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The impact of interactive multimedia incorporating local cultural content and project-based learning on Junior High School Student writing skills

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Abstract

This study investigated the effectiveness of interactive multimedia incorporating local cultural content and Project-Based Learning (PBL) on the writing skills of junior high school students. Utilizing a quasi-experimental design with a non-equivalent control group, the research involved pre-tests and post-tests for both experimental and control groups. The experimental group engaged with the Pontdaloka application, an interactive multimedia tool enriched with Pontianak's local cultural elements, while the control group utilized traditional PowerPoint presentations. Data analysis using independent sample t-tests revealed a significant improvement in students' writing skills in the experimental group, with a significant value (2-tailed) of 0.003, t-score of 3.043, and t-table of 1.671. These findings suggest that interactive multimedia combined with local cultural content and PBL enhanced students' writing skills more effectively than conventional teaching methods. The study underscores the importance of integrating local culture in educational media to create engaging and relevant learning experiences, thereby improving academic performance and fostering a deeper appreciation for cultural heritage.

Keywords: interactive multimedia, local culture, writing skills, Project-Based Learning, junior high school students

Public Interest Statement

This research underscores the critical convergence of technology, education, and cultural preservation by exploring how interactive multimedia and Project-Based Learning (PBL) integrated with local cultural content affect junior high school students' writing skills. The study utilized the Pontdaloka application, incorporating aspects of Pontianak's local culture. This innovative approach enhances academic performance and deepens students' appreciation for their cultural heritage, making learning more engaging and relevant. This study offers valuable insights for educators, policymakers, and technology developers who strive to create inclusive and effective educational tools by showcasing the advantages of merging modern technology with culturally responsive instruction. Integrating local culture into educational content can be pivotal in preserving cultural identity while equipping students with the essential skills needed for their academic and professional futures.

Introduction

Writing skills are crucial for junior high school students as they enhance communication, critical thinking, and creativity. Students who write proficiently can clearly and persuasively express their ideas, which is essential for academic success and future careers. As they advance, the ability to write organized and coherent texts becomes increasingly essential, impacting their performance across subjects and standardized tests. Good writing involves proper grammar, punctuation, spelling, and clear handwriting (Hajimia et al., 2020). Additionally, mastering various types of writing—such as expository, persuasive, procedural, narrative, and descriptive—prepares students for diverse writing tasks.

Traditional writing instruction methods, while somewhat effective, often fail to engage students or fully meet their diverse learning needs. The advancement of technology in education has transformed classroom learning processes (Shah, 2022; Daramola, 2022). One significant innovation is interactive multimedia, which combines text, audio, video, and interactive elements to create an engaging learning experience. Modern foreign language teaching emphasizes collaborative participation between teachers and students, with interactive classroom teaching gaining prominence (Hsin, Mu, & Selman, 2021). Multimedia technology complements traditional teaching methods by enhancing them rather than replacing them (Vidal-Hall, Flewitt, & Wyse, 2020). Teachers should use multimedia judiciously, ensuring that English classes remain focused on learning and not merely showcasing technology, avoiding a shift from traditional "human irrigation" to "machine irrigation" (Zou, 2023). Maintaining a manageable teaching pace is essential for students to keep up with the content (Ioannou & Ioannou, 2020; Pavlou, 2020).

Interactive media helps teachers find effective learning tools, increase student motivation, and foster active learning. By helping students understand concepts from various perspectives, interactive multimedia makes the writing process more dynamic and enjoyable, capturing students' interest and motivating them to develop their writing skills across various genres (Yu, 2023). Integrating technology in English language classrooms helps overcome obstacles in language learning (Knox, 2020), particularly in writing tasks where time constraints often arise (Kessler, 2020; Rahimi & Fathi, 2022; Wang, 2022). With technology and online platforms widely available, learners can now practice writing skills anytime and anywhere (Yan, 2023). Despite this potential, many teachers still rely on conventional methods, even though most students have smartphones that could support innovative technology-based learning (Rejekiningsih et al., 2023).

Incorporating local culture into educational content enriches the learning experience by making it more relevant and relatable to students. Local culture positively influences learning and supports national progress (Yaqin et al., 2024). When students see their culture reflected in learning materials, it boosts engagement and helps them connect more deeply with the subject. Language and culture are intertwined, as students learn languages through their environment (Munajah et al., 2023). Cultural integration is particularly effective in Project-Based Learning (PBL), where students work on real-world projects that require applying their writing skills in meaningful contexts (Chiu, 2020). PBL promotes active learning, collaboration, problem-solving, and critical thinking (Issa & Khataibeh, 2021). By engaging in projects that incorporate local cultural elements, students practice writing in different genres, such as narratives based on local folklore or persuasive essays on community issues. The combination of interactive multimedia and local culture within a PBL framework can significantly enhance junior high school students' writing skills.

Research on teaching writing skills using interactive multimedia combined with PBL and local cultural content is notably scarce. While technology integration in education (Ayob et al., 2022; Bland, Guo, & Dousay, 2024; Carrión-Robles, Espinoza-Celi, & Vargas-Saritama, 2023; Fathimah et al., 2023; Widodo et al., 2020; Zou, 2023) and PBL implementation (Alemneh & Gebrie, 2024; Arochman et al., 2024; Issa & Khataibeh, 2021; Loyens et al., 2023) have been comprehensively studied, the specific focus on multimedia tools enhancing writing skills through culturally relevant materials remains underexplored. This gap highlights a missed opportunity to develop pedagogical strategies that are both technologically innovative and culturally responsive, enriching the educational experience and outcomes for students worldwide.

This study's novelty lies in its focus on using interactive multimedia with local cultural content in West Kalimantan, Indonesia. There is a lack of Indonesian language learning media integrated with local culture to improve junior high school students' writing skills. Therefore, this research aimed to describe and explain the effect of interactive multimedia integrating local cultural content on junior high school students' writing skills, particularly in mastering various writing genres, including descriptive, narrative, and procedural texts.

Literature Review

Interactive multimedia

Multimedia employs computers to convey graphics, video, text, sound, and animation, offering a rich and interactive experience that enhances meaning (Abdulrahman et al., 2020; Guan et al., 2018; Obodo et al., 2022). It effectively illustrates phenomena, simulates complex concepts, and presents information at various abstraction levels, thereby enhancing the significance of learning (Shah & Khan, 2015). Smaldino et al. (2012) categorize multimedia into kits, hypermedia, interactive media, virtual reality, and expert systems. Multimedia kits combine different media types centered around a single topic, while hypermedia involves non-linear materials. Interactive media blends visual, sound, and video elements under the learner's control.

Interactive multimedia integrates text, images, videos, and animations within a single application (Deliyannis, 2012; Ussher et al., 2014). Its application in education significantly increases student engagement (Dousay, 2016), creates a positive learning atmosphere (Chipangura & Aldridge, 2017), and improves cognitive outcomes (Ramdani, 2016). It serves as a versatile platform for disseminating

information, guiding investigations, and encouraging students to make decisions. Accessible on various devices, it supports flexible learning, aligning with Gen Z's preference for on-the-go education (Widodo et al., 2020).

In educational contexts, interactive multimedia combines text, audio, video, graphics, and animation to create a cohesive and engaging learning experience. This approach captivates students and enhances learning outcomes by fostering a dynamic and interactive environment. Unlike traditional methods, it uses animations, simulations, and interactive videos to motivate learners (Mayer, 2009). Engaging multiple senses reinforces learning and aids in long-term memory retention (Clark & Mayer, 2023). Adaptive learning technologies within interactive multimedia personalize content to meet individual student needs, accommodating diverse learning styles and paces (Kay, 2012). Features like quizzes and interactive exercises provide instant feedback, helping students identify areas for improvement and reinforce learning through immediate correction (Moreno & Mayer, 2007).

Interactive multimedia is a groundbreaking teaching tool that promotes student achievement through active, instruction-based learning, facilitating skill mastery (Adeyele, 2024). Teachers use various media to discover the most effective communication methods for their students (Huang & Hung, 2022). It transforms abstract concepts into concrete ideas, quickly presents large amounts of information, stimulates student interest, and helps teachers monitor student progress (Abdulrahman et al., 2020).

With the integration of the internet, students can access a vast array of resources and information. Multimedia applications that link to external content further enrich the learning experience (Laurillard, 2013). Interactive multimedia is especially effective in language learning, providing immersive environments for practicing speaking, listening, and writing (Chiu & Churchill, 2016). To maximize the benefits of multimedia, proper training and ongoing technical support for teachers are essential (Lawless & Pellegrino, 2007). Interactive multimedia revolutionizes education by making learning more engaging, effective, and accessible. It caters to various learning styles and needs, offering a versatile tool for modern educators. As technology evolves, the potential for interactive multimedia in education will continue to grow, providing innovative ways to enhance the learning experience.

Local culture

Culture represents a community or nation's shared social ideas, habits, and behaviors (Ab Aziz et al., 2019). Local culture, in particular, is a dynamic system that evolves within tribes, holding significant intrinsic value (Kasanova et al., 2024). It encompasses a community's unique values, ethics, norms, rules, and skills, assisting them in addressing sustainability challenges. Local culture adapts to the surrounding environment through knowledge, conceptual ideas, cultural values, and practices (Baruadi et al., 2024). Thus, local culture can be seen as a recognized and evolving system of a local ethnic community. In Indonesia, local culture can be integrated into learning media as complementary content, aligning with culturally contextual-based learning. This integration significantly shapes educational practices and outcomes, influencing curriculum content, teaching methods, and educational goals. Understanding the intersection between local culture and education can help design more effective and culturally relevant educational systems. Junaidi, et al (2024) did research about folktales entitled *Beteri and Sinamnam*, *Bujang Bekurung*, and *The Kindness of Beteri*. It can be concluded that as a local culture, fictional stories about *Beteri*, consistently convey the admirable values of character. Folktales serve as a conduit

for imparting knowledge concerning the natural environment and social mores to children (Junaidi, et al, 2024).

Curriculum content is deeply influenced by local culture. In many Indigenous communities, the curriculum includes traditional knowledge, languages, and history, preserving cultural heritage while ensuring education is meaningful and relevant to student's lives (Smith, 2012). By integrating local culture into the curriculum, educators provide students with a sense of identity and belonging, fostering more profound engagement with their studies. Teaching methods also vary significantly based on cultural norms. A great education cannot be separated from internalization of good character values for students because they should not only be good at academics but also having good character (Junaidi, 2017). A child is surely expected to have good characters and personality early (Cahyani & Junaidi, 2019). In some cultures, the education system is predominantly teacher-centered, emphasizing rote learning and respect for authority, as seen in many Asian countries. In contrast, Western educational systems often promote student-centered learning, encouraging critical thinking, creativity, and collaboration. This approach fosters an environment where students actively participate in their learning, developing essential skills for problem-solving and innovation (Hofstede, 1986). The language of instruction in schools often reflects a region's linguistic diversity. Multilingual societies frequently use several languages in educational settings to cater to students' diverse linguistic backgrounds. This practice promotes inclusivity and enhances learning outcomes by allowing students to learn in their mother tongue, which can be more effective in early education. Additionally, it helps preserve minority languages and cultures, fostering a more inclusive and culturally rich educational environment (Garcia & Wei, 2014). Furthermore, the existence of folktale in learning can certainly had a positive impact on the development of student intelligence (Junaidi, et al, 2022).

Educational goals can differ significantly based on cultural priorities. Some cultures emphasize academic achievement and competitive success, driving students to excel in standardized tests and gain admission to prestigious universities. In contrast, other cultures prioritize holistic development, focusing on intellectual growth and emotional and social well-being (Noddings, 2003). This approach recognizes the importance of developing well-rounded individuals who can contribute positively to society. By acknowledging and integrating local cultural elements into the educational system, educators can create more relevant and effective learning experiences. This cultural sensitivity bridges the gap between students' home environments and educational experiences, leading to better educational outcomes and more inclusive societies.

Project-based learning

Project-Based Learning (PBL) is a widely recognized educational method defined in various ways across the research literature, each offering unique insights (Dolmans et al., 2016; Loyens et al., 2023; Zabit, 2010). Despite these varying definitions, PBL implementations share several core characteristics. Originating from McMaster University's approach (Spaulding, 1969), Barrows (1996) identified six fundamental traits of PBL. These include a focus on student-centered learning, small group collaboration guided by a tutor who acts more as a facilitator than a traditional teacher, and the introduction of real-life problems before any preparatory study. These authentic problems activate students' prior knowledge, revealing gaps that students address through self-directed learning, which includes ample time for self-study (Schmidt et al., 2009). Additionally, the PBL process itself follows a similar pattern across different

implementations. As Wijnia et al. (2019) highlighted, PBL typically consists of three stages: an initial discussion phase, a self-study phase, and a reporting phase. Students are presented with a meaningful problem, often rooted in real-world phenomena, which serves as a springboard for learning. These problems range from professional practices to specific events within a particular field.

One primary goal of PBL in educational institutions is to better equip students to handle complex issues in an ever-evolving world (Gijbels et al., 2005). This approach aims to teach students how to find and use information effectively, recognize when specific knowledge and strategies are needed, and develop well-founded explanations of significant disciplinary concepts (Loyens et al., 2012; McNeill & Krajcik, 2011). PBL also emphasizes collaborative learning, which enhances interpersonal communication skills, helping students to actively participate in discussions, draw conclusions, and address inconsistencies and unresolved issues (Loyens et al., 2008, 2012). Students develop robust problem-solving strategies by analyzing complex and ill-structured problems (Loyens et al., 2012). The domain-specific nature of PBL ensures that the knowledge and strategies acquired are directly applicable to students' future professional practices, thereby boosting their engagement, motivation, and interest (Hmelo-Silver, 2004; Larmer et al., 2015; Saad & Zainudin, 2022). Furthermore, the student-centered nature of PBL requires less directive roles from teachers, fostering an environment where students are encouraged to engage in self-directed learning activities (Schmidt, 2000). Srihati, et al (2024) state that implementing educational programs for students represents an endeavor to stimulate, guide, nurture, and offer learning activities that can foster young children's abilities and skills, irrespective of children's differences.

PBL promotes active participation from students at every stage of the learning process (Wanglang & Chatwattana, 2023). It is student-centered, emphasizing communication, cooperation, and autonomy (Becerra-Posada et al., 2022). PBL significantly impacts student learning by enhancing the overall learning experience, encouraging organized thinking, creativity, and creating a productive learning environment (Huang & Shideler, 2021; Padmadewi et al., 2023; Prachagoo, 2021). It motivates students to become more independent learners, improves teaching effectiveness, and fosters the development of students' knowledge, skills, and attitudes (Wurdinger, 2016; Uyen et al., 2023)especially in teacher education. Implementing online PjBL differs across subjects, bringing many benefits while posing challenges for educators and pre-service teachers. This systematic review aims to investigate the implementation, effectiveness and challenges of adopting PjBL in teacher education during the COVID-19 pandemic. The review provided a thorough overview of research on PjBL in teacher education during the COVID-19 pandemic, which was carried out using the systematic review methodology and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA. By promoting independent learning attitudes, PBL prepares students for the global community (Bagheri et al., 2020; Issa & Khataibeh, 2021), allowing them to freely express opinions, influence their learning process, and apply their knowledge in practical teamwork settings (Chen & Yang, 2019). Vasconcelos et al. (2012) outline four key stages in PBL: 1) the problem definition phase, where the problem and related questions are identified; 2) the planning and development phase, which involves project development in line with set objectives; 3) the implementation phase, which includes research and activities to tackle the problem; and 4) the dissemination and evaluation phase, where the process is evaluated.

Writing skills for junior high school students

Mastering a language involves developing proficiency in its four key skills: listening, speaking, reading,

and writing (Algaragere & Al-Khawaldeh, 2023). Among these, writing holds a notable place due to its profound impact on mental, academic, and occupational development (Abed, 2024; Mohammad, 2024; Price et al., 2024)students lag behind in developing writing skills including the paraphrasing ones. In order to deal with this situation, this study employs QuillBot, an AI-mediated and learner-centered tool, in a group pre/post quasi-experimental research to mend EFL students' writing and paraphrase skills Specific focus areas include summarization, grammar and spelling, rewriting sentences, sequencing sentences, identifying correct sentences, and matching phrasal verbs. 25 EFL students enrolled in the Technical Report Writing course and using QuillBot, an AI-mediated tool, comprised the research sample. Through pre- and post-experimental assessments, researchers assessed how well the students' writing skills performed both before and after the experiment. The dependent-sample t-test affected the post-test results. It was shown that the AI-mediated tool QuillBot significantly enhanced the writing skills of EFL students. Furthermore, a semi-structured interview was carried out to cross-validate the information gathered from the written samples. The semi-structured interview included questions about the students' observations and experiences using the instrument. The researchers suggested using QuillBot in a writing class to help students master writing and paraphrasing techniques in light of the findings. The results of the present research into the AI-mediated tool QuillBot may have ramifications for addressing other EFL teaching and learning issues.","author":[{"dropping-particle":"","family":"Mohammad","given":"Taj","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"World Journal of English Language","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2024"]]},"page":"211-219","title":"Challenging Traditional EFL Writing Classroom Using Al Mediated Tool: A Paradigm Shift","type":"article-journal","volume":"14"},"uris":["http://www.mendeley.com/documents/?uuid=4b4dc5dc-d26b-408f-b16b-7d9738f37f85","http://www.mendeley.com/documents/?uuid=a4f05510-e385-46b0-b8e8-fb7bae6b3e3e"]},{"id":"ITEM-2","itemData":{"DOI":"10.1177/23969415241227071","ISSN":"23969415","abstract":"Background and aims: Gender differences in the written language of autistic individuals are an overlooked but important area of research. We contend that the gender differences in spoken language of autistic individuals may extend to written language, mirroring the gender differences of writing in the general population and reflecting the shared dimensionality of oral and written language. Our research question was: Do autistic adolescent females demonstrate written language characteristics, across persuasive, expository, and narrative genres, that are distinct from those of autistic adolescent males and non-autistic (NA. Writing serves as a tangible manifestation of spoken language, enabling individuals to express their ideas, opinions, and emotions effectively (Algaragere & Al-Khawaldeh, 2023). Successful writing entails generating, organizing, and articulating ideas into coherent and engaging text (Nodoushan & Maibodi, 2017). Achieving this requires a solid understanding of grammar, a rich vocabulary, and logical coherence (Mehr, 2017).

This study focused on the writing skills of junior high school students in Indonesian subjects. Writing is crucial for their academic success and personal development. It is a vital tool for demonstrating knowledge across various subjects. Students who can effectively convey their ideas in writing tend to perform better on essays, reports, and exams, thereby achieving higher grades and academic success (Graham & Perin, 2007). Writing encourages students to organize their thoughts, analyze information, and construct arguments, thereby enhancing their critical thinking skills. It also fosters creative expression through stories, poems, and essays. Strong writing skills are essential for effective communication. Junior high school students who develop these skills are better equipped to articulate their thoughts clearly in both academic settings and everyday interactions (Fisher & Frey, 2015). Additionally, acquiring proficient writing skills early on prepares students for the demands of

high school, college, and professional careers, where clear and concise writing is often crucial. Writing also serves as a valuable means of self-expression, which is particularly beneficial during the junior high years—a period marked by significant personal and emotional development. Moreover, writing activities enhance reading comprehension and vocabulary, contributing to overall literacy development (Shanahan, 2004). In conclusion, the importance of writing skills for junior high school students cannot be overstated. These skills are fundamental for academic success, critical thinking, communication, future educational and career readiness, self-expression, and literacy development.

Method

Research design

This quasi-experimental study aimed to assess the effectiveness of interactive multimedia, incorporating local cultural content and Project-Based Learning (PBL), in teaching writing to junior high school students. The research employed a non-equivalent control group design, dividing participants into experimental and control groups. Both groups underwent pre-tests and post-tests; however, only the experimental group received the treatment (Creswell, 2014). The design is summarized in Table 1.

Table 1. Pre-test and post-test non-equivalent control group design

Group	Pre-test	Treatments	Post-test
Experiment	O_1	X	O_2
Control	O_2	-	O_2

Research data sources

The study population consisted of junior high school students in Pontianak City: 296 students (122 male, 174 female) from SMPN 13 Pontianak and 270 students (129 male, 141 female) from SMPN 10 Pontianak. A cluster random sampling technique was employed, where classes were randomly selected as subjects. A preliminary study was conducted to ensure the sample's relevance to the research objectives and problems. Using this sampling technique, 31 first-grade students (10 male, 21 female) from SMPN 13 Pontianak and 30 first-grade students (9 male, 21 female) from SMPN 10 Pontianak were selected. Students from SMPN 13 Pontianak formed the experiment group, while students from SMPN 10 Pontianak formed the control group.

Data collection and analysis techniques

Data collection involved assessing students' writing skills through pre-tests and post-tests. Students wrote descriptive, narrative, and procedural texts, aligning with the writing skills criteria for first-grade junior high school students. The experimental group used interactive multimedia with local cultural content and PBL, while the control group used PowerPoint presentations. Both groups' assessments were essay-based and evaluated using a rubric, with students incorporating the local culture of Pontianak City in their writing.

Validity testing ensured that the research instruments accurately measured the intended skills. Experts conducted content validity by evaluating each item's relevance to the measured concepts. Once validated, the instrument was deemed suitable for data collection. Reliability testing, specifically interrater reliability, assessed the level of agreement among raters. Three experts evaluated each indicator on the instrument, with the Inter-Class Correlation (ICC) reliability test used to compare ratings. The ICC score of 0.981 indicated excellent reliability, showing high objectivity and consistency in evaluations.

The writing skill assessment instrument was developed and adjusted from a design proposed by Oshima and Hogue (2007). The instrument rubric is as follows.

Table 2. Writing skills assessment instrument

No.	Aspects	Indicators
1	Format	The writing has a title
		The title is in the center
		The first row is indented
		Margins are on both sides
		Paragraphs are spaced
2	Mechanics	There is a period, question mark, or exclamation mark at the end of each sentence
		Capital letters are used correctly
		Correct spelling
3	Content	The paragraph corresponds to the task
		The paragraph is interesting to read
		The paragraph shows content that corresponds to the type of text
4	Organization	The paragraph begins with a topic sentence
		The paragraph contains several specific supporting sentences
		The paragraph ends with an appropriate closing sentence
5	Text structure	The text consists of a structure based on the type of text
		The text structure is arranged systematically
		The text structure is coherent and cohesive

After the pre-test and post-test, the data were analyzed quantitatively to test for normality, homogeneity, balance, and hypotheses. Prerequisite tests, including the Shapiro-Wilk test for normality and Levene's test for homogeneity, were performed before conducting the t-test (Cohen et al., 2018).

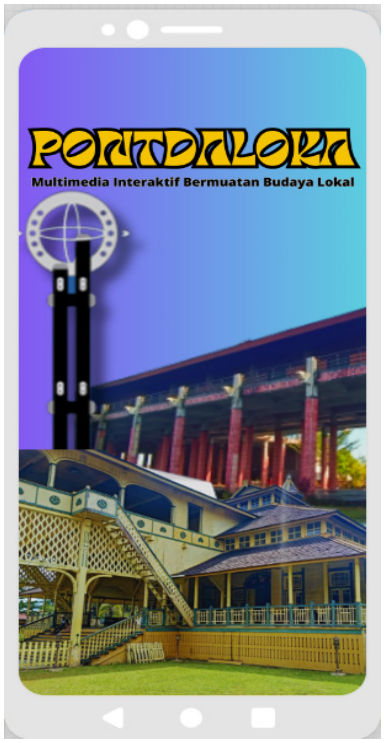
Results

Pontdaloka application

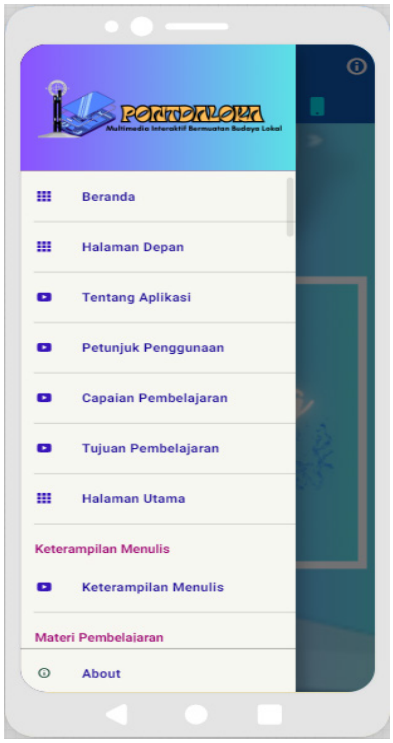
Pontdaloka (*Pontianak Budaya Lokal*) is an interactive multimedia application that seamlessly integrates local cultural elements into educational activities. This tool is invaluable for students and teachers, enhancing their understanding of Indonesian language lessons and improving their writing skills. It also provides parents with resources to guide and motivate their children during home study sessions. The application offers a variety of features, including 1) Educational materials focused on writing skills, 2) Instructional videos, 3) Examples of Pontianak's local culture, 4) Student activities and exercises, 5) Learning evaluations, and 6) Instrumental music.

Pontdaloka showcases content from over ten local cultures in West Kalimantan Province and includes music from more than ten instruments representing three ethnic groups. Its user-friendly interface ensures that learning remains engaging and enjoyable. The application is compatible with Android and iOS devices and is accessible on smartphones and tablets. While an internet connection is needed for some features, educational materials and instrumental music can be accessed offline. The application is currently being uploaded to the Play Store and App Store for broader availability.

The previews of the Pontdaloka application are as follows.



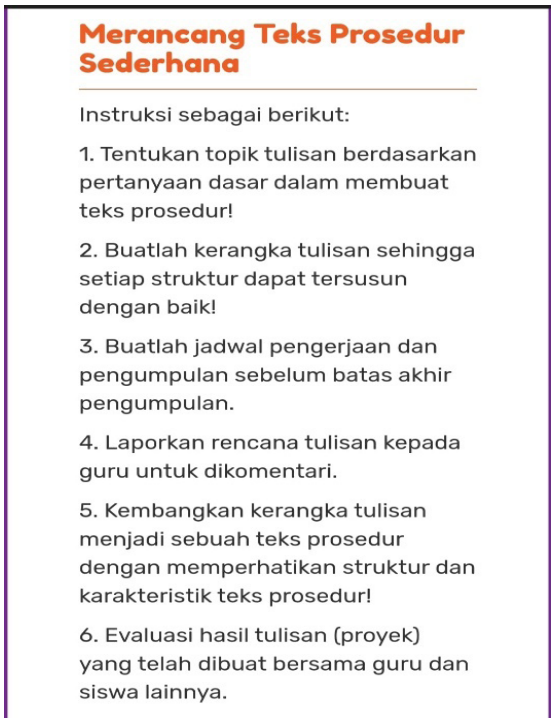
Media Initial View



Lists of Content

Preview of Learning Material Content

Figure 1. Previews of Pontdaloka application



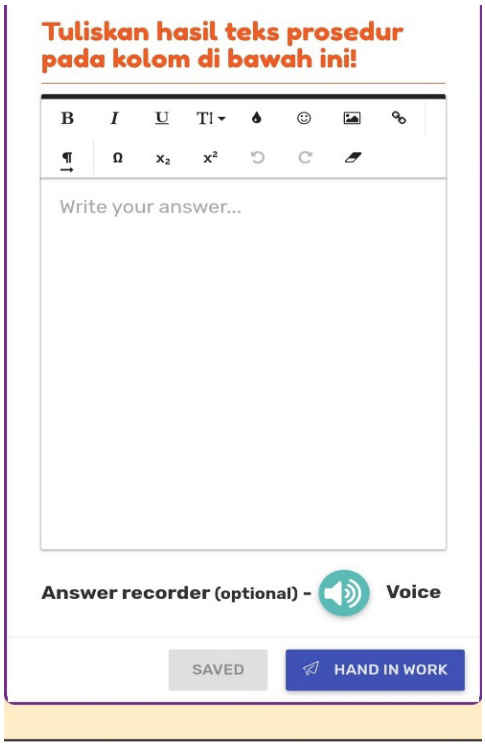


Figure 2. Student activities and exercises on Pontdaloka application

Learning stages

The teacher started the class with a warm greeting, checked attendance, and asked the class leader to lead a prayer. Afterward, the teacher reviewed the learning materials, highlighting their importance. The learning objectives, indicators, material coverage, and practical applications were then outlined. This introductory phase ended with the formation of study groups.

During the core activities, students watched YouTube tutorials on creating or performing tasks using the Pontdaloka application. The teacher guided discussions on the meaning and purpose of procedural texts. Students then completed assignments through the Pontdaloka application, following a Project-Based Learning (PBL) model. Working in groups, they completed exercises on the provided worksheets and later presented their analyses.

The learning session ended with discussions between the teacher and students, summarizing the learning materials. At the end of the lesson, everyone reflected on the learning experience and provided feedback. The teacher informed the students that the next session would continue learning about procedural texts.

Tests implementation

The research spanned nine sessions, starting with a pre-test in the first session and ending with a post-test in the ninth. Sessions two through eight focused on various topics: 1) Writing, 2) Definition, characteristics, and types of descriptive text, 3) Structure and linguistic elements of descriptive text, 4) Definition, characteristics, and types of narrative text, 5) Structure and linguistic elements of narrative text, 6) Definition, characteristics, and types of procedure text, and 7) Structure and linguistic elements of procedure text. The experimental class followed a three-stage learning process: introduction, core activities, and closing. The teacher used the interactive multimedia application "Pontdaloka" as a teaching tool. This application, incorporating local cultural content, was designed to enhance students' comprehension of Indonesian language lessons and improve their writing skills in descriptive, narrative, and procedural texts.

Statistical prerequisite tests

Before conducting hypothesis testing, several statistical prerequisite tests were performed, including the normality test, homogeneity test, and balance test. The normality test utilized the Shapiro-Wilk test at a significance level of 0.05, analyzed using SPSS Software v.23. The results of the normality tests for both the pre-test and post-test in the experimental and control groups are presented in Table 3.

Table 3. Normality test results

Variable	Group	Statistics	df	Sig.	Conclusion
Pre-test	Experimental	.938	31	.072	Normal
	Control	.948	30	.154	Normal
Post-test	Experimental	.976	31	.685	Normal
	Control	.959	30	.292	Normal

Table 3 shows that the data on students' writing skills were normally distributed for both groups. The homogeneity test, conducted using Levene's Statistics with SPSS v.23 software, also employed a significance level of 0.05. The results of the homogeneity test for the pre-test scores of the experimental and control groups are shown in Table 4.

Table 4. Homogeneity test results

Data	F	Sig.	Conclusion
Pre-tests of Experimental and Control Groups	.442	.509	Homogeneous

Table 4 indicates that with a significance value of 0.509 (greater than 0.05), the score variations in students' writing skills between the experimental and control groups were homogeneous. A balance test was subsequently conducted to ensure the two groups were equivalent before the treatment. This test used an independent sample t-test, and the results are detailed in Table 5.

Table 5. Balance test results

	t-test for Equality of Means							
	F	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
							Lower	Upper
Writing Skills Data	.442	.709	59	.481	2.247	3.171	-4.097	8.592

Table 5 demonstrates that the balance test results, with a significance value of 0.481 (greater than 0.05), indicate no significant difference in the initial writing skills between the experimental and control groups, confirming their equivalence.

Hypothesis testing

Hypothesis testing was conducted to test the hypothesis and draw research conclusions using independent sample t-tests, processed with SPSS v.23. The parameters included a significance level of 0.05 and a t-table value of 1.671. If the test results show a significant value (2-tailed) less than 0.05 and a t-score greater than the t-table, there is a difference in students' writing skills between the groups. The post-test scores after the treatment are presented in Table 6.

Table 6. Hypothesis test results

	t-test for Equality of Means							
	F	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
							Lower	Upper
Writing Skills Data	2.166	3.043	59	.003	4.803	1.579	1.645	7.962

Table 6 demonstrates that the hypothesis test results, with a significant value of 0.003 (less than 0.05) and a t-score of 3.043 (greater than the t-table value of 1.671), indicate that the null hypothesis (Ho)

was rejected, while the alternative hypothesis (Ha) was accepted. This suggests a significant difference in the writing skills of students taught using interactive multimedia incorporating local cultural content combined with Project-Based Learning (PBL) compared to those taught with PowerPoint media combined with PBL, demonstrating the effectiveness of the product used.

Discussion

The study results demonstrate that interactive multimedia significantly enhanced learning by promoting communication and fostering student independence. This finding is consistent with Ayob et al. (2022), who reported that interactive multimedia graphic materials significantly improved secondary school students' essay writing skills by enhancing creativity, critical thinking, and engagement. This improvement aligns with the curriculum's focus on higher-order thinking and ICT literacy. Similarly, Carrión-Robles, Espinoza-Celi, and Vargas-Saritama (2023) found that using augmented reality (AR) via the Assemblr Edu platform, another form of interactive multimedia, significantly increased student engagement and motivation in writing tasks, making learning more enjoyable and improving writing skills. The present study results also corroborate those of Fathimah et al. (2023), who highlighted the effectiveness of interactive multimedia in enhancing learning outcomes and student engagement. They further revealed that the perceived ease of use and usefulness of gamified, interactive multimedia positively affected students' attitudes and intentions to use such media for learning. Additionally, both this study and Widodo et al. (2020) explored the effectiveness of interactive multimedia in improving learning outcomes. Widodo et al. (2020) noted that while such multimedia was generally effective, Gen-Z students were difficult to satisfy due to their preference for multitasking capabilities and high-quality graphics, reflecting their extensive online engagement. Both studies suggest further research to improve multimedia interactivity. However, this study specifically emphasized combining multimedia and Project-Based Learning (PBL) for writing skill development, whereas Widodo et al. (2020) highlighted the need to cater to Gen-Z's high expectations in multimedia design.

This study highlighted the advantages of interactive multimedia over traditional PowerPoint presentations. Interactive multimedia integrates text, images, audio, video, and links into a single platform with navigation buttons and menus, making it highly portable and usable anytime, anywhere. In contrast, PowerPoint is often seen as monotonous due to its text-heavy nature. However, research by Bland, Guo, and Dousay (2024) indicates that redesigning PowerPoint slides using the Cognitive Theory of Multimedia Learning (CTML) could significantly enhance their effectiveness. This redesign improved medical students' performance and interest in pharmacology courses, suggesting that well-designed multimedia, even in PowerPoint format, can enhance learning outcomes and student engagement. Despite some limitations, such as media delivery and sample size, the findings suggest that both interactive multimedia and well-designed PowerPoint presentations could positively impact academic success.

The present study also revealed that the PBL model could improve students' writing skills by enhancing communication, collaboration, creativity, and critical thinking. Issa and Khataibeh (2021) demonstrated that PBL significantly enhanced critical thinking skills compared to conventional teaching methods. This underscores the need for educational reforms that integrate PBL to develop essential cognitive skills for students' academic and professional success. In this study, communication was

fostered through presenting discussion results with peers, collaboration was emphasized in completing tasks or projects, creativity was applied in writing text aligned with local culture content, and critical thinking was developed through acquiring and discussing new knowledge. Supporting these findings, Alemneh and Gebrie (2024) reported that students exposed to PBL exhibited significantly higher improvements in writing abilities compared to those in traditional learning environments. PBL notably enhanced content, organization, word choice, language use, and mechanics. Additionally, Arochman et al. (2024) found significant improvements in grammar, vocabulary, organization, and content following the implementation of PBL, which also boosted students' critical and creative thinking and motivation to write.

Based on the explanation above, this study indicates that combining interactive multimedia with local cultural content and PBL was highly effective in enhancing writing skills. This integrated approach not only improved writing competence but also created an engaging and independent learning environment.

Conclusion

This study demonstrates the effectiveness of combining interactive multimedia, local cultural content, and Project-Based Learning (PBL) to enhance junior high school students' writing skills. These innovative teaching methods significantly improved writing performance, fostering a more engaging and independent learning environment. The statistical analysis confirmed the effectiveness of the interactive multimedia application "Pontdaloka," which incorporates Pontianak's local cultural elements, making learning more communicative and motivating students to develop their writing skills. The experimental results indicated that students taught using the Pontdaloka application outperformed those taught with traditional PowerPoint media. Specifically, the independent sample t-test revealed a significant value (2-tailed) of 0.003, less than the significance level of 0.05, with a t-score of 3.043 exceeding the t-table value of 1.671. These results suggest a significant difference in the writing skills of students taught with the Pontdaloka application compared to those taught with PowerPoint, confirming the effectiveness of the interactive multimedia approach. Additionally, this study underscores the importance of incorporating local cultural content into educational materials to make learning more relevant and engaging for students. By reflecting their cultural heritage in the learning process, students are more likely to connect with the material and develop a deeper understanding of the subject matter. This approach not only enhances academic performance but also fosters a greater appreciation for local culture and heritage. Furthermore, this study provides valuable insights for educators seeking to enhance their teaching methods and promote a more engaging and effective learning experience.

Limitations of the study

This study has several limitations that should be acknowledged to provide a balanced understanding of its findings. *Firstly*, the research was conducted exclusively within Pontianak City. This geographic limitation might restrict the applicability of the results to other areas with different cultural contexts. *Secondly*, the sample size was relatively small, comprising students from only two schools. As a result, the findings might not fully represent the broader population of junior high school students. *Thirdly*,

the study employed a quasi-experimental design with non-equivalent control groups. Despite efforts to ensure group equivalence, this design might still introduce biases and confounding variables that could affect the outcomes. Moreover, the reliance on self-reported measures and essay-based assessments could lead to subjectivity and variability in evaluating writing skills. *Lastly*, while the study focused on integrating local cultural content into interactive multimedia, it did not assess the long-term impact and sustainability of these interventions. This limits the understanding of their lasting effects on students' writing abilities. Future research should address these limitations by expanding the sample size, including diverse cultural contexts, and exploring the longitudinal impacts of interactive multimedia interventions. This would provide a more comprehensive understanding of their effectiveness in enhancing writing skills.

Conflicts of interest

The authors declare no conflict of interest.

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