the strong UTS–UAS relationship, the analysis identified positive relationships between assignment scores and both UTS (r = .647) and UAS (r = .696). These findings indicate that performance on coursework activities tended to correspond with performance on formal examinations.

The pattern supports the broader principle of alignment between learning activities and assessment. When assignments are connected to the knowledge and skills assessed in examinations, students' performance across these components may become positively associated. Technology-enhanced learning can support such alignment by enabling instructional materials, classroom activities, independent tasks, and assessment preparation to draw on related content and representations.

Research on digital language learning has emphasized that technology is most pedagogically meaningful when it is integrated with instructional design rather than used merely as an additional delivery mechanism [12, 30, 31]. Interactive multimedia can provide a shared representational environment in which language input is presented, practiced, and revisited across different activities. In this respect, the positive relationships observed in the present study may reflect coherence between students' engagement with course tasks and their performance in formal assessments.

The correlation between assignment and UAS scores ($r = .696$) was somewhat stronger than the relationship between assignment and UTS scores ($r = .647$). One possible interpretation is that students' accumulated engagement with coursework may have been reflected more clearly in later examination performance. However, this interpretation remains tentative because the study did not directly measure students' exposure to or engagement with individual multimedia resources.

The findings also reinforce the importance of distinguishing descriptive association from causal explanation. The data show that students who performed strongly in one academic component tended generally to perform strongly in other academic components. They do not establish that assignments caused examination performance or that multimedia produced the observed relationships.

High Attendance but Weak Attendance–Achievement Relationships

A particularly interesting finding concerns attendance. Attendance had the highest mean score ($M = 97.00$, $SD = 5.99$), with a median of 100. Despite this high level of attendance, its relationships with assignment, UTS, and UAS scores were weak: $r = .077$, $r = .153$, and $r = .212$, respectively.

This pattern is important because it demonstrates that attendance and academic achievement represent different dimensions of learning participation. A student may attend classes regularly without necessarily obtaining the highest assessment scores, while another student may achieve relatively strong academic results without perfect attendance. Attendance is therefore an indicator of participation opportunity, but it should not automatically be interpreted as equivalent to learning achievement.

The finding can be considered within broader research on technology-enhanced learning, where learning may involve activities that extend beyond physical classroom attendance. Digital materials, multimedia resources, and technology-supported learning environments can provide learners with opportunities to review and interact with content outside the immediate classroom context [2, 8]. Consequently, the relationship between physical attendance and academic performance may become less straightforward when students have access to instructional resources in multiple formats.

At the same time, the weak correlations should not be interpreted as evidence that attendance is unimportant. Attendance may create opportunities for interaction, explanation, feedback, and collaborative learning that are not captured directly by the assessment variables. Rather, the present findings suggest that attendance alone is insufficient to explain variation in students' academic performance.

This observation is particularly relevant for multimedia-supported language education. Interactive learning involves more than simply being physically present in class. Learners must attend to instructional representations, process linguistic information, participate in activities, practice language forms, and integrate new information with existing knowledge. The distinction between attendance and achievement is therefore consistent with theoretical approaches that conceptualize learning as an active cognitive and social process rather than as simple exposure to instruction.

Overall Grade Distribution and Heterogeneity of Learning Performance

The final-grade distribution provides additional evidence of variation among the students. Of the 41 participants, 28 students (68.3%) received an A, five (12.2%) received a B, seven (17.1%) received a C, and one student (2.4%) received an E. Thus, although the largest group of students achieved high final grades, the distribution also demonstrates heterogeneity in learning outcomes.

This variation is important in interpreting technology-supported language learning. Multimedia does not necessarily produce identical learning experiences or outcomes for all learners. Students enter technology-enhanced environments with different levels of prior knowledge, digital experience, learning strategies, motivation, and language proficiency. Research on digital language learning has repeatedly emphasized the importance of learner characteristics and the ways in which students interact with technological resources [5, 6, 24].

The presence of students with lower grades therefore should not automatically be interpreted as a failure of the multimedia-supported learning environment. Instead, it indicates that a technology-supported instructional environment accommodates learners whose academic trajectories may differ. This observation reinforces the importance of instructional scaffolding, formative feedback, differentiated support, and careful multimedia design.

The findings also connect with research emphasizing that multimedia should be designed according to cognitive and pedagogical principles. Simply increasing the number of media formats does not necessarily guarantee better learning. Excessive or poorly coordinated information can increase cognitive demands, whereas well-organized multimedia can support learners' construction of meaningful mental representations [3]. Consequently, the pedagogical value of interactive multimedia depends on instructional design, task relevance, and the extent to which different modes complement rather than compete with one another.

Implications for Indonesian Language Education in Korean Higher Education

The present findings contribute to the relatively specific context of Indonesian language education among Korean university students. Much research on technology-enhanced language learning has focused on major international languages, while Indonesian as a foreign language remains comparatively less represented in technology-oriented higher-education research. The current study therefore extends the discussion of multimodal and technology-supported language education to an Indonesian-language learning context.

For Korean university learners, Indonesian is learned within an international and intercultural educational environment. Interactive multimedia provides a means of connecting linguistic forms with contextualized visual, auditory, and audiovisual information. Such integration is potentially useful for foreign-language learners because language learning involves understanding not only linguistic structures but also how language operates in particular communicative and cultural contexts.

This interpretation corresponds with research highlighting the role of digital technologies and multimodal resources in expanding the possibilities of language learning beyond conventional text-based materials [1, 2, 29]. It also supports recent work emphasizing the continued development of technology-enhanced language education and digital literacy in higher education [10, 19, 21, 26].

The study therefore positions interactive multimedia not simply as a technological tool but as part of an instructional environment in which language information can be represented through multiple modes. This conceptualization is consistent with the broader movement toward digitally mediated, multimodal, and technology-enhanced learning in higher education.

Theoretical and Pedagogical Implications

The findings have several implications for research and teaching. Theoretically, the study supports the relevance of multimodal learning perspectives to Indonesian language education by demonstrating how assessment patterns can be examined within a technology-supported learning environment. The results are consistent with the proposition that multimedia can provide multiple representational pathways for learning, while also emphasizing that technology alone does not determine learning outcomes.

Pedagogically, the findings suggest the value of integrating text, images, audio, and video into coherent learning sequences. Interactive multimedia can be particularly useful when materials are connected to assignments and assessment tasks. Teachers may therefore consider designing multimedia resources that provide contextualized language input, opportunities for repeated exposure, and connections between classroom activities and independent learning.

The findings also suggest that assessment should remain multidimensional. The relatively weak relationships between attendance and academic assessment indicate that physical participation should not be treated as a direct substitute for evidence of learning. Combining coursework, examinations, participation, and other forms of assessment may provide a more comprehensive representation of students' learning performance.

Finally, the strong relationship between UTS and UAS scores suggests the importance of monitoring students' performance progressively throughout a course. Early assessment results may help instructors identify students who require additional academic support before the final stage of the course. In a multimedia-supported environment, such support could include targeted review materials, additional audiovisual examples, guided practice, or supplementary interactive activities.

Limitations and Directions for Future Research

Several limitations should be acknowledged. First, the study employed a descriptive quantitative design involving 41 Korean university students from one Indonesian language course. Consequently, the findings should be interpreted as context-specific rather than generalized to all Indonesian language learners or higher-education contexts.

Second, the study did not employ a pre-test/post-test design, an experimental control group, or a comparison between different instructional conditions. Therefore, the observed assessment patterns cannot establish that interactive multimedia caused changes in students' learning achievement. Future research could employ quasi-experimental or mixed-methods designs to compare multimedia-supported instruction with alternative instructional conditions.

Third, the dataset consisted primarily of course assessment scores. It did not include detailed measures of students' actual interaction with individual multimedia materials, such as viewing time, frequency of access, type of resource used, or students' perceptions of usability and engagement. Future studies could combine achievement data with learning analytics, questionnaires, interviews, classroom observations, or student-produced learning artifacts.

Finally, future research could examine whether different types of multimedia representation—such as video, audio, interactive presentation, visual vocabulary support, or contextualized audiovisual materials—are associated with different aspects of Indonesian language development. Such research would provide a more fine-grained understanding of how multimodal technology can be integrated into Indonesian language education for foreign learners.

Overall, the findings indicate that students in the interactive multimedia-supported Indonesian language course demonstrated generally strong assignment performance, substantial consistency between midterm and final examination performance, and high attendance accompanied by relatively weak attendance–achievement relationships. These patterns provide empirical evidence of learning performance within a technology-enhanced Indonesian language learning environment while avoiding an unsupported causal interpretation. The findings consequently contribute to the growing discussion of interactive multimedia, multimodality, and technology-enhanced learning in higher education, particularly within the underexplored context of Indonesian language education for Korean university students.

6 Conclusion

This study examined the learning performance of 41 Korean university students enrolled in an Intermediate Indonesian Language course supported by interactive multimedia. The findings provide a descriptive account of students' academic performance across assignments, midterm examinations, final examinations, and attendance, while also examining the relationships among these assessment components.

The results indicate that students demonstrated relatively strong performance in assignment-based learning, with a mean score of 87.95, while the mean scores for the midterm and final examinations were 76.07 and 78.54, respectively. Attendance was consistently high, with a mean of 97.00. The final grade distribution also showed considerable concentration in the upper categories, with 68.3% of students receiving an A and 12.2% receiving a B. At the same time, the distribution demonstrated variation in achievement, with 17.1% receiving a C and 2.4% receiving an E.

The correlation analysis revealed a strong positive relationship between UTS and UAS performance ($r = .877$), while assignment scores were moderately to strongly associated with UTS ($r = .647$) and UAS ($r = .696$) performance. In contrast, attendance showed only weak relationships with assignment, UTS, and UAS scores. These findings suggest that academic performance across formal assessment components was more closely interconnected than attendance and academic achievement.

Within the context of technology-enhanced language education, these patterns can be understood as consistent with the potential of interactive multimedia to provide learners with multiple forms of linguistic representation through text, images, audio, and video. However, because the study employed a descriptive design without a control group or pre-test/post-test comparison, the findings do not establish a causal relationship between interactive multimedia and students' achievement. Instead, the study demonstrates how students' learning performance was distributed and interconnected within an authentic multimedia-supported Indonesian language learning environment.

The study contributes to research on technology-enhanced language education by extending the discussion of interactive multimedia and multimodal learning to Indonesian language learning among Korean university students. It also highlights the importance of examining learning performance through multiple assessment dimensions rather than relying on a single indicator such as attendance or final course scores. For Indonesian language educators in higher education, the findings support the pedagogical relevance of integrating multimodal instructional materials with coursework, classroom activities, and assessment practices.

Future research should employ larger and more diverse samples and incorporate comparative, longitudinal, quasi-experimental, or mixed-methods designs. Further studies could also examine students' actual interaction with different multimedia resources, their perceptions of multimedia-supported learning, and the relationship between specific types of multimedia representation and particular Indonesian language skills. Such research would provide stronger evidence concerning the mechanisms through which interactive multimedia may contribute to foreign-language learning.

In conclusion, the present study provides empirical evidence of generally strong and varied learning performance among Korean university students in an interactive multimedia-supported Indonesian language course. The findings reinforce the relevance of multimodal and technology-enhanced approaches to Indonesian language education while highlighting the need for further research capable of examining their pedagogical contributions through more rigorous comparative and longitudinal designs.

Declarations

Acknowledgments

The authors sincerely appreciate the contributions of the participating institutions, students, lecturers, and academic colleagues whose cooperation and support facilitated the implementation of the Indonesian language learning activities and the completion of this study.

Funding

This research received no external funding

Ethics approval

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Human Research Ethics Committee of Universitas Muhammadiyah Tangerang (Reference Number: 071/KET/III.AU/LPPM/2026; Approval Date: May 23, 2025; Expiration Date: September 23, 2025). Written informed consent was obtained from all participants involved in this study prior to data collection.

Consent to participate

Persetujuan setelah mendapatkan informasi (informed consent) telah diperoleh dari seluruh peserta yang terlibat dalam penelitian ini. Para peserta telah diberi penjelasan mengenai tujuan penelitian, penggunaan data penilaian pembelajaran mereka untuk kepentingan riset, serta kerahasiaan informasi mereka. Partisipasi bersifat sukarela, dan para peserta telah diberitahu bahwa keputusan mereka untuk berpartisipasi tidak akan memengaruhi status akademik maupun penilaian mata kuliah mereka.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy and confidentiality considerations relating to the student participants.

Competing interests

The authors declare that they have no competing interests that could have influenced the work reported in this study.

Author contributions

All authors contributed to the development of this study. The authors contributed to the study conception and design, data collection, data analysis and interpretation, and preparation of the manuscript, as applicable to their respective roles. All authors reviewed and revised the manuscript, approved the final version, and agreed to be accountable for their contributions to the work.

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Figures

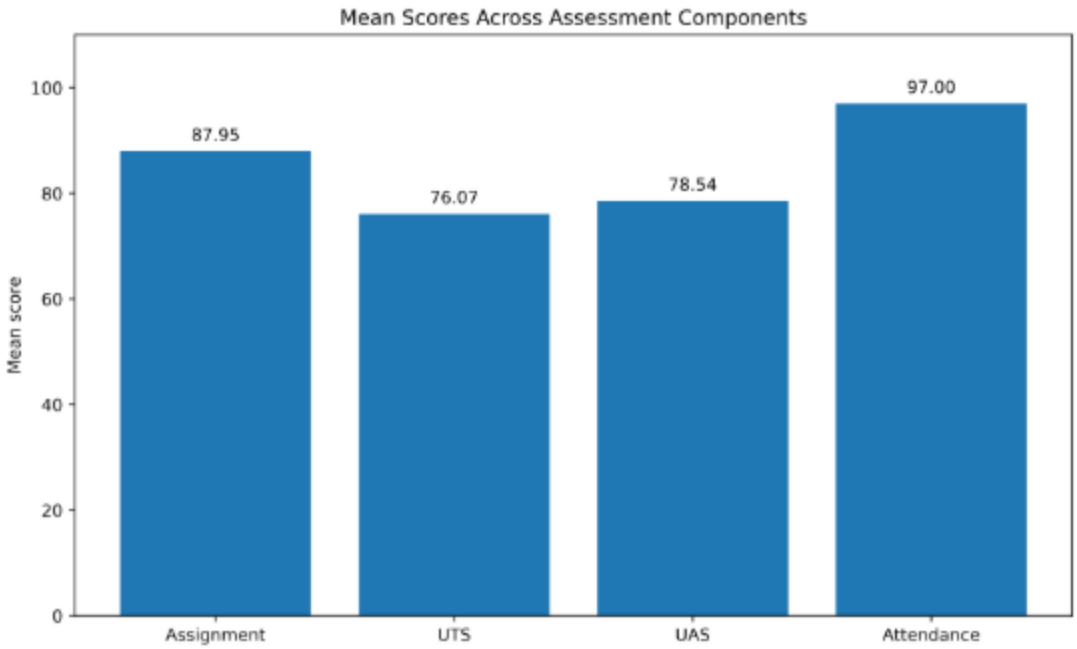


Figure 1

Mean Scores Across Assessment Components.

Note. Data source: students' assessment records from the Intermediate Indonesian Language course.

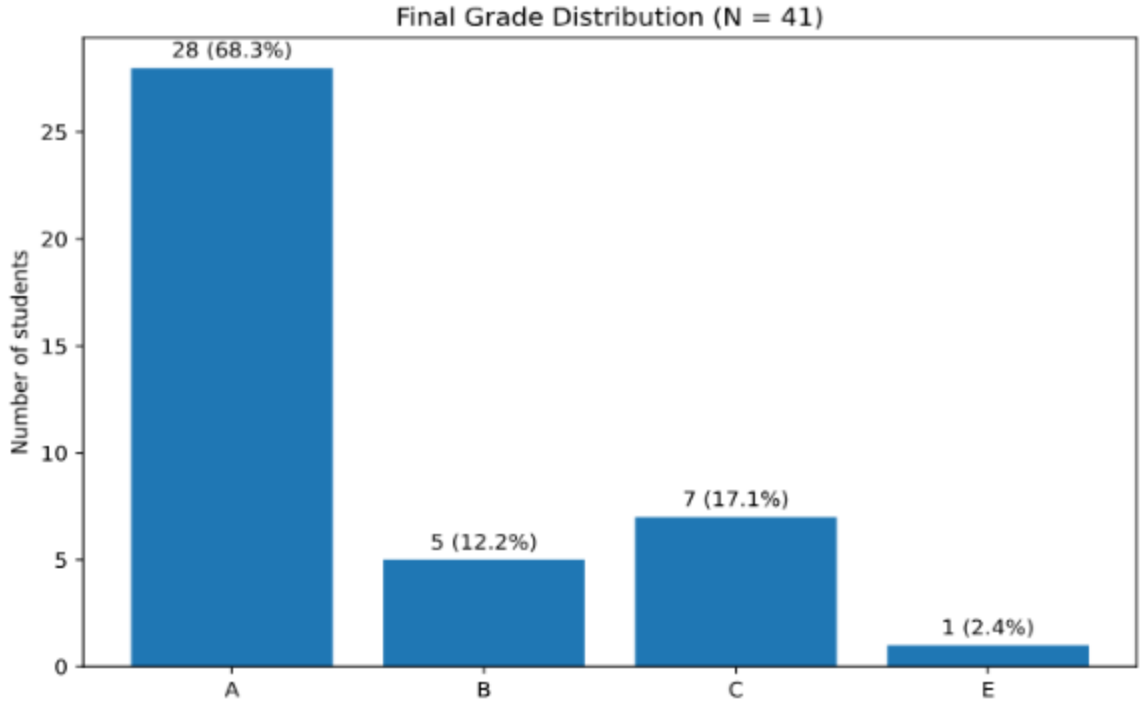


Figure 2

Final Grade Distribution (N = 41).

Note. Data source: students' final assessment records.

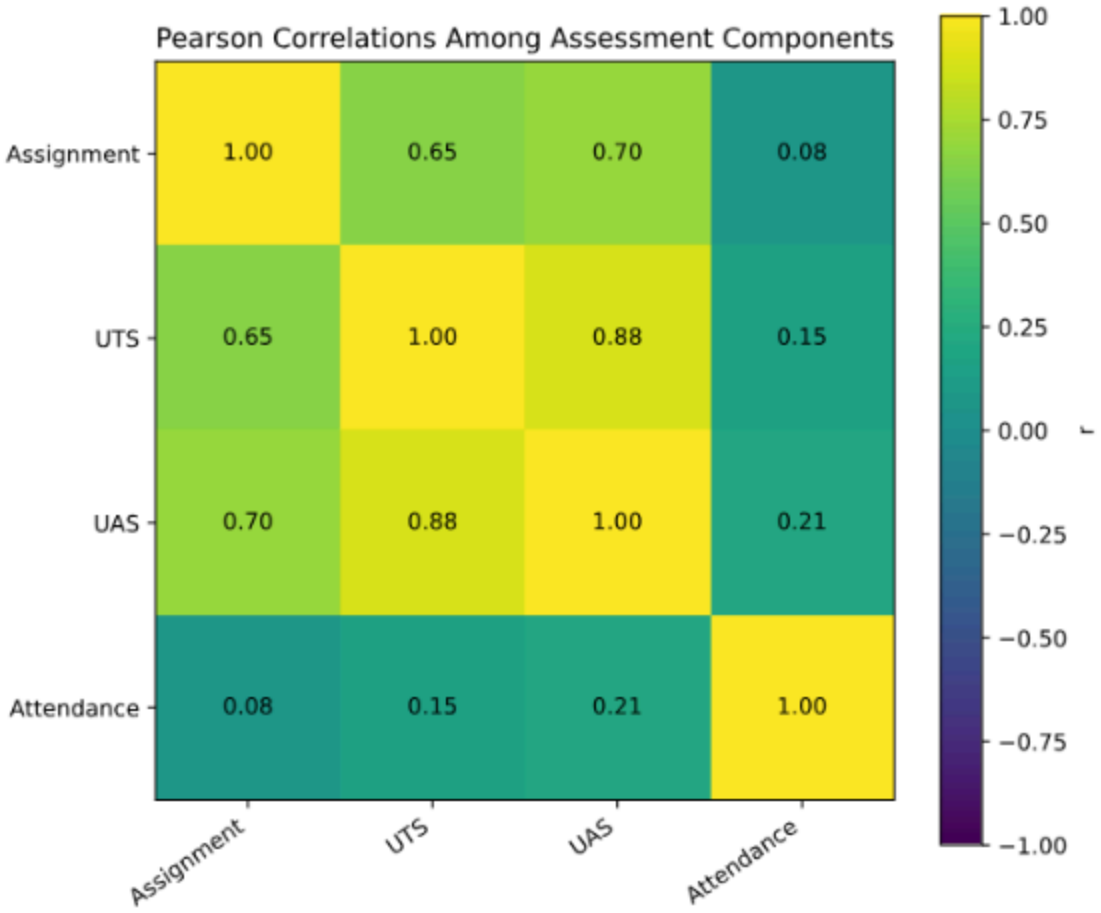


Figure 3

Pearson Correlation Matrix Among Assessment Components.

Note. Values represent Pearson's r. The final course score was excluded because it was calculated from the assessment components.

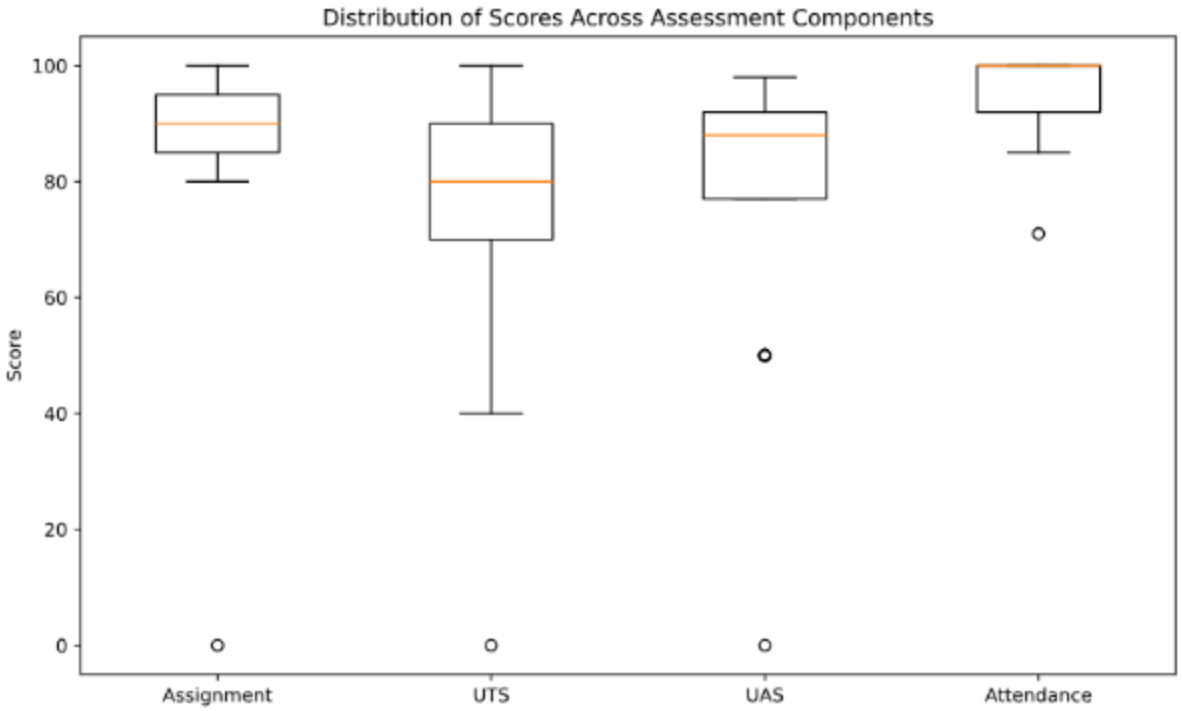


Figure 4

Distribution of Scores Across Assessment Components.

Note. Boxplots summarize the observed distribution of assignment, UTS, UAS, and attendance scores among 41 students.

Supplementary Files

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