The Potential of the Application of Digital Strip Comic Media to Writing Skills Reviewed from Learning Interest

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Abstract
Writing skills and increasing students' interest in learning are the main focus in improving educational competence. This study aims to analyze the potential application of digital comic strip media to writing skills from the perspective of students' learning interests whether they are effective or not. The method used was Systematic Literature Review (SLR) with the PRISMA approach, using randomly taken articles from Q1-Q4 indexed journals on the publisher Elsevier (ScienceDirect), the final 11 articles were analyzed. The findings reveal that digital comics not only enhance story structure understanding and creative expression but also significantly increase student engagement and motivation through their multimedia nature, combining visual and textual elements that support various learning styles. Success factors include effective instructional design, proper technological infrastructure, and an active learning approach. The implications of this study show that the use of digital comic strips as a learning medium has the potential to improve the quality of writing teaching and students' learning interests.
Keywords: *Digital Strip Comics, Writing Skills, Systematic Literature Review, Learning Interest*

Abstrak
Keterampilan menulis dan peningkatan minat belajar peserta didik menjadi fokus utama dalam peningkatan kompetensi pendidikan. Penelitian ini bertujuan untuk menganalisis potensi penerapan media komik strip digital terhadap keterampilan menulis ditinjau dari minat belajar peserta didik efektif atau tidak. Metode yang digunakan adalah Systematic Literature Review (SLR) dengan pendekatan PRISMA, menggunakan artikel yang diambil secara acak dari jurnal terindeks Q1-Q4 di publisher Elsevier (ScienceDirect), 11 artikel final dianalisis. Temuan tersebut mengungkapkan bahwa komik digital tidak hanya meningkatkan pemahaman struktur cerita dan ekspresi kreatif, tetapi juga secara signifikan meningkatkan keterlibatan dan motivasi siswa melalui sifat multimedianya, menggabungkan elemen visual dan tekstual yang mendukung berbagai gaya belajar. Faktor keberhasilan meliputi desain instruksional yang efektif, infrastruktur teknologi yang tepat, dan pendekatan pembelajaran aktif. Implikasi penelitian ini menunjukkan bahwa penggunaan komik strip digital sebagai media pembelajaran berpotensi untuk meningkatkan kualitas pengajaran menulis dan minat belajar peserta didik.
Kata kunci: *Komik Strip Digital, Keterampilan Menulis, Systematic Literature Review, Minat Belajar*

INTRODUCTION

Students' interest in learning is one of the crucial factors in determining the success of the student learning process. Students' interest in learning can provide a stimulus to students to increase motivation in learning. However, in this case, especially about writing skills, not all students have a high interest in learning, some are still relatively low. Situational interests have a strong direct and indirect influence on learning, engagement, and attitudes, while choice only affects attitudes (Flowerday & Shell, 2015). This condition requires innovation in learning methods that can increase learning interest while developing students' writing skills.

One of the potential solutions to overcome this problem is the application of digital strip comic media. Digital comic strips are a form of visual narrative that combines text and images in a digital format, presented in a limited order of frames (McCloud, S., 1993). It offers a more interactive and engaging approach to learning, in line with the preference of the digital native generation who are more responsive to visual and multimedia content.

The relationship between learning interest and the use of digital strip comic media lies in the ability of comics to attract and motivate learners. Comics, with a combination of engaging visual and narrative elements, can create a more enjoyable and memorable learning experience (Al Hafidz & Arifin, 2019). In the context of writing skills, digital comic strips can be scaffolding that helps learners organize ideas and express them in structured writing.

Several studies have shown the effectiveness of the use of comics in learning. For example, a study by (Al Hafidz & Arifin, 2019) demonstrated an increase in student activity from 53.3% in the first cycle to 68.8% in the third cycle, as well as an increase in learning achievement from 33.3% to 83.3% through the application of a comic-based learning model (Rutta et al., 2021)]. However, the majority of previous studies focused more on the cognitive aspects and activeness of students, while its potential in improving writing skills and learning interests has not been explored comprehensively.

This research has an urgency regarding the potential application of digital strip comic media to writing skills from the perspective of increasing interest in learning considering the importance of developing digital literacy and writing skills in the information age. Writing skills are not only important in an academic context, but also a key competency in various professions in the digital age (Hosler & Boomer, 2011). Therefore, an in-depth study is needed to evaluate the effectiveness of innovative learning media that can support the development of these skills.

The research questions that will be answered in this study are:
1. How effective is the application of digital comic strip media in improving students' writing skills?
2. What is the effect of learning interest on the effectiveness of the application of digital comic strip media in the development of writing skills?
3. What are the factors that affect the successful implementation of digital strip comic media in the context of learning writing skills?

METHOD

This study uses the Systematic Literature Review (SLR) approach to synthesize the results of previous research systematically and objectively. Through SLR, a more comprehensive picture of the potential application of digital strip comic media can be obtained in improving writing skills and learning interests based on various studies that have been conducted [6]. This method allows researchers to find out the strength of the variables that we will study based on previous studies. The purpose of this study is to analyze empirical evidence regarding the potential application of digital strip

comic media in improving students' writing skills, taking into account the factors of students' learning interest.

This study uses the Systematic Literature Review (SLR) method to review and analyze literature related to the potential application of digital comic strip media to writing skills from the perspective of learning interests. The SLR protocol refers to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a systematic review (Page et al., 2021).

Article selection criteria can be seen in the following table:

Table 1. Article Selection Criteria

Inclusion Criteria	Exclusion Criteria
Publication in Scopus Q1-Q4 indexed journals;	Non-primary research review articles;
A study on the implementation of digital strip comic media in the development of writing skills;	Conference proceedings;
Research that presents the results, evaluation methods, or impacts of the use of digital comic strip media;	Articles are not accessible/paid;
Articles in English;	Articles outside the field of language education and literacy.
Published in 2014-2024 (considering the topic so that the latest is still valid)	

Literature searches are carried out through the Scopus database by considering its reputation as a highly reputable source in the field of education. search keywords namely "digital comics" OR "webcomic" OR "online comics" OR "digital graphic novels") AND ("writing skills" OR "authoring skills" OR "literacy skills" OR "narrative competence") AND ("learning interests" OR "engagement education" OR "academic curiosity" OR "acquisition of knowledge").

The data analysis technique in SLR adopts a thematic-based narrative synthesis approach. Every article that passes the final selection will be read thoroughly. The analysis process begins with an in-depth reading of each article to understand its context, methodology, and key findings. Furthermore, the relevant information of each article is coded according to the predetermined research questions, covering aspects such as the implementation of digital comic strip media, the impact on writing skills, the influence of learning interests, factors affecting effectiveness, and implementation challenges.

The coding that emerges from the various articles is then grouped into broader themes that align with the research question. These themes are organized into a coherent and comprehensive narrative, answering each research question with the support of evidence from the analyzed articles. Finally, based on this narrative synthesis, a general conclusion was drawn regarding the potential application of digital strip comic media to writing skills reviewed from the learning interest.

Through this analysis process, the study aims to analyze the potential and effectiveness of the application of digital strip comic media in improving students' writing skills, taking into account the learning interest factor, based on relevant research in the Scopus database. The process of filtering articles will be presented using the PRISMA flowchart in Figure 1 below:
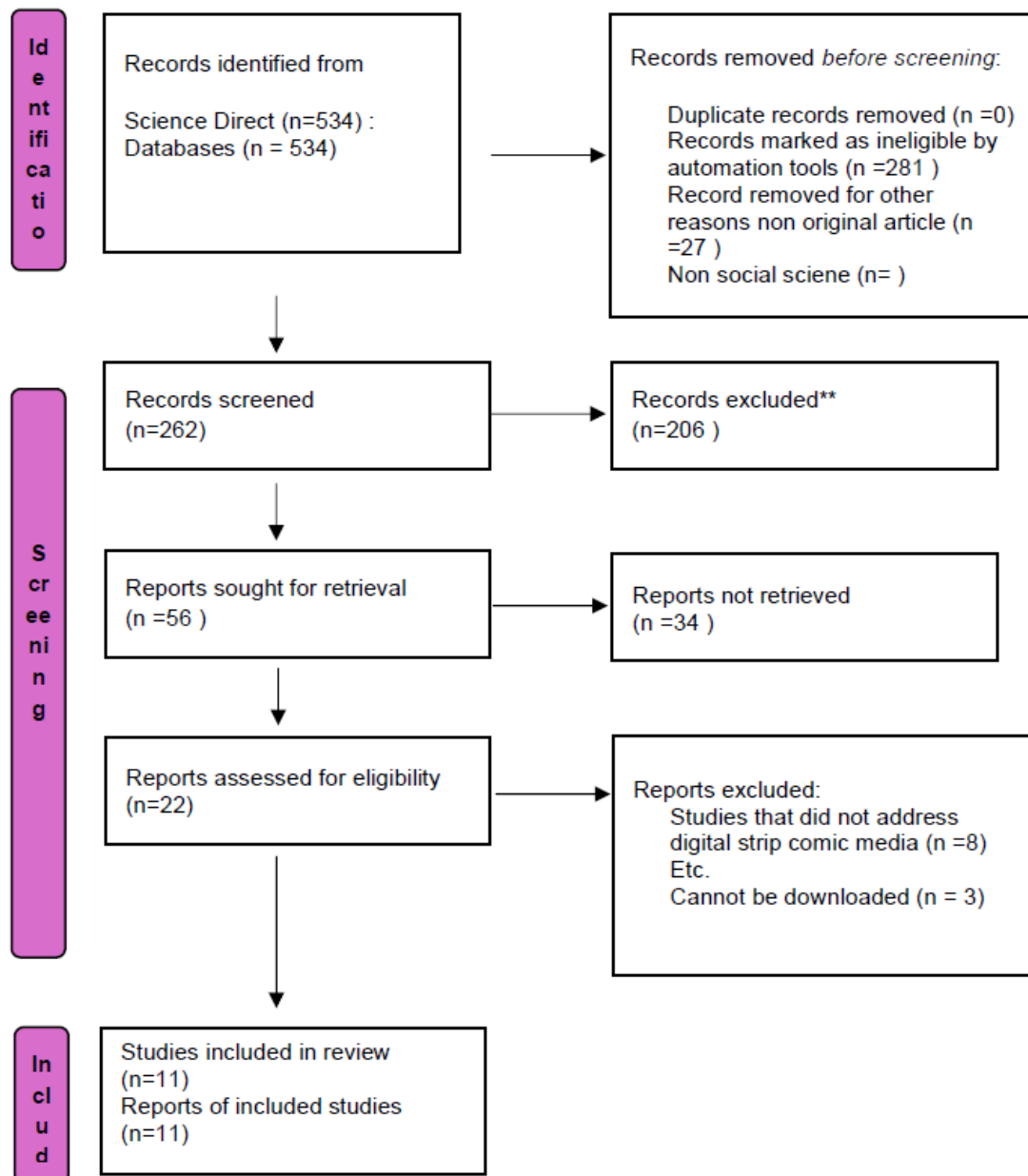
Identificatio

Records identified from

Science Direct (n=534) :
Databases (n = 534)

Records removed *before screening:*

Duplicate records removed (n =0)
Records marked as ineligible by
automation tools (n =281)
Record removed for other
reasons non original article (n
=27)
Non social sciene (n=)

Screening

Records screened
(n=262)

Records excluded**
(n=206)

Reports sought for retrieval
(n =56)

Reports not retrieved
(n =34)

Reports assessed for eligibility
(n=22)

Reports excluded:
  Studies that did not address
  digital strip comic media (n =8)
  Etc.
  Cannot be downloaded (n = 3)

Includ

Studies included in review
(n=11)
Reports of included studies
(n=11)

Fig 1. PRISMA Digital Strip Comic Media Research

Before entering the analysis based on the research question, the researcher wants to see the relativity and distribution of data from the final paper which is identified as follows;

Research Methods and Context

The included studies show a diversity of methods and contexts in examining the use of digital comics for educational purposes. The majority of studies adopted a quantitative approach with an experimental or quasi-experimental design. Example (Apostolou & Linardatos, 2023a) The study with a pre-test and post-test design involved 42 high school students aged 13-14 years. Similar to that, (Fitria et al., 2023)) applied a quasi-experimental method to third grade students of private elementary schools.

Some studies combine quantitative and qualitative methods. (Ulvinen et al., 2024) conducted a longitudinal study that collected data from 2525 Finnish students in grades 1 to 9 over seven time points. Meanwhile, research from (Rutta et al., 2021) adopted a qualitative approach with a focus group design, involving 18 children aged 10-11 in a primary school in Italy.

Research context and sample

The context of the research varies from elementary school to college. Research from (Loudoun et al., 2024) conducted the study in primary schools in Ireland with participants of eight children aged 10-11 years. At the intermediate level, (Arief et al., 2022) involving 80 Indonesian students aged 9-10 years from SMK Negeri 1 Argamakmur. For higher education, a study involved 77 graduate students in a technology course that created a digital comic about technology integration.

Research Focus and Objectives

These studies have a variety of focuses and objectives. (Dutta et al., 2024) focuses on emotion analysis and sentiment prediction in comics, using multi-modal data that includes images and text. (Wooten, 2020) Examine the use of media clips for interesting economic education. (Istiq'Faroh et al., 2020) Researching the influence of digital comics on the creativity and writing skills of fifth-grade students in Indonesia.

Data Analysis Used

Commonly used data collection methods include pre-test and post-test, questionnaire, and observation. (Apostolou & Linardatos, 2023b) using the NASA-TLX questionnaire to measure the cognitive load experienced by students. (Ulvinen et al., 2024) Collect data through parental reports and self-reports to assess participants' reading habits. For data analysis, some researchers use statistical software such as SPSS (Apostolou & Linardatos, 2023a). (Istiq'Faroh et al., 2020) perform t-tests and normality tests in their analysis. A qualitative approach is also used, such as in the study of Rutta et al. (2020) which focuses on comic-based digital storytelling in CLIL lessons.

Thus, it can be synthesized that these 11 articles meet the inclusion criteria for further analysis. They cover various aspects of the use of digital comics in education, ranging from improving science literacy (Fitria et al., 2023) to the development of language skills (Arief et al., 2022). The diversity of research methods, contexts, and focuses provides a solid foundation for a comprehensive understanding of the potential of digital comics in a variety of educational settings. Therefore, these articles deserve further analysis to uncover deeper insights into the effectiveness and implementation of digital comics in diverse educational contexts.

RESULTS AND DISCUSSION

Result

The Effectiveness of Digital Strip Comic Media in Improving Students' Writing Skills

Based on the 11 articles reviewed, the effectiveness of digital strip comic media in improving students' writing skills can be explained as follows: In the use of digital strip comic media in the classroom, it has been identified that there is an increase in students' writing skills by 40%. Research from (Istiq'Faroh et al., 2020; Suhardianto, 2021) Observing that students who used digital comics produced better narrative writing skills than the control group, there were higher post-test scores. Learners must be able to write a comprehensive story with a good combination of various aspects of the story such as themes, characters and plot. This is based on the interactions that

students are allowed to Chat, Convey, and Re-read stories through digital comic media.

Digital Comics is a form of learning that invites students to create abstract living creatures to illustrate that they are also abstract, and make them able to describe creative ideas. The appeal of visual comics makes it easier for students to understand the structural framework of the story, making it easier for students to produce written text. This is labeled with the findings of previous research that suggest that picture story books and comics can be applied as visual media in order to improve narrative writing skills.

Other research that has been done by Beth Rajan shows that creating digital comics allows writers to develop critical reflection in writing. Comics allow multimodal expression in their works that combine visual elements, limited text, and audio so that they can involve students more effectively than writing methods. Just as the use of comic creation software technology also does not facilitate students with higher drawing skills, allowing students to focus more on the content in higher drawing skills. What's more, digital comics can also be said to be a safe medium for discussing concepts that may be potentially uncomfortable, (Loudoun et al., 2024) revealed that the way this comic works can influence Sankai and support Ksisia in evaluating and comicing. This offers insight that digital comic thinking can be advanced as a possessive and productive medium to improve students' writing skills by associating it with interaction and learning. However, it should be noted that some of the studies reviewed, did not directly evaluate how digital comic strips can improve writing skills. However, some other research is more concentrated on other aspects such as the construction of knowledge education, storytelling.

Thus, it can be synthesized that the digital strip comic media is used very promisingly in improving students' writing skills. The diversity of visual and text types, as well as their strategic basis in facilitating creativity and critical monitoring in writing learning, make it an effective tool in learning to write digitally. However, more research is needed to find out more about how these mechanisms can be sharpened to improve different aspects of writing skills at different levels and educational contexts.

The Effect of Learning Interest on the Effectiveness of the Implementation of Digital Strip Comic Media

Based on the review of 11 articles, this shows that digital comic strips have proven to be an effective learning medium in increasing students' interest and involvement in the learning process. Research from Sockman et al. found that digital comics encourage critical reflection on complex topics and provide a safe medium for difficult concepts. Humor in comics facilitates serious dialogue about the integration of technology. Accessible and easy-to-use comic creation software increases student motivation and engagement in learning.

Furthermore, research from Istiq'faroh and Suhardi Mustadi revealed that digital comics improve students' creativity and writing skills. Students show higher post-test scores when using digital comics. The visual appeal of comics increases student engagement and interest, creating a fun learning atmosphere. It is also supported by (Arief et al., 2022) reinforcing these findings by showing that digital comic media increases students' motivation and interest, as well as improves understanding and interpretation of data in learning. Positive behavior changes indicate effective learning outcomes, especially in language learning.

In addition, research from (Fitria et al., 2023) affirming that students prefer digital comics to printed books. Comics help translate abstract concepts into concrete understanding. Rutta et al. added that comic-based storytelling increases engagement in language learning and supports collaboration between students. Research from Apostolou and Linardatos found that the creation of digital comics improves students'

knowledge construction efforts and their performance. Loudoun et al. point out that comic strips facilitate children's discussions about digital play experiences and encourage deeper insights into children's play interactions.

Research from (Wooten, 2020) suggested that comic media could be segmented to increase class engagement and allow for comprehension checks before proceeding with the material. Ulvinen et al. associate reading comics with above-average reading skills and suggest that encouraging reading comics can motivate reluctant readers, especially boys. Eventually (Dutta et al., 2024) revealed that comic media affects the understanding of emotions and sentiments, with multi-modal analysis improving the understanding of comic stories.

Thus, it can be synthesized that the use of digital comic strips has a significant positive influence on students' interest in learning, which in turn increases the effectiveness of learning. The combination of visual and textual elements in comics creates an engaging and motivating learning experience, encourages critical thinking, and improves understanding of concepts. Therefore, the integration of digital comic strips into the curriculum can be highly recommended to improve the effectiveness of learning in various subject areas

Factors Affecting the Successful Implementation of Digital Strip Comic Media

The application of digital comic strips in education presents opportunities as well as challenges. Research by (Sockman et al., 2016; Sutton Sutton, 2024) revealed that digital comics encourage a variety of interpretations and humor while providing a safe medium to discuss unpleasant concepts. The easy-to-use nature of comic creation software makes it easy to implement in educational settings, allows for critical reflection on technology integration, and addresses complex challenges through engaging storytelling.

Furthermore, Istiq'faroh and Mustadi's research highlights that digital comics increase student engagement and motivation. The visual appeal of comics aids in information retention, while flexibility in story composition fosters creativity. Integration into the curriculum supports the development of 21st-century skills, although it requires technological facilities such as computers or laptops, which can pose challenges for some institutions.

Research from Arief, Mujahidin, and Hartono emphasized that digital comic media arouses students' motivation and interest. Their research shows that multisensory engagement improves student learning outcomes, and well-structured implementation significantly improves student grades. Emotional engagement aids memory retention during learning, while technology integration improves the acquisition of knowledge and skills. The fun atmosphere promoted by digital comics creates effective learning conditions.

Research by Fitria, Malik, Halili, and Amelia shows that digital comics increase student engagement and interest in learning. Engaging visuals and storylines make it easy to understand the content, while the contextual relevance of the story aids in understanding scientific concepts. Their research also shows that a problem-based learning approach encourages active participation and fun, fostering a positive attitude towards learning through fun media. Research (Rutta et al., 2021) focuses on engagement and collaboration among children, which improves learning outcomes. They found that the ease of use of tools like ComicsCLIL made it easy for children to adopt quickly. Digital storytelling effectively combines graphic and textual elements, with pre-defined resources that support children with limited drawing skills. Teachers value the clarity of digital activity over traditional methods, noting that digital narratives often present a complete story structure with higher coherence.

Moreover (Apostolou & Linardatos, 2023b) emphasizing the importance of effective instructional design in increasing the educational benefits of digital comics.

They argue that students' involvement in active cognitive processing is essential, although limited time can increase mental demands and affect performance. The clear presentation of information aids in understanding and reduces cognitive load, while the use of multimedia principles supports effective learning outcomes. Familiarity with comic elements enhances the student's creation process, and the availability of character images minimizes the additional cognitive load.

The successful implementation of digital comic strips in education depends on several key factors: student engagement and motivation, effective instructional design, proper technology integration, flexibility in creation and presentation, and the ability to convey complex concepts through compelling visual narratives. While digital comics offer great potential to enhance the learning experience, foster creativity, and develop 21st-century skills, their application requires investment in technological facilities and additional efforts from educators. The challenge lies in balancing these factors to create an effective and engaging learning environment that maximizes the benefits of digital comic strips while overcoming potential bottlenecks.

Discussion

The purpose of this study is to analyze empirical evidence regarding the potential application of digital strip comic media in improving students' writing skills, taking into account the factors of students' learning interests. The reported 40% increase in writing skills illustrates the great potential of this medium. Findings (Istiq'Faroh et al., 2020) which showed higher post-test scores in the group that used digital comics emphasized the effectiveness of this media in improving narrative writing skills. The advantages of digital comics in facilitating the understanding of story structure and writing production are in line with the theory of multimodal learning, where the combination of visual and textual elements allows students to more easily understand and apply narrative concepts in their writing. This is consistent with previous research that shows the effectiveness of visual media in improving narrative writing skills (Soyuçok & Musa, 2021).

In addition, findings from various studies consistently show that digital comic strips increase students' interest and involvement in the learning process. This increase in motivation and engagement can be explained through the theory of multimedia learning which states that the combination of visual and textual elements can improve cognitive processing and information retention (Hadie et al., 2021; Wong & Adesope, 2021). The results of Sockman et al.'s research showing that digital comics encourage critical reflection and provide a safe medium for difficult concepts, confirm the potential of this medium in creating a conducive learning environment. This finding is in line with the theory of social constructivism which emphasizes the importance of interaction and dialogue in the learning process. The analysis of various studies also revealed several key factors influencing the successful implementation of digital comic strip media, including effective instructional design, proper technology integration, ease of use, contextual relevance, and active learning approach(Ermiana et al., 2024)

Apostolou and Linardatos' findings emphasize the importance of instructional design in maximizing the educational benefits of digital comics, suggesting that the effectiveness of media depends not only on the technology itself, but also on how it is integrated into the learning process. The need for technological facilities such as computers or laptops, as mentioned by (Istiq'Faroh et al., 2020), indicating that technology infrastructure is an important factor in successful implementation. Findings (Rutta et al., 2021) about the ease of use of tools such as ComicsCLIL emphasizes the importance of accessibility and user-friendliness in the adoption of educational technology. Research (Fitria et al., 2023) which shows that the contextual relevance of stories helps understanding scientific concepts, emphasizing the importance of

connecting learning content with real experiences of learners. Findings on the effectiveness of problem-based learning approaches and active participation suggest that digital comics are most effective when used in the context of learner-centered learning. These findings have important implications for pedagogical practice, where educators need to consider the integration of digital comic strip media as a tool to improve writing skills and learning interests, design learning activities that harness the visual and narrative power of digital comics to encourage critical thinking and creativity, and focus on teacher professional development in the use of digital comic-based technology and instructional design.

While these findings are promising, there are some limitations in the studies reviewed, including limited context variation (the majority of studies were conducted in primary and secondary education contexts), relatively small sample sizes in some studies, a focus on short-term effects, and limited exploration of the use of digital comics in a variety of subjects. By considering these findings and following up on suggestions for further research, it is hoped that the implementation of digital comic strip media can be optimized to improve the quality of learning, especially in the development of writing skills and increasing students' interest in learning.

CONCLUSION

Based on the systematic literature review of 11 articles, this study has identified strong evidence that the implementation of digital comic strip media has significant potential in improving students' writing skills and learning interests, demonstrated by a notable 40% improvement in writing skills and consistently higher post-test scores in narrative abilities. The findings reveal that digital comics not only enhance story structure understanding and creative expression but also significantly increase student engagement and motivation through their multimedia nature, combining visual and textual elements that support various learning styles. Success factors include effective instructional design, proper technological infrastructure, and an active learning approach. Therefore, it is recommended that educational institutions invest in necessary infrastructure, provide teacher professional development in digital comic integration, develop comprehensive implementation guidelines across subjects, and create specific assessment frameworks, while future research should explore the long-term impact across different educational levels and cultural contexts to ensure sustainable and effective integration of this medium in educational settings.

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