# Android-based augmented reality for writing learning for university students: A case study of Indonesian students' writing literacy problems

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ABSTRACT

This study explores the development and effectiveness of Android-based Augmented Reality (AR) learning media to enhance university students' writing skills in Indonesian language courses. The background stems from challenges observed in writing classes, where reliance on static PowerPoint presentations and lack of interactive media contributed to low student engagement and limited writing outcomes. Utilizing the ADDIE model, this developmental research involved stages of analysis, design, development, implementation, and evaluation. Media content was designed using Macromedia Flash integrated into Android-based AR, focusing on accessibility, interactivity, and the Technological Pedagogical Content Knowledge (TPACK) framework. Validation from material and media experts indicated high feasibility (scores of 3.87 and 3.77, respectively), while student response yielded an Aiken's V index of 0.95–1, categorized as excellent. An experimental test involving control and treatment groups demonstrated significant improvement in writing skills (p-value < 0.05). The results suggest that Android-based AR media effectively supports meaningful and engaging writing instruction, addresses students' literacy gaps, and aligns with 21st-century learning needs. This study contributes to educational technology and writing pedagogy by offering an innovative solution to writing literacy challenges in higher education.



## 1. Introduction

The writing course, a crucial component in the Indonesian Language and Literature Education curriculum, demands a more dynamic and interactive approach to enhance students' writing skills. The objective of the writing course is to equip students with the understanding and improvement of writing skills [1]. Students are expected to be able to comprehend and employ the Indonesian language in academic written communication [2]–[4]. The course teaches students the standard variety of written communication based on the standard grammar and spelling of the Indonesian language. In the writing course, students are required to produce popular articles adhering to correct Indonesian grammar, including the spelling of Indonesian terms, words, diction, loanwords, effective sentence structure, and paragraphs. From initial observations in the Indonesian Language and Literature Education program, the researchers identified an issue: students struggle to comprehend the material presented by lecturers. This challenge arises from the expectation that students should be capable of producing popular articles as an output in the writing course, which takes a significant amount of time in the writing process. The difficulty stems from the lack of supportive media for this requirement. Writing popular articles demands careful attention to the principles of Indonesian language writing, effective sentence construction, and precision in paragraph writing [5]. Consequently, the time

available for material explanation is reduced due to greater emphasis on practical writing. Another issue arises when lecturers solely use PowerPoint presentations (PPT) during lectures, followed by assignments. This approach decreases students' interest in the learning process and leaves them feeling disengaged and bored due to the lack of variety in instructional media. The media presented is still not very innovative. Moreover, the PPTs utilized are quite basic, which results in a decrease in students' learning outcomes [6].

The limited instructional variety provided by static PowerPoint presentations has led to reduced student engagement and suboptimal performance outcomes (average scores between 60 and 70). The issue indicates that media is one of the factors supporting the achievement of learning objectives [7]–[9]. The instructional media used during learning activities can greatly impact the overall effectiveness of the learning process [10], [11]. Teachers need to consider several factors when selecting media: (1) student considerations; (2) learning objectives considerations; (3) learning strategy considerations; (4) considerations of designing and using media capabilities; (5) cost considerations; (6) considerations of facilities and infrastructure; and (7) considerations of efficiency and [12]–[14]. Furthermore, educational media can enhance the effectiveness of students' learning success and create an interest among learners to participate in classroom learning activities [15]. Educational media in the current era can be accessed and integrated with gadgets [16]. However, students' utilization of gadgets or smartphones has not been maximized. Students primarily use gadgets as tools for social media activities such as YouTube, TikTok, and Instagram. There is still a lack of significant integration of gadgets or smartphones in the learning process [7], [17]. In the context of education, students possess gadgets or smartphones that are not fully utilized. This situation allows for the potential use of gadgets to access educational media [15]. The current use of gadgets must be optimized [18], and one way to achieve this is by utilizing them as educational tools [19], [20].

Android devices, falling within the Android category, play a significant role in the integration of educational technology. Currently, however, students primarily use Android on these devices to access social media [21]. It is crucial for educators to unlock the potential of Android in the educational context. Android, as a device, offers the opportunity to engage with educational media, including Flash [22], [23]. The utilization of Android can involve the application of Flash, which is software well-suited for creating visually compelling presentations encompassing various media types such as video, animation, images, and sound. This software excels in producing interactive and captivating tutorial applications. Augmented Reality (AR) presents users with a seamless integration of the real and virtual worlds, observed from the same perspective. AR is distinguished by its real-time interactivity, enhancing user interaction and perception with the real world, and its three-dimensional nature [23], [24]. Conceptually, media serves as a conduit for transmitting information (messages) between a message sender (source) and a message receiver [9]. Describing an intermediary conveying information between source and receiver, "media" acts as a tool employed by educators to effectively communicate messages for easy understanding by students [25]. Rooted in the Latin term "medium," meaning a conduit or intermediary, the Association for Education and Communication Technology (AECT) defines media as any form or channel facilitating information conveyance. According to the National Education Association (NEA), media encompasses objects that are manipulable, visible, audible, readable, and discussable, along with the instruments employed in activities [12], [26], [27]. Media exists in diverse forms and types, all of which find applications in the educational realm [28].

Media can be categorized into distinct types, each serving specific purposes. Visual media, as a learning resource, conveys messages, particularly subject matter, in a captivating and creative manner, engaging the sense of sight. However, it's important to note that visual media is not universally applicable and is inaccessible to individuals with visual impairments, as it relies solely on the sense of sight. On the other hand, audio media, or listening media, present messages or subject matter in an interesting and creative way, solely utilizing the sense of hearing. This type of media is exclusively in the form of sound. Audiovisual media, a combination of both visual and audio elements, is another category of learning resource. It presents messages or subject matter in an engaging and creative manner, utilizing both the senses of hearing and sight. This type of media incorporates both sound and images [29], [30]. Amid these diverse media types, Android emerges as a versatile medium capable of collaboration with various forms of media [31], [32]. Its adaptability allows for seamless integration with different learning resources, enhancing the educational experience across visual, audio, and audiovisual media. Android is a type of gadget that can be utilized to access learning media, such as Flash [22], [23]. Android is a mobile Operating System (OS) that has grown among other developing

OS today, such as Windows Mobile, iPhone OS, Symbian, and many more. One of the media in Android that can be used to support the learning process is Augmented Reality [23], [33], [34].

Augmented reality (AR) is a direct or indirect interaction of the real-world physical environment that has been augmented by adding virtually generated computer information [35], [36]. AR is a type of interactive technology and is registered in 3D, which combines real and virtual objects [37]. It can be collaborated using one of the programs, such as Macromedia Flash [38]. Macromedia Flash proves to be a versatile software tool that is well-suited for crafting compelling visual presentations and is capable of interpreting a variety of media, including video, animation, images, and sound. Notably, this software excels in generating interactive and captivating tutorial applications. One key advantage of Macromedia Flash lies in its ability to capture students' interest in the learning process, facilitating better comprehension of the material [24], [39], [40]. When implemented in schools and higher education, Android-based flash learning media becomes a valuable asset for educators. It aids teachers in developing and executing effective learning strategies, fostering an environment that encourages students to be active and creative participants in the learning process [38]. This creative potential can be particularly harnessed in writing courses, showcasing the dynamic and expressive nature of the learning experience [41].

Building upon the preceding discussion, this study ventures into creating Android-based Augmented Reality (AR) learning tools tailored for writing courses. The research addresses several key problem formulations: (1) What is the initial landscape of utilizing learning media in university-level writing courses?; (2) How does the development process unfold for the AR product designed for writing courses?; (3) What is the overall feasibility of the developed product?; (4) To what extent is the AR-based product effective in enhancing writing skills within the course? Aligned with these inquiries, the primary objective of this research is to design Android-based learning media specifically for teaching writing to university students. Writing is an activity of expressing ideas or thoughts in written form that can be understood by others, which serves as a means of communication . Writing falls within the realm of literacy competency [43], [44]. Learning to write is a unique learning style that emphasizes both the process and the outcome. This underscores that writing is not a skill someone inherently possesses but rather something that takes time to develop. Mastering writing skills is challenging due to the need to command various linguistic elements and external elements. Language and non-language elements must intertwine to produce a coherent and cohesive composition [45]. A writing course teaches students to understand the intricacies of word arrangement, clauses, and sentences in a work [46], [47]. Regarding this matter, previous research on the development of instructional media has been conducted by [9], [37], [48]–[50]. Overall, this study is a continuation of that research. The contributions provided by these relevant studies include theoretical insights and the development process, serving as a foundation for this research. The novelty presented in this study lies in the development of instructional media for the writing course, an area that has been relatively unexplored.

This study aims to address this gap, potentially inspiring further relevant research. The target audience of this research is students who are taking writing courses in the Indonesian Language Education program. The innovation in this research is evident in the development of AR learning media specifically designed to improve writing skills, an aspect that has received less attention in previous research. By integrating AR technology, this research contributes not only to the field of educational technology but also to the methodology of teaching Indonesian language and literature. The novelty of this research also lies in solving literacy problems, especially the writing literacy of students in Indonesia. Given that written literacy is one of the initial foundations in 21st-century skills that lead to deep learning, one of which consists of meaningful, joyful learning. Meaningful full becomes meaningful learning, and joyful is fun learning using learning media. This is based on the fact that the writing learning process carried out by lecturers and students has not integrated AR as a learning medium.

## 2. Method

This study falls into the category of developmental research. The developmental research model employed was the ADDIE model, consisting of the following stages: (1) analysis; (2) design; (3) development; (4) implementation, and (5) evaluation. The steps in this research were carried out through the following phases of analysis: (1) job analysis, consisting of identifying the fundamental problems in the writing course; (2) student analysis to determine the students' understanding level of

the writing course; (3) analysis of facts and learning objectives conducted through the syllabus created by the lecturers and applied to the students. In these analytical activities, interviews were also conducted with the lecturers on the writing course and the students currently taking it. This process led to the discovery of several aspects related to the actual conditions and the needs concerning instructional media in the writing course. Next was the design phase, and the design stage in this research included: (1) collecting materials and evaluation questions elaborated in the developed instructional media; (2) designing the interface of the instructional media, including the cover, various material aspects, and components used to implement the developed instructional media. The subsequent stage was development, consisting of: (1) presenting and modifying the developed instructional media; (2) producing instructional media by compiling all aspects prepared in the design stage. This is done to produce a product design that will be developed. The next stage is implementation, which consists of conducting feasibility tests with material experts: (1) conducting a feasibility test with content experts. Content experts assessed the appropriateness of the developed instructional media in terms of various material aspects; (2) conducting a feasibility test with media experts to evaluate the graphical aspects of the developed product. The assessment of media experts was used to evaluate the suitability of the developed instructional media with various aspects assessed by media experts, such as media readability and various applications or supporting components of the media; (3) feasibility and trial tests involving 10 students; (4) conducting an experimental test as a determinant of the effectiveness of the developed instructional media, involving 2 writing classes, each consisting of 30 students with control and experimental groups. After conducting several feasibility and effectiveness tests, the next step was calculating the results of these tests using the Aiken V formula [51] and pretest and posttest control group design [52]. The final stage was conducting an evaluation as a reflective activity on the development of instructional media. The instruments used to gather research data were observation guideline questionnaires, interviews, and expert assessment questionnaires for the developed product. The data analysis techniques employed were: (1) descriptive analysis, utilized to describe the results of the product development needs analysis, which involved observation, document analysis, and interviews; (2) quantitative descriptive analysis used to describe the results of product feasibility tests, student response tests, and product effectiveness tests. Overall, this research did not only stop at data analysis, but the findings of the research were also later summarized.

## 3. Results and Discussion

### 3.1. Analysis

The analysis phase in this research was conducted through several stages, see Table 1: (1) document analysis; (2) interviews with writing course lecturers; (3) interviews with students currently taking the writing course, and; (4) observation of the writing course in the Indonesian Language and Literature Education Study Program in the Special Region of Yogyakarta.

**Table 1.** Analysis Results

| Aspect | Findings |
|---|---|
| The conditions of a writing course in higher education | Students are assigned tasks to review articles and present them;<br>Group assignment presentations;<br>Students explore the material independently through books, articles, and so on;<br>Students' interest in writing is still lacking;<br>The students' creative process in producing written work still needs improvement. |
| The actual situation of learning media used in the writing course | The media used is videos sourced from the internet;<br>There is no media serving as the main source of lecture information;<br>There haven't been any media that can effectively stimulate students' critical and creative thinking processes;<br>There haven't been any media that can effectively stimulate students' interest in writing;<br>There haven't been any media that are easily accessible and portable. |
| The specifications for learning media products that need to be developed in the writing course in higher education | In line with the times;<br>Capable of attracting students' interest in writing;<br>Capable of eliciting critical and creative thinking processes in students;<br>Easy to carry anywhere and can be used anytime. |

### 3.2. Study Design

The design phase in this research was conducted through several stages. The first stage involved designing the interface or initial display of the learning media used. The design of the interface for the developed learning media included: (1) determining the media cover; (2) choosing the media's color scheme; (3) selecting supporting learning media applications that had been adjusted based on the results of the conducted needs analysis. Subsequently, designing the content is adopted from various sources, with primary sources being books, writing, and several published journal articles. After designing the content, the next step was to create evaluation questions that were presented in the developed product. The evaluation in this activity was tailored to the Technological Pedagogical Content Knowledge (TPACK), involving students' critical and creative thinking abilities.

### 3.3. Development

The development phase was carried out to create the product, *i.e.*, the learning media for the writing course. In this stage, the writing course media was structured based on the predetermined design of the learning media, see Fig. 1. The writing course learning media consisted of teaching outcomes and indicators, references, materials, examples, exercises, quizzes, and profiles. The determination of these materials had been aligned with the *RPS* (Syllabus). Below is an example of the developed product.


**Fig. 1.** (a) Initial Display of the Media; (b) Main Page Display

### 3.4. Implementation

The implementation in this study was conducted to determine: (1) practicality tests by experts (see Table 2), consisting of content experts and graphics experts (see Table 3); (2) response tests conducted with 15 students from the Indonesian Language and Literature Education Study Program; (3) product effectiveness tests conducted with 30 students in two classes, namely the control and experimental groups. Table 2 are the results of the implemented procedures.

**Table 2.** Content Expert Assessment Results

| Aspect | Indicator | Validation |
|---|---|---|
| Material and Learning Material | Alignment with Competency Standards and Basic Competencies | 3 |
| | Material Suitability | 4 |
| | Material Depth | 4 |
| | Material relevance | 4 |
| | Clarity of Material | 3 |
| | Material readability | 4 |
| | Sequencing of learning materials | 3 |
| | Ease of understanding the material | 4 |
| | Suitability of images with the material | 3 |
| | Suitability of reading materials with the material | 4 |
| | Suitability of vocabulary | 3 |
| | Accuracy of PUEBI (Indonesian Spelling and Style Guide) | 4 |
| | Sentence accuracy | 3 |
| | Quality of questions according to TPACK evaluation | 4 |
| | Accuracy of term usage | 3 |
| | Quality of question difficulty | 3 |
| | Total | 54 |
| | Mean | 3.87 |
| | Category | Good |

**Table 3.** Expert Assessment Results on Graphic Design

| Aspect | Indicator | Item Number |
|---|---|---|
| Layout | Appropriateness of layout | 3 |
| | Appropriateness of text | 4 |
| | Appropriateness of font type and font size in the media | 4 |
| | Appropriateness of illustrations | 4 |
| | Appropriateness of text and image layout | 4 |
| | Appropriateness of colors | 3 |
| | Appropriateness of animations | 3 |
| | Appropriateness of reading material display | 5 |
| | Appropriateness of the cover | 4 |
| | Total | 34 |
| | Mean | 3.77 |
| | Category | Good |

### 3.5. Product Effectiveness Test

Effectiveness testing was conducted on 30 students divided into two classes. These classes were the control and experimental classes. Table 4 is the result of the normality test.

**Table 4.** Normality Test Results

| Tests of Normality | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | *Kolmogorov-Smirnov*[a] | | | *Shapiro-Wilk* | | |
| | *Classes* | *Statistic* | *df* | *Sig.* | *Statistic* | *df* | *Sig.* |
| Learning outcomes | Experimental Class Pre-Test | .117 | 46 | .136 | .967 | 46 | .215 |
| | Experimental Class Post-Test | .119 | 46 | .105 | .963 | 46 | .147 |
| | Control Class Pre-Test | .113 | 46 | .178 | .937 | 46 | .015 |
| | Control Class Post-Test | .124 | 46 | .073 | .960 | 46 | .126 |

The normality test results for pretest and posttest data were conducted using Kolmogorov-Smirnov. The normality test results for the pretest data in the control class trial on students yielded a significance level of 0.215 > 0.05, while in the experimental class, it showed a significance level of 0.147 > 0.05. Then, the normality test results for posttest data in the control class yielded a significance level of 0.015 > 0.05, whereas in the experimental class, it showed a significance level of 0.120 > 0.05. These results indicate that the pretest and posttest data in both the control and experimental classes follow a normal distribution. The homogeneity test results for pretest and posttest data were examined, see Table 5. The homogeneity test results for pretest data in the control class showed a significant level of 0.125 > 0.05, while in the experimental class, it demonstrated a significant level of 0.126 > 0.05. Subsequently, the homogeneity test results for posttest data in the control class revealed a significance level of 0.127 > 0.05, whereas in the experimental class, it showed a significance level of 0.124 > 0.05. These results indicate that the pretest and posttest data in both the control and experimental classes are homogeneous.

**Table 5.** Homogeneity Test Results

| Test of Homogeneity of Variance | | | | | |
|---|---|---|---|---|---|
| | | *Levene Statistic* | *df1* | *df2* | *Sig.* |
| Student Learning Outcomes | Based on Mean | 1.937 | 3 | 180 | .125 |
| | Based on Median | 1.929 | 3 | 180 | .126 |
| | Based on Median and with adjusted df | 1.929 | 3 | 169.411 | .127 |
| | Based on trimmed mean | 1.947 | 3 | 180 | .124 |

. The analysis results yielded a p-value of 0.154. This indicates that the p-value > 0.05, thereby accepting H0. Consequently, it can be concluded that the initial intelligence of students before the treatment between the control and experimental groups was not significantly different. The pretest analysis results obtained a p-value of 0.003, revealing that the p-value < 0.05, leading to the rejection of H0. Therefore, it can be concluded that the initial intelligence of students before the treatment between the control and experimental groups differs significantly, see Table 6.

**Table 6.** Difference Test Results

| Independent Samples Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Levene's Test for Equality of Variances* | | *t-test for Equality of Means* | | | | | | |
| | | ***F*** | ***Sig.*** | ***t*** | ***df*** | ***Sig. (2-tailed)*** | ***Mean Difference*** | ***Std. Error Difference*** | ***95% Confidence Interval of the Difference*** | |
| | | | | | | | | | ***Lower*** | ***Upper*** |
| Student Learning Outcomes | Initial Stage | .294 | .595 | 1.436 | Initial Stage | .294 | .595 | 1.436 | Initial Stage | .294 |
| | Final Stage | 2.308 | .127 | 3.084 | Final Stage | 2.308 | .127 | 3.084 | Final Stage | 2.308 |

### 3.6. Evaluation

In this research, evaluation was conducted to reflect on the development process, starting from needs analysis, design, development, to implementation carried out until the effectiveness test of the product. The research flow serves as the main reflection in this evaluation activity, and feedback from all components serves as notes for product development in the subsequent stages.

### 3.7. Review Development Results

The development of augmented reality-based Android learning media in the writing course begins with needs analysis. The needs analysis is conducted to understand the actual situation regarding the use of learning media in the writing course. The results of the needs analysis indicate that the current use of media in the course still relies on conventional PowerPoint (PPT) presentations created by lecturers and provided to students. There is a need to transform these PPT presentations into interactive learning media. This aligns with the opinion expert, stating that interactive learning media can support the learning process, making it easier to achieve learning indicators. Interactive learning using media facilitates students to learn anywhere, anytime, making it more concise, practical, and in line with the current era's developments [25]. The presence of Augmented Reality (AR) as a learning media is highly anticipated. Through AR, students are taught how to learn and stimulate critical and creative thinking processes through the presented media [53]. With the use of this media, it is expected that students will find it easier to comprehend the materials taught by instructors. Next is the design phase. In this research, the design is carried out to conceptualize all components presented in the developed learning media. These components encompass aspects ranging from the interface and content to the evaluation. The design phase in the ADDIE research model is a crucial aspect that serves as the initial foundation for product development, aligning with the findings of the needs analysis [54].

The next stage is development. In this research, development is carried out to integrate various design components into a single product, which takes the form of a learning media. The learning media referred to in this study is augmented reality based on Android which aims to facilitate students in their learning process [46]. The augmented reality in this research is embedded in each substance within the developed media. In the developed media, students can directly access any desired material by (1) accessing the media through Android; (2) reading the media and selecting each substance they want to explore; (3) accessing several videos presented to enhance their understanding of the material to be learned [8], [33], [55]. The next stage in this research is implementation. Implementation is conducted to assess the quality of the product adjusted to the research needs. This is in line with the opinions of [48] and [41], stating that the assessment of product feasibility, product testing, and product effectiveness are crucial in development research. The implementation process includes several stages. Firstly, it involves collaboration with content experts. After applying the five-point scale formula, a score of 3.87 is obtained, categorizing it as good. However, revisions are necessary to enhance the content within the learning media. Implementation with graphic design experts obtains a score of 3.77, categorized as good. Revisions are made to improve the color scheme in the developed media. The student response test, calculated using the Aiken's V formula, results in a score of 0.95 – 1, categorized as excellent. This aligns with [51], who states that the V index calculation in Aiken's correlation allows for categorization or conclusions based on the index. If the index is less than or equal to 0.4, it can be concluded that its validity is low; 0.4-0.8 is categorized as moderate validity,

and if it exceeds 0.8, it is considered highly valid. The product effectiveness test, with pretest results yielding a p-value of 0.003, shows that the p-value is 0.05, thus rejecting H0. Thus, it can be concluded that the students' level of thinking, after treatment between the control group and the experimental group, is significantly different. Therefore, the learning media developed in this study is effective in improving students' ability in writing courses. The last stage is evaluation, carried out to reflect on the results of the development, ensure that the results of the development are useful and become an assessment record for improvements needed in further research. Evaluation is carried out to make improvements related to product development in the form of learning media in writing courses for students. Evaluation is carried out by recording the results of the study, successes, and shortcomings of the research, which will be used as a basis for further research.

## 4. Conclusion

This study concludes that Android-based Augmented Reality (AR) learning media offers a promising solution to address writing literacy challenges among university students in Indonesia. The integration of AR technology provides an interactive, accessible, and engaging alternative to conventional instructional methods, particularly the overreliance on PowerPoint. Through a systematic development process using the ADDIE model, the media was designed to enhance writing instruction by stimulating students' critical and creative thinking. The feasibility tests conducted with content and media experts confirmed the product's quality, while student responses indicated high acceptance and engagement. Most importantly, the effectiveness test demonstrated a significant improvement in students' writing performance in the experimental group compared to the control group. This confirms the potential of AR-based instructional media to improve learning outcomes in higher education writing courses. As a result, this study contributes not only to the field of educational technology but also provides practical insights for curriculum designers and educators in fostering meaningful, student-centered learning experiences. Future research is encouraged to further refine the product and explore its scalability across other language-related subjects.

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### References

[1] R. Himawan and B. Nurgiyantoro, "Analisis butir soal latihan penilaian akhir semester ganjil mata pelajaran bahasa Indonesia kelas VIII SMPN 1 Bambanglipuro Bantul menggunakan program ITEMAN," *KEMBARA J. Sci. Lang. Lit. Teach.*, vol. 8, no. 1, pp. 160–180, Apr. 2022, doi: 10.22219/kembara.v8i1.20530.

[2] S. Sartika, "Penanaman Keterampilan Berbicara dalam Mata Kuliah Ekspresi Lisan sebagai Upaya Melatih Rasa Percaya Diri Mahasiswa," *Pros. Semin. Bhs. dan Sastra Indones.*, no. 5, pp. 249–256, 2021.

[3] A. D. Krisbiono and Dkk, "Keefektifan Penggunaan Model Sinektik Dan Model Simulasi Dalam Pembelajaran Menulis Teks Drama Berdasarkan Gaya Belajar Pada Peserta Didik Kelas Xi Sma," *Seloka J. Pendidik. Bhs. dan Sastra Indones.*, vol. 4, no. 2, pp. 125–130, 2015.

[4] M. D. Kristyanawati, S. Suwandi, and M. Rohmadi, "Peningkatan Keterampilan Menulis Teks Eksposisi Menggunakan Model Problem Based Learning," *Sch. J. Pendidik. dan Kebud.*, vol. 9, no. 2, pp. 192–202, 2019, doi: 10.24246/j.js.2019.v9.i2.p192-202.

[5] R. Himawan and P. Suyata, "Analisis Kebutuhan Pengembangan Soal HOTS Dalam Pembelajaran Teks Pidato Persuasif di MGMP SMP Wilayah Kabupaten Bantul," *Ghancaran J. Pendidik. Bhs. dan Sastra Indones.*, pp. 1–9, 2021.

[6] I. S. S. Azzahra, T. Sobari, and A. M. Suhara, "Penerapan Metode Game Based Learning Berbantuan Gather Town Dalam Mata Kuliah Pembelajaran Keterampilan Berbahasa Memirsa," *Parol. J. Pendidik. Bhs. dan Sastra Indones.*, vol. 5, no. 6, pp. 383–392, 2022, doi: 10.22460/parole.v5i6.10744.

[7] M. Ridha and A. Riwanda, "Literasi Media, Literasi Politik, dan Partisipasi Kewarganegaraan Pemilih Pemula di Era Digital," *J. Ilm. Pendidik. Pancasila dan Kewarganegaraan*, vol. 5, no. 1, p. 110, 2020, doi: 10.17977/um019v5i1p110-121.

[8] V. Hendra Saputra and D. Pasha, "Komik Berbasis Scientific Sebagai Media Pembelajaran di Masa Pandemik Covid-19," *SJME (Supremum J. Math. Educ.*, vol. 5, no. 1, pp. 85–96, 2021, doi: 10.35706/sjme.v5i1.4514.

[9] R. Yulia Aftiani, K. Khairinal, and S. Suratno, "Pengembangan media pembelajaran e-book berbasis flip pdf professional untuk meningkatkan kemandirian belajar dan minat belajar siswa pada mata pelajaran ekonomi siswa kelas X IIS 1 SMA Negeri 2 Kota Sungai Penuh," *J. Manaj. Pendidik. dan Ilmu Sos.*, vol. 2, no. 1, pp. 458–470, Jul. 2021, doi: 10.38035/jmpis.v2i1.583.

[10] N. S. Puspitasari, A. F. R. Akbar, and A. B. Cahyani, "Tikrar al-Muhyi: Development of a Pocketbook for Memorizers of the Qur'an," *Al-Misbah (Jurnal Islam. Stud.*, 2022, doi: 10.26555/almisbah.v10i2.6328.

[11] S. Setiyani, S. Sumarwati, L. Sagita, and D. Fadhlurrohman, "The incredible boong gi: Educational game RPG for mathematical understanding ability," *Int. J. Educ. Learn.*, 2021, doi: 10.31763/ijele.v3i2.217.

[12] G. Hidayat, H. Hermanto, and R. Himawan, "Pengembangan Media Pembelajaran Canva Materi Teks Puisi Untuk Siswa Kelas VIII SMP," *Kode J. Bhs.*, vol. 11, no. 3, pp. 74–85, Sep. 2022, doi: 10.24114/kjb.v11i3.38819.

[13] A. Arsyad, *Media Pembelajaran*. Jakarta: Raja Gafarindo Persada, 2016.

[14] R. Harahap, H. Hermanto, and R. Himawan, "Pengembangan modul digital materi teks cerita narasi pada siswa kelas VII SMP," *Wacana J. Penelit. Bahasa, Sastra dan Pengajaran*, vol. 20, no. 2, pp. 74–88, Jul. 2022, doi: 10.33369/jwacana.v20i2.22925.

[15] N. Hidayah, R. Wahyuni, and A. T. Hasnanto, "Pengembangan Media Pembelajaran Gambar Berseri Berbasis Pop-Up Book Untuk Meningkatkan Keterampilan Menulis Narasi Bahasa Indonesia," *J. Pendidik. dan Pembelajaran Dasar*, vol. 7, no. 1, pp. 59–66, 2020.

[16] H. D. Momang, "Pengembangan model buku ajar digital keterampilan menyimak berdasarkan pendekatan autentik," *KEMBARA J. Sci. Lang. Lit. Teach.*, vol. 7, no. 1, pp. 71–93, 2021, doi: 10.22219/kembara.v7i1.16202.

[17] M. Ramdhan, M. I. Sukarelawan, M. A. Thohir, and F. Arifiyanti, "Junior high school student perception of online learning in pandemic Covid-19: Gender, social media ownership, and internet access duration perspective," *Int. J. Educ. Learn.*, vol. 4, no. 1, pp. 28–40, Apr. 2022, doi: 10.31763/ijele.v4i1.517.

[18] A. S. Hidayah, "Efektivitas Penggunaan Google Form Pada Penilaian Harian Aspek Kognitif Mata Pelajaran Al Qur'an Hadis di MTs Ma'arif Nu 1 Cilongok Kabupaten Banyumas," 2016.

[19] H. Rahman and U. A. Dahlan, "Pemanfaatan Informasi Digital Sebagai Bahan Ajar Membaca Kritis dan Kreatif," *J. Bhs.*, vol. 11, pp. 56–64, 2021.

[20] D. S. Smyth, S. Chen, G. Sompanya, M. Metz, and T. Conefrey, "How Getting Friendly with Bacteria Can Promote Student Appreciation of Microbial Diversity and Their Civic Scientific Literacy," *J. Microbiol. Biol. Educ.*, vol. 23, no. 2, 2022, doi: 10.1128/jmbe.00055-22.

[21] M. N. Putri, R. Ariesta, and N. Noermanzah, "Problematika Siswa dalam Pembelajaran Bahasa Indonesia dengan Sistem Blended Learning pada Masa Pandemi Covid-19 di Kelas IX SMP Negeri 17 Kota Bengkulu," *Disastra J. Pendidik. Bhs. dan Sastra Indones.*, vol. 4, no. 2, p. 233, Jul. 2022, doi: 10.29300/disastra.v4i2.6659.

[22] L. Agustina, K. Kusmiyati, and S. T. E. Silver, "Peranan Model Pembelajaran Project Based Learning Pada Meningkatkan Keterampilan Bahasa Indonesia Siswa Kelas XI SMKN 2 Bangkalan," *J. Teknol. Pembelajaran*, vol. 2, no. 2, pp. 12–20, Jan. 2022, doi: 10.25217/jtep.v0i0.1894.

[23] T. Kurniawati, I. Ratna Ermawaty, and M. N. Hidayat, "Media Pembelajaran Pada Materi Fluida Dengan Teknologi Augmented Reality Berbasis Android Untuk Siswa SMA," *Pros. Semin. Nas. Fis. Festiv.*, no. November 2019, pp. 168–173, 2019.

[24] Majidah khairani, "Pengembangan Media Pembelajaran Dalam Bentuk Macromedia Flash Materi Tabung Untuk SMP Kelas IX," *J. Iptek Terap.*, vol. 10, no. 2, pp. 95–102, May 2016, doi: 10.22216/jit.2016.v10i2.422.

[25] N. Hidayah and R. K. Ulva, "Pengembangan Media Pembelajaran Berbasis Komik pada Mata Pelajaran Ilmu Pengetahuan Sosial Kelas IV MI Nurul Hidayah Roworejo Negerikaton Pesawaran," *J. Pendidik. dan Pembelajaran Dasar*, vol. 4, no. 1, pp. 34–46, 2017.

[26] N. U. Martha, D. Wijayawati, V. Krisnawati, and B. A. P. Nugroho, "Pengembangan bahan ajar menulis naskah drama bermuatan kearifan lokal dan pendidikan karakter," *JINoP (Jurnal Inov. Pembelajaran)*, vol. 8, no. 1, pp. 68–83, 2022, doi: 10.22219/jinop.v8i1.19554.

[27] S. P. Apriliani and E. H. Radia, "Pengembangan Media Pembelajaran Buku Cerita Bergambar Untuk Meningkatkan Minat Membaca Siswa Sekolah Dasar," *J. Basicedu*, vol. 4, no. 4, pp. 994–1003, 2020, doi: 10.31004/basicedu.v4i4.492.

[28] M. Menrisal and N. R. Utami, "Perancangan dan Pembuatan Media Pembelajaran Android pada Mata Pelajaran Simulasi dan Komunikasi Digital," *J. PTI (Pendidikan Dan Teknol. Informasi) Fak. Kegur. Ilmu Pendidik. Univ. Putra Indones. "YPTK" Padang*, vol. 6, no. 1, pp. 1–11, Jun. 2019, doi: 10.35134/jpti.v6i1.13.

[29] Susanti, Z. Affrida, and E. F. Fahyuni, "Jenis Jenis Media Dalam Pembelajaran," *Umsida*, vol. 1, no. 1, pp. 1–17, 2017.

[30] N. Nuryati, T. Subadi, A. Muhibbin, B. Murtiyasa, and S. Sumardi, "Pembelajaran Statistik Matematika Berbantuan Website Google Sites (Quizizz) di Sekolah Dasar," *J. Basicedu*, vol. 6, no. 2, pp. 2486–2494, 2022, doi: 10.31004/basicedu.v6i2.2377.

[31] K. Saddhono, "Pengembangan E-Book Interaktif Bipabermuatan Kearifan Lokal Dengan Pendekatan Scientific-Thematic," *Konf. Int. Pengajaran Bhs. Indones. bagi Penutur Asing XI*, pp. 389–401, 2019.

[32] P. Z. Diana, "Pengembangan e-Modul Mata Kuliah Pembelajaran Bahasa Indonesia," *Alinea J. Bahasa, Sastra, dan Pengajaran*, vol. 10, no. 2, p. 153, Oct. 2021, doi: 10.35194/alinea.v10i2.1635.

[33] J. Carmigniani, B. Furht, M. Anisetti, P. Ceravolo, E. Damiani, and M. Ivkovic, "Augmented reality technologies, systems and applications," *Multimed. Tools Appl.*, vol. 51, no. 1, pp. 341–377, 2011, doi: 10.1007/s11042-010-0660-6.

[34] V. R. Wibowo, K. Eka Putri, and B. Amirul Mukmin, "Pengembangan Media Pembelajaran Berbasis Augmented Reality pada Materi Penggolongan Hewan Kelas V Sekolah Dasar," *PTK J. Tindakan Kelas*, vol. 3, no. 1, pp. 58–69, Nov. 2022, doi: 10.53624/ptk.v3i1.119.

[35] M. Billinghurst, A. Clark, and G. Lee, "A Survey of Augmented Reality," *Found. Trends® Human–Computer Interact.*, vol. 8, no. 2–3, pp. 73–272, 2015, doi: 10.1561/1100000049.

[36] N. Nuryadi, L. Kurniawan, and I. Kholifa, "Developing mobile learning based on ethnomathematics viewed from adaptive e-learning: Study of two dimensions geometry on Yogyakarta palace's chariot," *Int. J. Educ. Learn.*, vol. 2, no. 1, pp. 32–41, Jun. 2020, doi: 10.31763/ijele.v2i1.85.

[37] A. Wiharto and C. Budihartanti, "Aplikasi Mobile Augmented Reality sebagai Media Pembelajaran Pengenalan Hardware Komputer Berbasis Android," *J. PROSISKO*, vol. 4, no. 2, pp. 17–24, 2017.

[38] W. Akhmadan, "Pengembangan Bahan Ajar Materi Garis dan Sudut Menggunakan Macromedia Flash dan Moodle Kelas VII Sekolah Menengah Pertama," *J. Gantang*, vol. 2, no. 1, pp. 27–40, Mar. 2017, doi: 10.31629/jg.v2i1.62.

[39] Y. Arisanti and M. F. Adnan, "Pengembangan Multimedia Interaktif Berbasis Software Macromedia Flash 8 untuk Meningkatkan Motivasi dan Hasil Belajar Peserta Didik Sekolah Dasar," *J. Basicedu*, vol. 5, no. 4, pp. 2122–2132, Jul. 2021, doi: 10.31004/basicedu.v5i4.930.

[40] A. Nasution and R. Rahim, "The development of Flashcard media to improve students' English vocabulary in English lessons at MIS Nurul Hidayah Medan," *JINoP (Jurnal Inov. Pembelajaran)*, vol. 8, no. 2, pp. 215–223, 2022, doi: 10.22219/jinop.v8i2.22521.

[41] U. Lestari, "Pengembangan Bahan Ajar Menulis Cerpen Berbasis Proyek Dengan Pendekatan Kontekstual Untuk Meningkatkan Kemampuan Siswa Menulis Cerpen," *Metafora*, vol. 2, no. 1, pp. 153–179, 2015.

[42] M. Mahsun, "Upaya Meningkatakan Keterampilan Menulis Dengan Teknik RCG (Reka Cerita Gambar) Pada Siswa Kelas VI SDN Buse Kecamatan Praya, Kabupaten Lombok Tengah Tahun Pelajaran 2017/2018," *JISIP (Jurnal Ilmu Sos. dan Pendidikan)*, vol. 3, no. 1, pp. 32–46, Mar. 2019, doi: 10.58258/jisip.v3i1.631.

[43] S. C. Kong, W. M. Y. Cheung, and G. Zhang, "Evaluating artificial intelligence literacy courses for fostering conceptual learning, literacy and empowerment in university students: Refocusing to conceptual building," *Comput. Hum. Behav. Reports*, vol. 7, no. July, p. 100223, 2022, doi: 10.1016/j.chbr.2022.100223.

[44] Z. Nuryana, A. Suroyo, I. Nurcahyati, F. Setiawan, and A. Rahman, "Literation movement for leading schools: Best practice and leadership power," *Int. J. Eval. Res. Educ.*, 2020, doi: 10.11591/ijere.v9i1.20279.

[45] S. Suprayogi, B. E. Pranoto, A. Budiman, B. Maulana, and G. B. Swastika, "Pengembangan Keterampilan Menulis Siswa SMAN 1 Semaka Melalui Web Sekolah," *Madaniya*, vol. 2, no. 3, pp. 283–294, 2021, doi: 10.53696/27214834.92.

[46] D. Ramadhanti, "Development of Explanatory Text Writing Evaluation Tools Based on a Process Approach (Pengembangan Alat Evaluasi Menulis Teks Eksplanasi Berbasis Pendekatan Proses)," *Gramatika STKIP PGRI Sumatera Barat*, vol. 5, no. 2, pp. 194–210, 2019, doi: 10.22202/jg.2019.v5i2.3445.

[47] T. Koltay, "The media and the literacies: Media literacy, information literacy, digital literacy," *Media, Cult. Soc.*, vol. 33, no. 2, pp. 211–221, 2011, doi: 10.1177/0163443710393382.

[48] D. G. S. Gogahu and T. Prasetyo, "Pengembangan Media Pembelajaran Berbasis E-Bookstory untuk Meningkatkan Literasi Membaca Siswa Sekolah Dasar," *J. Basicedu*, vol. 4, no. 4, pp. 1004–1015, 2020, doi: 10.31004/basicedu.v4i4.493.

[49] T. Solihudin JH, "Pengembangan E-Modul Berbasis Web Untuk Meningkatkan Pencapaian Kompetensi Pengetahuan Fisika Pada Materi Listrik Statis Dan Dinamis Sma," *WaPFi (Wahana Pendidik. Fis.*, vol. 3, no. 2, p. 51, 2018, doi: 10.17509/wapfi.v3i2.13731.

[50] I. Suwartini and A. Fujiastuti, "Teknik Pembuatan Buku Ajar Membaca Kritis Dan Kreatif Berbasis Arcs (Attention, Relevance, Convidence, Satisfaction) Untuk Mahasiswa Pendidikan Bahasa Dan Sastra Indonesia," *Bahastra*, vol. 37, no. 2, p. 138, 2017, doi: 10.26555/bahastra.v37i2.7610.

[51] H. Retnawati, *Validitas, Realibilitas & Karakteristik Butir*. Yogyakarta: Parama Publishing, 2015.

[52] S. Zubaidah, S. Mahanal, F. Rosyida, Z. L. Kurniawati, M. Sholihah, and N. Ismirawati, "Using remap-TmPS learning to improve low-ability students' critical thinking skills," *Asia-Pacific Forum Sci. Learn. Teach.*, vol. 19, no. 1, 2018.

[53] I. Maryani, U. Estriningrum, and Z. Nuryana, "Self-regulated learning and creative thinking skills of elementary school students in the distance education during the covid-19 pandemic," *Creat. Stud.*, vol. 16, no. 2, pp. 496–508, Aug. 2023, doi: 10.3846/cs.2023.15278.

[54] F. Hidayat and M. Nizar, "Model Addie (Analysis, Design, Development, Implementation and Evaluation) dalam pembelajaran Pendidikan Agama Islam," *J. Inov. Pendidik. Agama Islam*, vol. 1, no. 1, pp. 28–38, Dec. 2021, doi: 10.15575/jipai.v1i1.11042.

[55] R. Himawan, "Penerapan Model Pembelajaran Discovery Learning dalam Pembelajaran Teks Puisi Rakyat di SMP," *Pros. Samasta*, pp. 1–6, 2020.