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## AI-Powered Digital Comic Videos as Interactive Media for Listening Comprehension in Indonesian Language Education

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### ABSTRACT

**Objective:** This study aimed to examine the effectiveness of AI-powered digital comic videos as interactive media in improving students' listening comprehension in Indonesian language education. The study addressed limitations in traditional listening instruction by integrating multimodal learning media that combined visual narratives and audio elements.

**Method:** The study employed a mixed-methods approach using a quasi-experimental pre-test and post-test design. The participants consisted of 60 junior high school students who participated in listening activities through AI-generated digital comic videos. Quantitative data were collected from listening comprehension tests administered before and after the intervention, while qualitative data were obtained through focus group discussions and teacher interviews to explore students' learning experiences and engagement. **Results:** The findings showed a significant improvement in students' listening comprehension scores after the implementation of the AI-powered digital comic videos. Students demonstrated a better understanding of tone, context, and narrative meaning, with a large effect size (Cohen's  $d = 0.85$ ). Qualitative results also indicated increased student engagement, improved vocabulary acquisition, and stronger comprehension supported by visual cues and culturally relevant storylines. **Novelty:** This study highlighted the transition from static digital comics to AI-powered interactive video narratives as an innovative learning medium in Indonesian language education. The transformation of passive visual reading materials into dynamic multimodal experiences created an interactive listening environment that enhanced comprehension, engagement, and contextual understanding, offering a new approach for developing listening skills in language learning.

### INTRODUCTION

Listening comprehension is widely recognized as a fundamental foundation for language acquisition and a crucial component in building learners' communicative competence (Tai & Chen, 2024). Technically, this skill is a highly complex, active process, requiring listeners to simultaneously distinguish sounds, master the lexicon, and interpret stress and intonation (Susanto & Nanda, 2024). The difficulty of listening often exceeds that of other language skills due to the exceptionally high concentration demands, especially for young learners with limited attention spans (Syakur, 2020; Yıldırım & Yıldırım, 2016). Inability to focus on the speaker often results in failure to absorb the entire message, confirming that listening is not simply a mechanical process (Latip et al., 2021). Furthermore, listening comprehension is not a linear filtering of information, but rather a deep interpretative method involving linguistic sensitivity and background knowledge (Gabrilovich & Markovitch, 2009). Therefore, there is a sharp distinction between simply listening without interpretation and listening comprehension, which involves the brain's active processing of information through audio and video input (Shaojie et al., 2022).



In practice, listening skills are often considered the most confusing and difficult aspect of language education for students to master (Nushi & Orouji, 2020). Obstacles in listening can negatively impact overall communicative competence, as poor listening skills hinder the effectiveness of oral information exchange (Alharbi & Mohammed Hassan Al-Ahdal, 2024). Despite the challenges, appropriate listening activities provide significant opportunities for students to express ideas accurately and learn how to convey messages correctly through audio input (Knoop-van Campen et al., 2020; Masykuri, 2022). Various efforts have been made to optimize these skills, ranging from the use of podcasts and audio texts to the integration of Learning Management Systems (LMS) into the curriculum (Eragamreddy, 2024; Nisak, 2024). The relationship between listening and speaking is very close in real-world interactions, where both encourage students to actively provide feedback based on the language input received (Mulyadi et al., 2021). However, without proper management, the cognitive load of understanding dialogue or monologue texts can trigger significant stress and anxiety in learners (Hardiyanto, 2020).

To address this complexity, listening instruction must be directed toward developing inference skills through the interaction between syntactic knowledge, discourse markers, and world context (Qomariyah et al., 2021). Teachers play a vital role in designing lesson plans and selecting materials aligned with students' ability levels to effectively achieve learning objectives (Nor et al., 2022). Given that listening involves interactive top-down and bottom-up information processing, selecting appropriate materials is key to supporting the information encoding and decoding process (Trang, 2021). A pleasant learning environment is essential for students to become accustomed to absorbing various sources of information according to their communicative goals (Hamada & Hassan, 2016; Papanikolaou et al., 2002). The use of media that can combine visual and auditory cues greatly assists listeners in predicting and confirming the content of the message conveyed by the speaker (Qomariyah et al., 2021; Shaojie et al., 2022). With a more inclusive approach and carefully designed materials, emotional barriers such as decreased interest and learning anxiety can be effectively minimized (Tran & Duong, 2020).

The modern educational landscape is currently experiencing a significant pedagogical paradigm shift thanks to rapid technological advances (Al-Abdullatif, 2022). Digital innovation has successfully reshaped conventional teaching methods into more engaging and accessible processes for a wide range of learners. One educational instrument that is beginning to attract significant attention is digital comics, which cleverly combine the power of visual narratives with elements of interactivity (Aladsani, 2024). As a multimodal medium, digital comics offer a highly relevant learning experience for the visual-inclined characteristics of contemporary learners (Yusuf et al., 2025). This medium is not merely illustrative but has also been proven to sharpen critical thinking and deepen students' understanding of complex narrative structures (Krusemark, 2017). Therefore, the relevance of using digital comics in the context of language education is becoming increasingly crucial for exploring the potential for student emotional and cognitive engagement. This integration of visual storytelling is seen as an innovative solution in bridging the needs between a rigid curriculum and dynamic student interests.



Despite the immense potential of technology, the Indonesian language curriculum still faces persistent challenges, particularly in developing students' listening skills (Alp & Onan, 2023). Traditional approaches tend to be stuck in monotonous memorization methods with minimal meaningful interaction (Sattarova, 2024). Conventional materials, such as printed textbooks, often fail to present content that is visually engaging and culturally relevant for the modern generation (Anggito et al., 2023). This gap creates barriers to student engagement with the character values that should be internalized in language learning. In response to these challenges, digital comics have been proposed as a bridge capable of providing educational content rooted in local culture (Das & Mohapatra, 2024). The use of this medium is expected to support educational transformation that focuses not only on cognitive aspects but also on strengthening students' cultural identities (Moses & Reid, 2021). Thus, digital comics are not merely tools but also strategic tools for overcoming stagnation in national language teaching methods.

The significance of digital comics in improving educational outcomes has been demonstrated through various cross-disciplinary studies (Apostolou & Linardatos, 2023). As a form of edutainment, digital comics facilitate the integration of complex concepts into the classroom environment in a fun and interactive manner (Rasmet et al., 2025). Furthermore, the use of comics also functions as scaffolding for critical literacy, enabling students to be more skeptical and analytical about ideologies in media narratives (Vie & Dieterle, 2016). In Indonesia, the effectiveness of comics has been seen in a significant increase in reading interest and academic achievement, where students become active participants in learning (Surya et al., 2020). Not only in language, the development of digital comics in other disciplines such as mathematics has also been shown to foster discipline and teamwork (Bachri et al., 2023; Kirchoff, 2017). However, despite these successes, in-depth exploration of the specific impact of digital comics on listening comprehension remains very limited (Kumar & Dhar, 2024). This suggests an urgent need to further investigate how visual and audio elements in digital comics work together to support auditory skills.

This research gap is made even more apparent because the literature has focused more on literacy aspects of reading and writing than on listening skills (Belda-Medina, 2024). Yet, listening is an essential competency in language acquisition that is often overlooked in curriculum design and global research agendas (Bina et al., 2024). Through this research, we sought to in-depth investigate the impact of using digital comics on listening comprehension for Indonesian language learners (Dika & Bektiningsih, 2023). The primary focus of this study was to evaluate the effectiveness of culturally responsive media that integrates local narratives and character-building themes (Castillo-Cuesta & Quinonez-Beltran, 2022a). This approach aligns closely with the vision of the Independent Curriculum (Kurikulum Merdeka), which emphasizes flexibility and relevance of materials to students' life contexts. By combining smart technology and cultural values, this research provides both theoretical and practical contributions to the literature on educational innovation.

Based on related literature, digital comics have long been considered an alternative medium for language learning, but their use for listening skills still faces significant structural obstacles. This is due to the predominantly visual nature of conventional comics, which often fail to capture the auditory essence necessary for mastering listening competency. To overcome these limitations, the integration of artificial



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intelligence (AI) offers a significant opportunity to transform static comics into more dynamic, interactive video-based multimodal media. This format shift allows for synchronization between strong visual narratives and auditory input, creating engaging and effective learning media for language learning. This innovation aligns with the direction of developments in instructional technology, which demands media capable of more accurately simulating real-world interactions. Through this approach, AI plays a vital role in bridging the gap between visual media and the need to strengthen listening skills in language education.

The integration of artificial intelligence (AI) into the modern education ecosystem has triggered fundamental transformations, particularly in the simulation of cognitive operations that mimic the working mechanisms of the human brain to produce complex intellectual processes (Liang, 2020). This technology not only functions as a tool for automating repetitive tasks but also acts as a creative agent capable of optimizing digital information management and minimizing human error in instructional environments (Susilo et al., 2023). In the context of language education, AI offers flexibility through interactive digital platforms, enabling broader and more efficient distribution of learning materials (Guan et al., 2020; Orak & Turan, 2024). The use of AI-powered multimedia technologies is creating new patterns of innovation that are transforming the way digital media is designed and implemented (Ingavélez-Guerra et al., 2022). This phenomenon confirms that AI is not merely a technical tool but a key catalyst in creating innovative learning environments for language learners in the digital age (Sadykova & Kayumova, 2025).

The implementation of AI in learning content production has been shown to personalize self-paced learning experiences by tailoring materials based on the unique interests and characteristics of each learner (Dembe, 2024). Through advanced features such as automatic translation, subtitling, and AI-based video editing, the accessibility of learning media becomes more inclusive for various learner groups (Hristov et al., 2025). The use of generative artificial intelligence (GenAI) further accelerates the multimedia media production process, enabling educators to deliver more relevant and engaging content in a shorter time (Laoha et al., 2025). Furthermore, AI systems are capable of providing instant feedback crucial for evaluating student progress, thereby increasing the effectiveness of teacher-student interactions (Dhanasekaran, 2025). With the support of this technology, digital materials can be transformed into more understandable and interactive learning assets, which directly support student engagement in the classroom (Zhang & Wilker, 2022).

Recent research consistently shows that AI technology significantly contributes to strengthening receptive and productive skills, including vocabulary, grammar, and intercultural competence (AlTwijri & Alghizzi, 2024; Mohammed & Mahdi, 2025). In particular, listening comprehension skills benefit significantly from multimodal and visual learning activities that allow students to independently review material with the guidance of intelligent systems (Ghoneim & Elghotmy, 2021; Tai & Chen, 2024). Dialogic interactions with digital systems have also been reported to be effective in stimulating speaking and writing skills through targeted, individualized instruction (Ali et al., 2024; Garcia Laborda & García Esteban, 2016). Furthermore, the integration of AI-based visual elements, such as in immersive digital storytelling, has been shown to improve students' motivation, interest, and overall digital literacy (Mykytiuk et al., 2025).

Based on the above explanation, this research aims to bridge the pedagogical gap in Indonesian language learning by utilizing AI-powered digital comic videos as an interactive medium for developing listening skills. This study is grounded in the urgent need to modernize listening learning practices, which are currently dominated by conventional, static materials that are less capable of sustaining students' attention, frequently resulting in low learning engagement and cognitive difficulties in comprehending spoken information in depth. To address these issues, this study proposes the use of more dynamic digital media by integrating visual, audio, and narrative elements in the form of digital comic videos developed with the support of artificial intelligence technology. The novelty of this research lies in the integration of AI technology that transforms digital comics from merely passive visual media into interactive multimodal learning media. Unlike most previous studies that still use digital comics as visual reading materials, this study develops the comic into an interactive video format that combines the power of visual narratives, audio elements, and interactivity based on intelligent technology. Through this combination of visual and audio elements, AI-powered digital comic videos are expected to facilitate the process of meaning comprehension more naturally during listening activities, while simultaneously strengthening student motivation and engagement beyond what traditional listening materials can offer.

Guided by this rationale, the present study is directed by the following research questions: (1) Does the use of AI-powered digital comic videos significantly improve students' listening comprehension skills in Indonesian language learning? (2) How do students perceive and experience the use of AI-powered digital comic videos as an interactive learning medium? (3) To what extent does the use of AI-powered digital comic videos influence students' motivation and engagement during the listening learning process? Accordingly, this study specifically aims to: (1) examine the effectiveness of AI-powered digital comic videos in improving students' listening comprehension skills through a quasi-experimental design; (2) explore students' perceptions and learning experiences during the implementation of AI-powered digital comic videos; and (3) investigate the influence of AI-powered digital comic videos on students' motivation and engagement in Indonesian language listening learning.

## RESEARCH METHOD

### Research Design and Materials

This study uses a mixed methods approach to comprehensively analyze the effectiveness of AI-Powered Digital Comic Videos Interactive Media for Listening Comprehension in Indonesian Language Education. This approach was chosen because it allows the integration of quantitative and qualitative analysis, thus providing a more comprehensive understanding of the impact of using AI-based learning media in improving students' listening skills (Johnson, 2014). Quantitatively, this study applies a quasi-experimental design with a pre-test and post-test model to measure changes in students' listening skills before and after the use of AI-based digital comic videos in Indonesian language learning. This design is used to identify the extent to which AI-powered digital comic videos as an interactive learning medium can improve students' understanding of spoken information, including the ability to understand information and the meaning of stories in spoken texts. Meanwhile, a qualitative approach is used to explore students' learning experiences, perceptions of the use of AI-based digital media,

and their level of engagement during the learning process. By combining these two approaches, this study provides an overview of the role of AI-based digital comic videos in supporting the development of listening skills in Indonesian language learning.

This AI-powered digital comic video learning media used in Indonesian listening lessons was developed through several stages based on the use of artificial intelligence (AI) technology and digital devices. The first stage was the production of audio narration using the AI-based text-to-speech platform, ElevenLabs. At this stage, researchers compiled a digital comic story script, then converted it into a narrative voice by selecting Indonesian-language voice characters with clear and natural articulation. The result of this stage was a narrative audio file that would be used as the basis for visual development. The second stage was the creation of character animation and digital comic visuals using the Adobe Express Animation platform (a free, web-based animation tool). At this stage, the audio narration from ElevenLabs was synchronized with the animated character movements, including facial expressions and gestures, resulting in an interactive visual display that supports understanding of the story's content. The third stage was the integration and final editing process using the CapCut application. At this stage, researchers combined audio and visual elements, added supporting text (subtitles), sound effects, and transitions to improve the quality of the learning video. The final result was an interactive digital comic video ready for use in listening lessons. The video can be seen in the barcode below.



Figure 1. Digital Comic Videos

### 23 Participant

The data sources in this study were obtained from students and Indonesian language teachers at the junior high school level in West Sumatra. The study population included all junior high school students in the West Sumatra region. The research sample was selected by considering the representation of different geographical areas, namely the darek and pasisie areas, so that three schools were obtained that represented these characteristics, namely SMPN 6 Bukittinggi, SMPN 2 Batang Kapas, Pesisir Selatan Regency, and SMPN 2 Padang City which represented the pasisie area. Overall, the research sample consisted of 60 students and 3 Indonesian language teachers from these schools.

### 1 Research Instruments

The research instrument used in this study was a listening comprehension test administered in two stages: a pre-test and a post-test, to identify changes in students' abilities before and after the learning intervention. This test covered several indicators of listening skills, such as the ability to understand main ideas, identify detailed

information, and interpret story content. In addition to these quantitative instruments, this study also utilized<sup>3</sup> a qualitative instrument in the form of a Focus Group Discussion (FGD) guide to explore students' experiences and perceptions of the use of AI-based digital comic videos in learning activities. Interviews with teachers were also conducted to<sup>32</sup> gain pedagogical perspectives regarding the effectiveness of the learning media and the level of student engagement during the learning process.

### Data Collection Procedures

The data collection process was carried out through several structured stages throughout the research. In the initial stage, all participants took a pre-test to measure students' initial listening skills before using digital comic video-based learning media. The next stage was a six-week learning intervention, in which students participated in learning activities using AI-powered digital comic videos as the primary medium for listening activities. Each learning session lasted 45 minutes and involved listening to audio narration from the digital comic, following the visual storyline, answering comprehension questions, and having group discussions with teacher guidance. After the entire intervention series was completed, students took a post-test to measure improvements in listening skills and participated in focus group discussions to provide feedback on their learning experiences while using the media.

### Data Analysis Procedure

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The data obtained in this study were analyzed using quantitative and qualitative approaches to provide<sup>6</sup> comprehensive understanding of the research results. Quantitative analysis was conducted by comparing pre-test and post-test scores using a paired sample t-test to identify significant differences in students' listening skills after the learning intervention. Furthermore, effect sizes were calculated to determine the extent of the influence of t<sup>16</sup> use of AI-based digital comic videos on improving listening skills. Meanwhile, qualitative data obtained from focus group discussions (FGDs) and teacher interviews were analyzed using a thematic analysis approach. The analysis process involved transcribing all data, iteratively developing codes, and identifying emerging patterns or themes related to student engagement, learning experiences, and perceptions of the use of AI-based learning media.

## 1 RESULTS AND DISCUSSION

### Results

The research findings were obtained from quantitative and qualitative data analysis to provide an overview of the effectiveness of using AI-powered digital comic<sup>18</sup> videos as an interactive medium in Indonesian listening learning. Quantitative analysis was conducted by comparing students' pre-test and post-test scores to identify change<sup>39</sup> in listening skills after the implementation of the learning medium. This comparison aims to determine the extent to which the use of AI-based digital comic videos contributes to improving students' comprehension of spoken information, including the ability to understand main ideas, identify detailed information, and interpret context and tone in the narrative heard. To test the si<sup>17</sup>gnificance of the difference in scores before and after the intervention, this study used a paired sample t-test. The results of the test can be seen in the following table.

**Table 1. Paired Sample T-Test Result**

| Test      | Mean Score | Std  | t-value | Effect Size (Cohen' d) |
|-----------|------------|------|---------|------------------------|
| Pre-test  | 62.45      | 7.21 | -8.94   | 0.85                   |
| Post-test | 78.32      | 6.98 |         |                        |

The results indicate a significant improvement in students' listening comprehension scores following the intervention ( $p < 0.001$ ). Based on the results obtained in the table, it shows the results of a comparative analysis of pre-test and post-test scores to measure the improvement of students' listening skills after the use of AI-powered digital comic videos in Indonesian language learning. The average student score in the pre-test stage was 62.45 with a standard deviation of 7.21, while the average score in the post-test stage increased to 78.32 with a standard deviation of 6.98. The results of the analysis using a paired sample t-test showed a value of  $t = -8.94$ , which indicates a significant difference between the scores before and after the learning intervention. In addition, the effect size value (Cohen's d) of 0.85 indicates that the use of artificial intelligence-based digital comic videos has a significant impact on improving students' listening skills. However, the relatively high standard deviations in both pre-test ( $SD = 7.21$ ) and post-test ( $SD = 6.98$ ) suggest considerable variability in individual student responses to the intervention. This indicates that while the majority of students benefited substantially from the use of AI-powered digital comic videos, a portion of students demonstrated more modest gains, likely reflecting differences in prior listening ability, learning styles, or familiarity with digital media. Such variability underscores the importance of differentiated instructional support alongside multimodal media, ensuring that students with lower baseline listening proficiency receive additional scaffolding to maximize the benefits of this learning approach. These findings indicate that the integration of learning media based on AI-powered digital comic videos effectively helps students understand spoken information better in Indonesian language learning.

To gain a deeper understanding of the impact of using AI-powered digital comic videos on various components of listening skills, an analysis was also conducted on each listening skill indicator measured in this study. This analysis aimed to identify the dimensions of listening skills most responsive to digital comic video-based learning interventions. By comparing the average scores for each indicator before and after the intervention, this study can demonstrate how AI-based learning media facilitates the process of understanding spoken information more specifically. The results of the analysis of improvements in each listening skill indicator are presented in Table 2.

**Table 2. Improvement Across Listening Skill**

| Indicators                | Pre-test mean | Post-test mean | Mean Difference | Percentage Improvement |
|---------------------------|---------------|----------------|-----------------|------------------------|
| Understanding main ideas  | 60.12         | 75.45          | 15.33           | 25.5%                  |
| Identifying key details   | 65.78         | 80.67          | 14.89           | 22.6%                  |
| Interpreting tone/context | 61.45         | 78.21          | 16.76           | 27.3%                  |

Based on the data analysis presented in Table 2, it shows that improvements in listening skills did not occur evenly across all indicators, indicating the differential influence of the use of AI-powered digital comic videos on cognitive processes in listening. The greatest improvement occurred in the ability to interpret tone and context, indicating that the integration of visual, narrative, and audio elements in digital comic videos effectively helped students capture implicit meaning and emotional



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nuances in spoken texts. This suggests that AI-based multimodal media better supports the process of interpreting complex meanings than simply understanding explicit information. Meanwhile, improvements in the ability to understand main ideas and identify important information indicate that the structured presentation of storylines in digital comics helps students build a framework for understanding the narrative content. These findings indicate that the use of AI-powered digital comic videos not only strengthens students' literal understanding of spoken information but also expands their interpretive abilities in understanding context and deeper meaning in listening learning.

In addition to quantitative analysis, this study also presents qualitative findings obtained from Focus Group Discussions (FGDs) with students and interviews with Indonesian language teachers. This qualitative data is used to enrich the interpretation of the quantitative results by describing students' learning experiences, their level of engagement during the lesson, and teachers' perceptions of the effectiveness of using AI-based digital comic videos in listening activities. By combining these two approaches, this study not only assesses improvements in learning outcomes statistically but also understands how the learning media influences the learning process in greater depth. The research results based on the qualitative data analysis are described as follows.

### Student Engagement

Qualitative findings from Focus Group Discussions (FGDs) indicate that the use of AI-powered digital comic videos has a positive impact on student engagement during the listening learning process. Most students reported that this learning medium increased their interest and motivation in participating in learning activities compared to conventional listening methods, which typically use only text or audio recordings. The integration of visual elements in the form of comic illustrations, engaging storylines, and audio components featuring character voices made it easier for students to understand the narrative. This medium also helped students build connections between text, voice, and story context, making the process of understanding spoken information clearer and more structured.

Furthermore, students expressed that presenting material in the form of digital comic videos made listening activities more interactive and less monotonous. The visualized narrative, through characters and storylines, enabled students to follow the story more actively and helped them grasp the implicit meanings contained in the dialogue and situations. This indicates that the use of AI-powered digital comic videos serves not only as a means of conveying information but also as a stimulus that increases students' cognitive and emotional engagement in learning. This was reflected in various student responses during group discussions, such as the following statements:

*"I could follow the story better because I could hear the characters' voices while reading the text."*

*"The pictures helped me understand what was happening in the story even when I didn't catch every word."*

*"Listening to the characters while watching the comic scenes made the lesson more interesting and easier to remember."*



*"The story format made me feel like I was watching a short animation, so I wanted to pay attention until the end."*

These statements indicate that the combination of audio and visual elements in digital comic videos helps students process spoken information more effectively. The support of voice narration combined with visual representations of characters allows students to connect the information they hear to the context of the ongoing story. Thus, the use of AI-powered digital comic videos not only increases student engagement during learning but also helps them develop a deeper understanding of the narrative content they hear. These findings also support the quantitative results of the study, which showed a significant improvement in students' listening skills after the implementation of this learning medium.

### **Perceived Learning Benefits**

Qualitative findings from Focus Group Discussions (FGDs) indicate that the use of AI-powered digital comic videos not only increases student engagement in the learning process but also provides various learning benefits directly experienced by students. Participants expressed that this learning medium helped them understand listening material more effectively because information was presented through a combination of complementary visual, audio, and narrative elements. The integration of these multimodal elements enabled students to process linguistic information more contextually, helping them associate language sounds with the meaning, situations, and actions occurring in the story. Furthermore, the use of digital comic videos encouraged students to pay more active attention to the dialogue and storyline, as the presentation format resembled the experience of watching an engaging animated story. These results indicate that AI-powered digital comic videos function not only as a medium for delivering material but also as a tool that enriches the language learning experience cognitively and affectively.

One of the most frequently reported benefits by students was improved vocabulary mastery through the use of contextual audio-visual cues in digital comic stories. Students stated that the visual illustrations and situations in the stories helped them understand the meaning of new words without always having to rely on teacher explanations or a dictionary. When dialogue is spoken by characters in the story, students can connect the sounds <sup>29</sup> words with the actions or visual expressions appearing in the scene. This makes it easier for students to understand and remember new vocabulary in a more realistic context. Some students shared their experiences as follows:

*"When I heard new words, I could understand them from the pictures and what the characters were doing."*

*"The comic scenes helped me guess the meaning of new words even before the teacher explained them."*

*"It was easier to remember vocabulary because I could see the situations in the story."*

In addition to increasing vocabulary, students also reported improved listening skills as they practiced understanding spoken dialogue presented in a more natural story context. The voice-over narration delivered by the characters allowed students to hear variations in intonation, expression, and sentence patterns in conversations that

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resembled everyday communication. This helped students develop the ability to understand the dialogue more comprehensively, not only at the word level but also at the context level. By following the ongoing storyline, students were also able to predict future information and connect various parts of the dialogue to understand the overall story. This experience is reflected in the following student statements:

*"Listening to the characters talk helped me understand how the sentences are used in real conversations."*

*"The dialogues made it easier to understand the story because I could hear how the characters expressed their feelings."*

*"I practiced listening while following the story, so it felt like real communication."*

Another benefit emerging from the qualitative findings is students' increased cultural appreciation through story content that highlights local cultural elements. The digital comic videos used in this study integrated folktales and moral values relevant to students' lives, helping them understand the story's meaning within a broader social and cultural context. The visual and audio presentation of the story also made it easier for students to grasp the cultural background and moral messages contained within the narrative. Thus, listening instruction focuses not only on linguistic aspects but also on understanding the cultural values embedded in the story. This is evident in the following student responses:

*"I liked the stories because they were similar to the folktales I heard from my family."*

*"The comic stories taught us moral lessons while we were practicing listening."*

*"I learned more about local culture because the stories were about our traditions."*

Overall, these findings indicate that the use of AI-powered digital comic videos in Indonesian language learning provides broader benefits than conventional listening media. This media not only improves students' listening skills but also supports vocabulary development and strengthens cultural understanding through a more engaging learning experience.

### Teacher Observations

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Interviews with Indonesian language teachers indicate that the use of AI-powered digital comic videos has a positive impact on the dynamics of listening learning in the classroom. Teachers observed increased student enthusiasm and participation during learning activities. Digital comic videos, which combine visual elements, audio, and narrative, are considered effective in capturing students' attention, allowing them to focus more fully during listening activities. Teachers also noted that the story format, presented through characters and narrative flow, helps students understand the context of conversations more easily than conventional listening methods that rely solely on audio recordings or written text. This leads to students being more active in answering comprehension questions and gaining confidence in expressing their opinions during class discussions.

In addition to increasing student engagement, teachers also believe that the use of AI-powered digital comic videos helps create more inclusive learning. This medium allows students with varying listening abilities to still participate meaningfully in learning activities. Students who previously struggled with listening comprehension

can utilize visual aids and story context to grasp the meaning of the dialogue they hear. Meanwhile, students with higher abilities can use the visual and audio information to analyze the story content more deeply. Thus, AI-powered digital comic videos serve as a medium that supports differentiated learning, allowing students to access material through various information representation channels. These findings were also reflected in various teacher statements during interviews. One teacher stated:

*"Students who usually struggled with listening tasks became more engaged and were able to answer comprehension questions more accurately after using the comic."*

*"The combination of visuals and audio helped students follow the story more easily, especially those who usually lose focus during listening activities."*

*"I noticed that more students were willing to participate in discussions because they understood the story better."*

*"The digital comic videos made the listening lesson more interactive, and students seemed more motivated to pay attention from beginning to end."*

Overall, teacher observations indicated that the use of AI-powered digital comic videos not only increased student participation during listening lessons but also helped create a more interactive and adaptive learning environment. This medium provided additional support for students who had difficulty understanding spoken information while enriching the learning experience for students with higher abilities. These findings support the quantitative results of the study, which showed a significant improvement in students' listening skills after implementing digital comic video-based learning media.

### Discussion

The research findings indicate that the use of AI-powered digital comic videos significantly improves listening skills in Indonesian language learning, extending the pedagogical contributions of digital comic media into a domain that prior research has largely left unexplored. In general, the integration of digital comic media has a documented positive impact on students' listening comprehension and has the potential to become a pedagogical innovation in language learning (Ermiana et al., 2024). The quantitative analysis results indicating substantial development in students' overall listening skills demonstrate that presenting material through multimodal media can support language comprehension more effectively than conventional learning approaches (Fitria et al., 2023). Digital comic media combines visual, audio, and narrative elements, helping students process linguistic information more deeply, a condition that aligns with previous research confirming that multimodal learning resources can increase students' cognitive engagement in the language acquisition process (Flores-González et al., 2024). While previous studies on non-AI digital comics have demonstrated their value primarily in supporting reading comprehension and vocabulary development (Castillo-Cuesta & Quinonez-Beltran, 2022b), the present study builds upon those findings by demonstrating that the incorporation of AI-powered video narration genuinely expands the pedagogical benefits of digital comics into the domain of listening comprehension, a skill that static comic formats are structurally ill-equipped to develop. The dynamic and interactive dimensions introduced through AI enhancement offer cognitive affordances beyond what static



comic formats provide, and the strong practical effect observed in this study suggests that the pedagogical promise long attributed to digital comics in reading contexts can be meaningfully realized and arguably exceeded when the medium is enriched with intelligent audio-narrative technology.

Further analysis of the listening skill components revealed that student improvement was not uniform, but varied across the measured skill areas. The most pronounced gains were observed in the ability to interpret conversational tone and context, suggesting that AI-powered digital comic videos offer particular benefits in helping students understand the pragmatic and emotional dimensions of spoken communication, an area where static or text-based media have historically struggled to provide sufficient contextual richness. Audio elements such as intonation, dialogue tempo, and sound effects presented in the comic videos enable students to grasp implicit meanings that are often difficult to capture through written text alone (Humaira Mariyam & Karthika, 2024), an affordance that distinguishes this medium from conventional digital comics which rely predominantly on visual-textual cues without dynamic auditory input. Notably, substantial gains were also recorded in the ability to identify important details, contrasting with findings from earlier digital comic studies that reported stronger outcomes in vocabulary recognition and reading fluency than in detail-oriented listening tasks (Istiq'faroh & Mustadi, 2020). When the dialogue students hear is supported by visual expressions of characters and a clear storyline, they can associate linguistic information with concrete representations, thereby strengthening memory consolidation in ways that neither purely auditory nor purely visual media can independently achieve (Kumar & Dhar, 2024). This pattern of differentiated improvement aligns with the Cognitive Theory of Multimedia Learning, which holds that learning is more effective when information is conveyed through simultaneous visual and verbal channels, and collectively suggests that AI-powered digital comic videos do not merely replicate the benefits of their static predecessors, but introduce a qualitatively richer modality for developing nuanced listening competencies.

Furthermore, notable gains in the ability to understand the main idea suggest that the narrative structure inherent in digital comics contributes meaningfully to students' capacity to grasp the global meaning of spoken texts, an outcome that extends beyond what prior digital comic research has typically reported in reading-dominant contexts (Mataram et al., 2022). Presenting the story through chronologically arranged comic panels helps students follow the narrative flow systematically, making it easier for them to identify main ideas in conversation (Mazid et al., 2024), whereas static digital comic formats without audio narration have been found to support plot comprehension primarily through visual inference rather than active auditory engagement. The audio component, accompanied by expressive narration, strengthens this understanding by emphasizing key points in the story in ways that purely visual comic formats cannot replicate. Another instructive finding concerns the reduced variation in post-test scores compared to pre-test scores, indicating that AI-powered digital comic videos not only improve average performance but also narrow the performance gap between students. A pattern less consistently reported in previous digital comic studies that tended to show stronger benefits for higher-ability learners (Sujinah et al., 2023). By providing simultaneous visual, audio, and narrative representations, this medium accommodates diverse learning styles more comprehensively than its static predecessors (Reche et al.,



2022), confirming that AI-powered digital comic media carries inclusive characteristics that allow students with varying initial abilities to remain effectively engaged. Collectively, these findings affirm that AI-powered digital comic videos constitute a high-impact pedagogical strategy for developing listening skills, one whose benefits demonstrably surpass the more narrowly defined contributions of conventional digital comic formats in language learning.

The qualitative findings of this study indicate that the use of AI-based digital comic videos has a positive impact on student engagement and motivation in listening learning. Many students reported that digital comics made the learning process more engaging and less monotonous than conventional listening activities, which are often considered boring (Apostolou & Linardatos, 2023). The integration of visual storytelling with audio narration creates a more immersive learning experience, enabling students to follow the storyline more actively. These findings indicate that multimodal media can increase students' intrinsic motivation and encourage active participation in the learning process. In addition to increasing motivation, the use of digital comics also helps students understand the material through the complementary integration of visual and audio elements (Terlouw et al., 2020). Students explained that character expressions, visual settings, and vocal intonation helped them interpret the meaning of dialogue more accurately. These findings align with the Cognitive Theory of Multimedia Learning, which states that presenting information through multiple sensory channels can improve comprehension because it involves more complex cognitive processes.

In addition to improving comprehension, qualitative data also shows that digital comics support contextual vocabulary acquisition and strengthen students' connection to local cultural content. Students acquire new vocabulary through dialogue embedded in story situations, enabling them to grasp word meanings more naturally than through isolated memorization (Wardani, 2024). Teachers also observed that students began using the new vocabulary they encountered in comics during class discussions. Beyond linguistic aspects, digital comics containing folktales and moral values also help students develop an appreciation for local culture (Arief et al., 2022). Many students stated that the stories presented felt close to their own experiences, increasing their emotional engagement in learning. These findings suggest that culturally responsive learning materials not only increase student engagement but also strengthen their cultural identity in the language learning process.

Other findings indicate that the use of digital comic videos creates a more inclusive learning environment and encourages collaborative learning in the classroom. Teachers observed that the multimodal format allows students with varying listening abilities to actively participate in learning (Bachri et al., 2023). Students who struggle with audio comprehension can benefit from visual support, while students with higher abilities can focus on interpreting more complex narratives. Furthermore, the group discussion activities that accompany the use of digital comics encourage students to exchange opinions, clarify understanding, and discuss the moral message of the story (Axelrod & Kahn, 2024). Overall, the findings of this study fill a gap in the literature, which has primarily examined digital comics for reading skills, by demonstrating that this medium is also effective in improving listening skills (Damopolii et al., 2021). The results also suggest that integrating digital comics into the Indonesian language



curriculum has the potential to improve listening skills while supporting cultural and moral education.

The findings of this study are further strengthened by the perspective of the Cognitive Theory of Multimedia Learning (CTML), which asserts that meaningful learning occurs through active processing of two cognitive channels: verbal and visual, each with limited capacity but working in an integrated manner. In this context, a digital comic video format that simultaneously combines animation, narration, and text can optimize both channels, thereby strengthening learners' comprehension and retention. Previous research confirms that audiovisual input provides more authentic language input and a richer multimodal cultural and situational context, which better enhances learners' comprehension and stimulates their interest in listening comprehension tasks (Shaojie et al., 2022), making this medium highly relevant for students with varying listening ability levels. Consistent with the CTML principle of personalization, the combination of spoken words and images has been shown to be more effective than purely verbal presentation, while the dual coding dimension emphasizes that the simultaneous use of verbal and non-verbal representations can facilitate and enhance learning outcomes (AlShaikh et al., 2024). This visual support serves as a cognitive support for lower-ability students, while the complexity of the narrative remains an intellectual challenge for advanced students. These findings also align with Luo (2023), who demonstrated that integrating multiple sensory stimuli into learning can improve cognitive performance, sense of presence, and learning engagement. Therefore, the improvements in listening comprehension and inclusive participation in this study were not merely coincidental, but rather predictable outcomes of digital comic video media design that aligns with CTML principles and is practically applied in learning (Cavanagh & Kiersch, 2023).

However, this CTML-aligned interpretation must be critically examined against competing perspectives in contemporary AI pedagogy. Several scholars caution that AI-mediated multimodal environments, despite their cognitive appeal, risk producing surface-level engagement rather than deep comprehension when learners become overly dependent on visual scaffolding to bypass effortful linguistic processing (Singh & Pegadraju, 2026). This concern is particularly relevant in the context of listening comprehension, where the ultimate goal is autonomous decoding of spoken language, a skill that may be undermined if animated visual cues consistently compensate for gaps in phonological or lexical competence. Furthermore, critical voices in AI-assisted language learning argue that the personalization afforded by intelligent media can inadvertently reduce productive struggle, which is recognized as a necessary condition for deep language acquisition (Wah, 2025). These tensions suggest that the comprehension gains observed in this study, while theoretically consistent with CTML, should not be attributed solely to the cognitive optimization of dual channels. Rather, future implementations must carefully calibrate the degree of visual support provided by AI-powered media to ensure that multimodal richness complements, rather than replaces, the cognitive effort required for genuine listening skill development.

## CONCLUSION

**Fundamental Finding:** This study confirms that the use of AI-powered digital comic videos is an effective pedagogical innovation in improving listening skills in Indonesian language learning. Quantitative findings show a significant increase in students'



listening comprehension scores after the learning intervention using this media, indicating that the integration of visual, audio, and narrative elements can strengthen the language comprehension process more optimally. Furthermore, the analysis also shows that digital comic media makes a significant contribution to improving students' ability to understand main ideas, identify important details, and interpret tone and context in conversations. Qualitative findings support these results by showing that students experienced increased motivation, learning engagement, and ease in understanding the material through the multimodal and contextual presentation of stories. The presence of expressive characters, storylines, and sound elements allows students to connect linguistic information with a more concrete visual context, thus deepening the meaning process. Furthermore, the use of digital comics that integrate folklore and local cultural values enriches students' learning experiences by fostering an appreciation of cultural heritage. Thus, this study confirms that the use of artificial intelligence-based digital comic videos can be an innovative learning strategy that not only improves listening skills but also strengthens students' cognitive and emotional engagement in language learning. **Implication:** The findings of this study have important implications for developing Indonesian language learning practices in the digital age. The integration of AI-based digital comics can be an effective alternative to address the limitations of conventional listening learning methods, which are often unengaging and lack contextualization for students. Teachers and curriculum developers can leverage this technology to create more interactive, multimodal learning experiences that are responsive to students' diverse needs. **Limitation:** This study still has several limitations, primarily related to the relatively limited sample size and the focus of the study, which involved only junior high school students in a specific region. Furthermore, the relatively short duration of the intervention also does not fully reflect the long-term impact of digital comic media use on students' language skill development. **Future Research:** Future research should expand the scope of participants to include participants from various educational levels and learning backgrounds. Future studies could also explore the use of more adaptive artificial intelligence technologies, such as AI-based personalized learning systems that can tailor digital comic content to students' abilities and learning preferences. With further development, this technology has the potential to become a transformative approach to language learning, combining technological innovation, local cultural richness, and the ongoing strengthening of students' communication skills.

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