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Development of an Interactive PDF-Based E-Module Using ChatGPT in Learning to Write Short Stories in Junior High School

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ABSTRACT

The development of artificial intelligence (AI) technology has brought significant changes in the world of education, including in Indonesian language learning at the junior high school (SMP) level. One form of AI utilization that has the potential to support writing learning is the use of ChatGPT as an aid in developing ideas, composing texts, and providing initial feedback. However, the use of this technology requires teaching materials that are structured, directed, and aligned with the curriculum so that they can be used pedagogically and responsibly. This study aims to develop an interactive e-module entitled Innovative Short Story Writing Strategies Using ChatGPT and analyze the level of validity, practicality, and effectiveness of the e-module in improving the short story writing skills of eighth-grade junior high school students.
The research method used is research and development (R&D) with the stages of needs analysis, product development, expert validation, trials, and evaluation. The research subjects consisted of 22 eighth-grade junior high school students. The research instruments included validation sheets from material experts, media experts, and learning practitioners, a practicality questionnaire, and a short story writing ability test through a pretest and posttest. Data collection techniques were carried out through observation, documentation, questionnaires, and written tests. Data were analyzed using descriptive analysis and inferential statistical analysis through a Paired Sample t-Test. The results of the study showed that the developed interactive e-module was declared valid by experts with several minor revisions to the visual design aspect, practical for use in learning, and effective in improving students' short story writing abilities. The results of the statistical test showed a significant value of <0.05, which indicated a significant difference between the pretest and posttest scores. Thus, the ChatGPT-based interactive e-module is suitable for use as an Indonesian language learning medium in junior high schools and contributes to strengthening digital literacy, creativity, and the ethical and pedagogical use of technology.

Keywords: Interactive e-modules, ChatGPT, short story writing

INTRODUCTION

The development of information and communication technology as a teaching tool has fundamentally transformed the learning process. Digital developments in education are no longer merely a replacement for print media, but have evolved into interactive tools capable of facilitating personalized, collaborative, and adaptive learning. One example of this

innovation is interactive PDFs, which integrate interactive elements into learning materials, supporting student engagement and understanding.

As educators, teachers are tasked with managing and developing learning resources. Developing teaching materials, such as modules or digital materials, is essential to improving learning outcomes and tailoring them to students' specific needs, interests, and talents. Developing interactive PDF-based digital guides can be a strategic alternative for improving the quality of creative writing instruction in junior high schools (SMP).

At the same time, advances in artificial intelligence (AI), particularly large-scale language models like ChatGPT, are opening up new possibilities for providing feedback, facilitating ideation, and assisting with the writing process. When students utilize external support, their writing skills improve. A meta-analysis of 406 intervention studies (Graham, S., Kim, Y.S., Cao, Y., Lee, J.W., Tate, T., Collins, P., & et al., 2023) tracked the reported effects of instruction that de-constrained the writing process and found that peer support, teacher feedback, or computer-assisted instruction resulted in richer ideas, stronger organization, and increased writing knowledge and motivation. Numerous studies demonstrate that AI plays a significant role in learning and can even impact students' academic performance (Maamor, H., Achim, N., Ahmad, N., Roszaman, N., Anuar, N., Azwa, N., & et al, 2024). AI's ability to process, analyze, and generate content that students need can shift the paradigm of student collaboration (Kuka, L., Hörmann, C., & Sabitzer, B., 2022). Furthermore, numerous studies have shown that AI technology can provide personalized learning support to meet the needs and learning styles of each student (Hasan & Rahman, 2024).

In the context of writing instruction, ChatGPT can assist students in various stages, from pre-writing (brainstorming ideas, character and plot development), through the writing process (drafting), to post-writing (revision and reflection). This aligns with the cognitive model of writing proposed by Flower and Hayes (1981), which divides the writing process into several stages: planning, translation, review, and monitoring. Integrating ChatGPT into writing instruction has the potential to improve the efficiency and quality of the learning process. Students can obtain rapid feedback, new ideas, and more effective language improvement.

However, the use of AI also has limitations. The feedback generated by ChatGPT is mechanical and cannot fully replace the role of teachers in providing affective guidance and context-based assessment. Clear guidelines for the use of ChatGPT are needed to ensure its ethical use and support educational goals. The context of learning to write short stories at the junior high school level has its own characteristics. At this stage, students are in a phase of cognitive and affective development that demands a contextual, process-oriented learning approach that facilitates the development of imagination and language skills. Previous research in the Indonesian context has shown that systematic, interactive, and literacy-appropriate short story writing teaching materials can significantly improve their writing skills. Therefore, the development of an interactive PDF-based digital guide that integrates ChatGPT is expected to help students learn to write in a more engaging and productive way.

The use of ChatGPT in schools must be accompanied by an understanding of the ethics of AI use, including issues of plagiarism, originality of work, content accuracy, and personal data protection. The Indonesian government has emphasized the importance of implementing AI ethics through Circular Letter of the Minister of Communication and Information Technology Number 9 of 2023 concerning the Ethics of Artificial Intelligence, which encourages the responsible use of AI based on humanitarian values (Menkominfo, 2023). Based on the theoretical study and

empirical conditions, it can be concluded that the world of education requires learning media that are not only technologically interactive, but also pedagogically relevant and ethical. The development of an Interactive PDF-Based Digital Guide that integrates ChatGPT in short story writing learning in junior high schools is a strategic step to address this need. This guide is expected to be able to: provide a systematic learning structure for short story writing that is appropriate to the characteristics of junior high school students; present interactive learning activities that involve ChatGPT as a tool for ideation and text revision; strengthen digital literacy and ethical use of technology; and increase student motivation, creativity, and learning outcomes in short story writing.

Based on the above explanation, a practical need arises to develop an Interactive PDF-Based Digital Guide that integrates the use of ChatGPT into short story writing learning materials for junior high school level. The development of this Interactive PDF teaching material is not only a response to technological trends, but also a strategic step to enrich the practice of learning to write short stories at the junior high school level. An empirically tested guide compiled based on research evidence can be a real contribution to improving the quality of students' creative literacy as well as a practical guide for teachers in utilizing ChatGPT responsibly. Therefore, this research is focused on designing, developing, and testing an Interactive PDF-Based Short Story Writing Guide: Utilization of ChatGPT in Learning to Write Short Stories at the junior high school level with the aim of producing a valid, practical, and effective product as an innovative teaching material.

LITERATURE REVIEW

A. Use of Information Technology in Education

Today's technological developments have brought about significant changes in various aspects of life, including education. One of the most prominent aspects is the use of communication media and information technology to support the learning process, which is no longer limited to printed books or blackboards, but has evolved into digital technology-based teaching materials that enable broader, more flexible, and more interactive interactions between teachers, students, and learning resources (Bates & Poole, 2003). From an educational perspective, the use of teaching materials in the form of information technology plays a strategic role in improving the quality of learning. According to Warsita (2018), technology-based teaching materials can accelerate the process of information transfer, expand access to education, and facilitate the creation of more meaningful educational interactions.

B. Digital & Interactive PDF-Based Learning Materials

Modern technology as an innovation of digital learning is any form of technology-based software or platform used to convey learning messages in a more interactive, flexible, and engaging manner compared to conventional materials or methods (Munir, 2017). According to Arsyad (2020), digital-based teaching materials have characteristics that are able to present a combination of text, images, audio, video, and animation so as to stimulate more of the students' senses. Thus, the information received becomes easier to understand, remember, and apply in real life. Research conducted by Kuswanto & Walusfa (2017) shows that the use of digital-based teaching materials in learning is proven to increase student motivation and learning outcomes, due to its interactive nature and suitability to the learning styles of today's digital generation.

C. PDF Interactive

An interactive PDF is a PDF-based digital document equipped with interactive elements. Interactive PDFs are a development of Portable Document Format (PDF) digital documents, complemented by

interactive features such as hyperlinks, navigation buttons, quizzes, videos, and answer fields. The study "The Development of Electronic Students' Worksheets Assisted by Flip PDF Professional in Natural Science Lessons to Improve Students' Higher-Order Thinking Skills" shows that electronic worksheets produced via Flip PDF Professional are categorized as interactive, used as electronic teaching media with interactivity attributes (student answers, visual media, navigation) that help improve HOTS (higher-order thinking skills) (Farah, Sri, & Ulin, 2022).

The main advantage of interactive PDFs is their flexibility, ease of access on various devices, and the ability to be used both offline and online (Risma and Durinda, 2022). This makes interactive PDFs an alternative learning medium that contains materials and guides, making them practical and effective, especially in schools that still face limited internet access.

D. AI & LLM ChatGPT in Teaching Writing

One increasingly prominent innovation is the use of Artificial Intelligence (AI) and Large Language Models (LLM). AI is defined as a computer system designed to mimic human intelligence through the ability to learn, reason, and make data-driven decisions (Russell & Norvig, 2010). In language learning, AI plays a crucial role as a tutoring system capable of providing automated feedback, fostering creative thinking, and facilitating student text production. LLM itself is a form of generative AI trained using a large text corpus, enabling it to predict the next word, construct sentences, and produce coherent and contextual text (Bommasani, R., Hudson, D.A., Adeli, E., Altman, R., Arora, S., Arx, S.V., & et al, 2021).

E. Learning to Write Short Stories in Junior High School

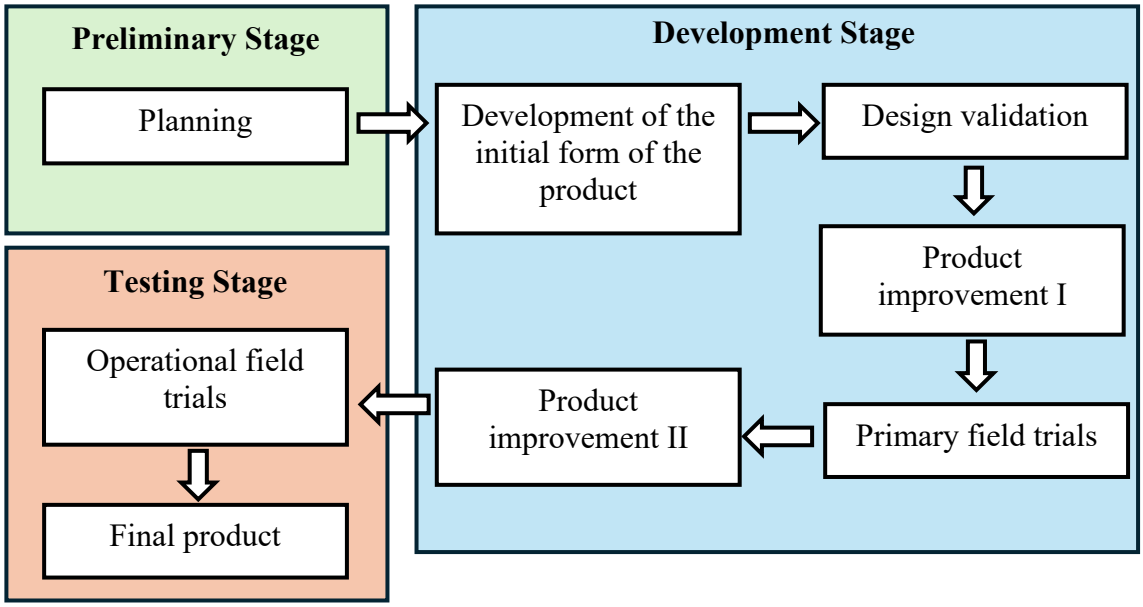
According to Achriyati, Indriani, & Suminah (2022), writing is one aspect of language skills that students express their ideas and opinions in written form. Writing is an integral part of the entire learning process experienced by students while studying at school. In writing learning activities, students are guided to be able to communicate in written language, such as writing short stories. According to Harahap (2022), a short story is a type of story that is a form of fiction that is short, its length can be only one page. The short story in its abbreviation and density remains bound to a unity of spirit, short, concise, and complete. Furthermore, Prassetia (2023) suggests that writing short stories is one of the language skills that has great potential for the development of reasoning.

Tarigan (2008) emphasized that writing is a productive and expressive language skill, so that through short story writing activities, students are trained to organize ideas in a coherent, logical, and communicative manner. Characteristics of Short Story Writing Learning in Junior High School Short story writing learning has several specific characteristics, namely: Oriented to student experience: Students are directed to write based on personal experiences, the surrounding environment, or imagination that is close to their world. Creative: Emphasis is placed on freedom of expression, while still paying attention to the rules of short story writing (plot, characters, setting, conflict, and theme). Integrating other language skills: Short story writing activities also involve reading (to find ideas), speaking (discussing ideas), and listening (listening to stories for inspiration). Process-based: Learning is carried out through the stages of writing, starting from pre-writing (brainstorming), draft writing, revision, to publication.

MATERIALS & METHODS

The type of research used to regard "Development of an Interactive PDF-Based Digital Guide for Utilizing ChatGPT in Short Story Writing Learning in Junior High School" is R&D or better known as Research and Development (R&D). The reason why R&D is suitable is what is

mentioned above, in line with the opinion of Sugiyono (2017: 297) that this development research method is used to produce certain products and test the effectiveness of these products. This is also based on the opinion of Brog and Gall (1983) in Emzir (2015: 263) who stated that development research is based on industry that uses research findings in designing new products and procedures. Through this research, the model is systematically tested in the field, evaluated, and improved until specific criteria regarding effectiveness, quality, or the same standards are obtained.



Research on learning to write short stories with PDF Interactive at Al Hikam Middle School was conducted on 22 class VII B students in the Indonesian Language subject in the 2025/2026 academic year.

Data collection was conducted through a user trial questionnaire of the product as a teaching medium in short story writing learning using PDF Interactive, administered to teachers and students. The questionnaire was given to determine teachers' and students' responses to the PDF interactive media through two stages: a limited trial and a broader trial or actual learning class. Responses to the limited trial served as input for improvements before being tested in the broader trial class or learning class.

Data analysis from the expert questionnaire results was carried out by finding the average Likert scale score for each aspect or domain. The conclusions from this analysis were used to revise the developed teaching media. The assessment was conducted using the criteria 1 = less, 2 = sufficient, 3 = good, 4 = very good. The average results of the questionnaire assessment were then calculated using the following formula:

$$\text{Score} = \frac{\sum \text{score obtained}}{\sum \text{score max}} \times 100$$

In addition to the formula for testing the feasibility of using interactive PDF media, the author also used the N-Gain formula to test the feasibility of the product's effectiveness. Data for this N-Gain calculation was obtained from student scores before and after using the product. The manual calculation formula for the feasibility of the N-Gain effectiveness can be calculated using the following equation (Hake, 1998).

$$\text{N-Gain} = \frac{\text{postest score} - \text{pretest score}}{\text{skore max} - \text{pretest score}}$$

N-Gain Index Criteria:

1. Score (g) ≥ 0.70 high/adequate/effective category
2. Score 0.30 ≤ (g) ≥0.70 moderate/fair enough/fairly effective category
3. Score (g) < 0.30 low/inadequate/ineffective category

RESULT

The research subjects in this chapter were 22 grade VII.B students in the Indonesian Language subject in the 2025/2026 academic year. The instrument used was a short story writing skills test compiled based on short story writing learning indicators at the junior high school level. The assessment of short story writing results was carried out using an assessment rubric that included aspects of idea and theme development, storyline, characters and characterization, setting, and use of written language. The scores obtained by students were then analyzed descriptively quantitatively to determine the tendency of initial abilities, final abilities, and the level of improvement in learning outcomes.

Table 1 Students' Pretest Scores

No	Range Score	Category	Students
1	17-20	Very good	0
2	13-16	Good	0
3	9-12	Enough	11
4	5-8	Deficient	11
Students			22

A pretest was conducted at the beginning of the learning activity with the aim of determining students' initial abilities at writing short stories before being given treatment in the form of an interactive PDF-based e-module with the use of ChatGPT. This test was designed to measure students' mastery of important aspects of short story writing, including theme development, plot, characterization, setting, point of view, and language use. Based on the data in Table 1, of the 22 students, the majority obtained a predicate of less than or sufficient, while no students achieved a predicate of good or very good. Most students were not yet able to develop story ideas coherently and completely, and still experienced difficulties in building conflict and story resolution. In addition, the use of language in the short stories written by students tended to be simple, lacked variety, and did not demonstrate optimal creativity.

Table 2 Students' Posttest Scores

No	Range Score	Category	Students
1	17-20	Very good	5
2	13-16	Good	11
3	9-12	Enough	6
4	5-8	Deficient	0
Students			22

Based on the data in Table 2, students' posttest scores ranged from 10 to 17. Compared to the pretest, there was a significant improvement. Most students achieved good grades, with some even achieving excellent grades. This indicates positive development in their short story writing skills after participating in the GPT Chat-assisted e-module learning. Qualitatively, the improvement in students' abilities was evident in several assessment aspects. Students began to develop story themes more clearly and purposefully. The written storylines exhibited a more coherent structure, with logical conflicts and resolutions. Furthermore, the depiction of characters and settings in students' short stories became more detailed and vivid compared to the results of their writing in the pretest stage. Language use also showed improvement, both in terms of vocabulary choice and sentence clarity.

This improvement can be attributed to the learning characteristics that emphasize a step-by-step writing process. The e-module provides systematic guidance for composing short stories, while the ChatGPT serves as a tool that provides initial feedback and stimulates ideas.

After conducting a pretest and posttest, this study conducted an N-Gain to determine changes in students' short story writing skills after participating in learning using an interactive PDF-based e-module utilizing ChatGPT. The data analyzed were short story writing test scores obtained before

treatment (pretest) and after treatment (posttest) on the same subject group. This analysis aims to numerically describe the level of improvement in students' learning outcomes and the overall trend of changes in short story writing skills.

Table 3 N-Gain

N-Gain	Students
>= 70	4
< 30	2
30<x<70	16
Students	22

Based on Table 3, all students experienced an increase in their scores after participating in learning using the ChatGPT -assisted e-module. The gain scores obtained by students varied, with the lowest increase being 1 point and the highest being 10 points. This variation in gain scores indicates differences in the level of development of short story writing skills among students, which is influenced by initial abilities, involvement in learning, and the intensity of use of the e-module and ChatGPT. This increase indicates that, classically, students' short story writing skills experienced positive development after the treatment was given.

DISCUSSION

A classical comparative analysis of pretest and posttest scores was conducted to determine changes in students' short story writing abilities across the entire class, not just specific individuals. This analysis is important to observe general trends (class trends) as a basis for assessing the effectiveness of the learning implemented. In the context of this study, classical analysis was used to assess whether short story writing learning using interactive PDF-based e-modules utilizing ChatGPT had a positive overall impact on class VII.B students. Classically, pretest and posttest data were analyzed by comparing average scores, distribution of assessment categories, and changes in the proportion of students in each ability category.

A comparison of the distribution of pretest and posttest categories shows a shift in students' abilities from the lower to the higher categories. In the pretest stage, the dominance of the less and sufficient categories reflects students' limitations in understanding and applying short story elements comprehensively. After the learning process was implemented, the distribution of posttest categories showed that students were able to develop short stories with a clearer structure, a more coherent plot, and more effective use of language. This shift in category distribution can be interpreted as an indicator of the success of learning to write short stories using the ChatGPT -assisted e-module.

In general, students' improvement in short story writing skills can be analyzed through several key assessment aspects, namely story idea development, plot development, character and setting descriptions, and language use. In the pretest, most students still had difficulty developing story ideas into a coherent and coherent plot. The resulting short stories tended to be simple descriptive, with unclear conflicts and immature resolutions. After participating in the learning process, posttest results showed that students began to be able to compose short stories with a clearer structure, characterized by a logical introduction to the story, conflict, and resolution.

This improvement in skills is inseparable from a learning approach that emphasizes a step-by-step writing process. The e-modules used in learning provide systematic guidance from the planning and development stages to short story revision. Students no longer write spontaneously without direction, but rather follow clear stages. Furthermore, the use of ChatGPT in learning contributes to improving students' ability to develop ideas and vocabulary. ChatGPT serves as a source of stimulus that helps students discover story ideas, develop conflicts, and enrich word choice. However, the use of ChatGPT remains directed and controlled by the teacher so that students do not become completely dependent on

technology. With this approach, ChatGPT acts as a cognitive tool that supports students' thinking processes.

Thus, the analysis of students' short story writing skills demonstrated that learning using interactive PDF-based e-modules with the use of ChatGPT helped students navigate the writing process in a more focused and systematic manner. This improvement was reflected not only in improved grades but also in changes in the quality of their writing and their attitudes toward writing.

Although this research on the development of an interactive PDF-based e-module utilizing ChatGPT in short story writing learning demonstrated effective results in improving students' short story writing skills, it still has several limitations that need to be objectively acknowledged. These limitations include the limitations of the research design, the limitations of the subjects and research locations, the limitations of the use of GPT Chat, and the limited timeframe for implementation. Therefore, this research cannot yet describe the sustainability of students' short story writing skills in the long term. Despite these limitations, the results of this study still have significant academic and practical value. It is hoped that these limitations can serve as a basis for further research to develop more comprehensive research designs, involving a wider range of subjects, and exploring the use of artificial intelligence in writing learning in greater depth and sustainability.

CONCLUSION

This research resulted in an interactive PDF-based e-module designed to support short story writing learning by utilizing artificial intelligence technology, specifically ChatGPT. The developed e-module has gone through systematic research and development stages, starting from needs analysis, design, development, to testing the effectiveness of learning. In general, the interactive PDF-based e-module with the use of ChatGPT is declared effective in improving students' short story writing skills. This is evidenced by a significant increase in student learning outcomes based on a comparison of pretest and posttest scores, as well as the results of calculating learning effectiveness using N-Gain.

The developed e-module is systematic, interactive, and oriented towards the gradual process of writing short stories, from prewriting, drafting, to revision. The integration of ChatGPT in the e-module serves as a learning aid (scaffolding) that supports students in developing ideas and composing stories in a more directed manner. The use of e-modules and ChatGPT has a positive impact on the learning process, including increased student engagement, increased confidence in writing, and improved ability to compose short stories with a clearer and more coherent structure. Learning becomes more contextual, adaptive, and in line with the needs of students in the digital era.

Declaration by Authors

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