

Development E-Module Augmented Reality Assisted To Improve Writing Skills Elementary School Students

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ABSTRACT

This study aims to determine the feasibility and effectiveness of an augmented reality assisted e-module. This type of research is research and development. This study uses a 4-D development model consisting of four stages: define, design, develop, and disseminate. The study was conducted at SD IT Hamas. The subjects in the study were 20 fourth grade students, consisting of 9 female students and 11 male students. The object of the study was an augmented reality assisted e-module.. The data collection techniques used were observation, tests, and questionnaires. The data analysis techniques were (1) feasibility analysis.augmented reality assisted e-module; (b) effectiveness analysisaugmented reality assisted e-module. Based on the research results, it is known that the results of the media expert validation are:96.85% is in the very feasible category, and the results of the material expert validation are 80.00% in the feasible category. Meanwhile, in the pretest trial the pretest score percentage was 56.95%, and the posttest score was 80%. Based on this description, augmented reality assisted e-modules are feasible and effective for improving students' writing skills at SD IT Hamas.

Keyword : E-module; Augmented Reality; Writing Skills.

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1. INTRODUCTION

Elementary education plays a crucial role in building the foundation of students' language skills, one of which is writing. Writing is not only a means of communication but also serves as a medium for the structured expression of ideas, thoughts, and feelings. However, in practice, elementary school students' writing skills are still relatively low. This is evident in students' difficulties in constructing sentences, developing ideas, and using correct grammar.

These problems are inextricably linked to conventional and less varied learning methods. Teachers tend to use textbooks as the sole learning resource, making the learning process less engaging and less able to stimulate student creativity. This situation results in low learning motivation and minimal active student engagement in writing activities (Myhill et al., 2023).

Along with technological advancements, the world of education is being challenged to adapt by utilizing various digital innovations. One form of innovation that can be implemented is the use of electronic based teaching materials, such as e-modules. E-modules are teaching materials that are specifically prepared and systematically designed based on a specific curriculum, packaged in the smallest units (modular) that can be used independently by students to achieve certain predetermined learning objectives (Andani et al., 2024). The use of e-modules then developed into a necessity to facilitate the demands of the era of information technology development which requires digital skills or digital literacy (Chairunisa & Zamhari., 2022). E-modules allow for more interactive, flexible, and ubiquitous presentation of material. Thus, e-modules have the potential to increase student learning interest and facilitate understanding.

In addition, the integration of augmented reality technology in learning is an interesting alternative. Augmented reality is a technology that combines two dimensional or three-dimensional virtual objects into a real three-dimensional environment and then projects these virtual objects in real time (Sari et al., 2023). This technology can combine virtual objects with the real world in real time, creating a more concrete and imaginative learning experience. In writing skills, augmented reality can help students visualize ideas and enrich vocabulary through interactive image or animation representations (Wang, 2017).

The use of augmented reality assisted e-modules is expected to provide a solution to the problem of students' poor writing skills. With engaging and interactive visualizations, students can more easily understand concepts, develop ideas, and express their thoughts in written form (Rumapea et al., 2025). This can also increase student engagement in the learning process.

On the other hand, the application of technology in learning also aligns with curriculum demands that emphasize strengthening literacy and the use of information technology. Teachers are expected to create innovative and relevant learning experiences (Hatsanmuang & Sanrattana, 2023). Therefore, the development of teaching materials that integrate technology, such as augmented reality assisted e-modules, is crucial.

Several previous studies conducted by Sabila (2014) said augmented reality assisted learning can make it easier for students to understand the concept of writing descriptive text. Wulandari & Darmana (2026) stated that the developed e-module can be used as an alternative, more modern teaching material, through 3D elements based on augmented reality, thus potentially improving the quality of learning.

Based on the findings above, innovation is needed in the form of developing an augmented reality assisted e-module specifically designed to improve elementary school students' writing skills. This e-module is expected to not only present material in an engaging manner but also provide an interactive and meaningful learning experience for students. Therefore, this research is crucial to produce effective learning products that meet the needs of students in the digital age. Furthermore, the results of this study are expected to contribute to the development of more innovative learning methods and serve as a reference for teachers in improving the quality of writing instruction in elementary schools.

2. RESEARCH METHOD

This type of research is research and development. The study uses a 4-D development model consisting of four stages: define, design, develop, and disseminate (Wijayanti et al., 2023). However, this study only reached the develop stage. The research was conducted at SD IT Hamas. The subjects were 20 fourth-grade students, consisting of 9 girls and 11 boys. The object of the study was an e-module assisted by augmented reality.. The data collection techniques used were observation, tests, and questionnaires. The data analysis techniques were (1) feasibility analysis augmented reality assisted e-module; (b) effectiveness analysis augmented reality assisted e-module.

Table 1. Likert Scale Criteria

No	Answer	Score
1	Strongly agree	5
2	Agree	4
3	Doubtful	3
4	Don't agree	2
5	Strongly disagree	1

(Lubis et al,
2023)

The formula used to measure the feasibility of an e-module assisted by augmented reality is as follows:

$$\text{Eligibility Percentage} = x 100\% \frac{\text{Skor yang diperoleh}}{\text{Skor yang diharapkan}} \quad (\text{Utami \& Hidayat., 2025})$$

To measure the validation results that have been carried out on the augmented reality assisted e-module, you can use the feasibility test percentage scale in the table below:

Table 2. Percentage Scale of Validity Test

No	Score	Classification
1	81% - 100%	Very Worthy
2	61% - 80%	Worthy

3	41% - 60%	Quite Decent
4	21% - 40%	Not feasible
5	0% - 20%	Totally Unworthy

(Adibah et al., 2025)

To measure the effectiveness of the augmented reality assisted e-module, the following formula can be used from student learning outcomes in mathematics learning:

$$\text{Effectiveness} = x 100\% \frac{\text{total skor}}{\text{skor maksimal}} \text{ (Yudatama et al., 2023)}$$

Table 3. Effectiveness Criteria

No	Score	Classification
1	81% < P < 100%	Very Effective
2	60% < P < 80%	Effective
3	40% < P < 60%	Quite Effective
4	20% < P < 40%	Less Effective
5	P < 20%	Ineffective

3. RESULTS AND DISCUSSION

This research resulted in an augmented reality assisted e-module to improve elementary school students' writing skills. The development process employed a 4D model, encompassing the stages of define, design, develop, and disseminate. Each stage was implemented systematically to produce a viable and effective product

A. Stage Define

The initial stage of the research focused on needs analysis as the basis for product development. At this stage, several activities were carried out, namely initial analysis, analysis of student characteristics, analysis of materials, and formulation of learning objectives. At this stage, the results of the analysis showed that: (a) elementary school students still experience difficulties in developing ideas and writing coherently, (b) the learning media used by teachers are still limited to textbooks so that they are less interesting for students to learn, (c) innovative learning media are needed that can increase student involvement in learning to write, (d) analysis of student characteristics shows that students are more interested in visual and interactive media. Therefore, the use of assisted e-modules augmented reality considered appropriate to support the writing learning process.

B. Stage Design

In this design phase, the initial design of an e-module product using augmented reality was carried out. Activities included developing the e-module structure, selecting media, and designing the display and content. The results of the design phase were: (a) the development of an e-module framework consisting of an introduction, materials, exercises, and evaluation; (b) the design of augmented reality features. which displays visual objects to stimulate students' writing ideas, (c) preparation of student writing skills assessment instruments, (d) design of e-module displays that are attractive, interactive, and appropriate to the characteristics of elementary school students.

C. Stage Develop

The development phase aims to produce a final product that has undergone validation and testing. This phase includes validation by validators, product revisions, and student trials. The results obtained in the development phase are as follows:

1. Validation Results by Validators (Material Experts and Media Experts)

Table 4. Validation ResultsAugmented Reality-Assisted E-Module

No	Validation	Percentage	Criteria
1	Media expert	96.85%	Very worthy
2	Material expert	80.00%	Worthy

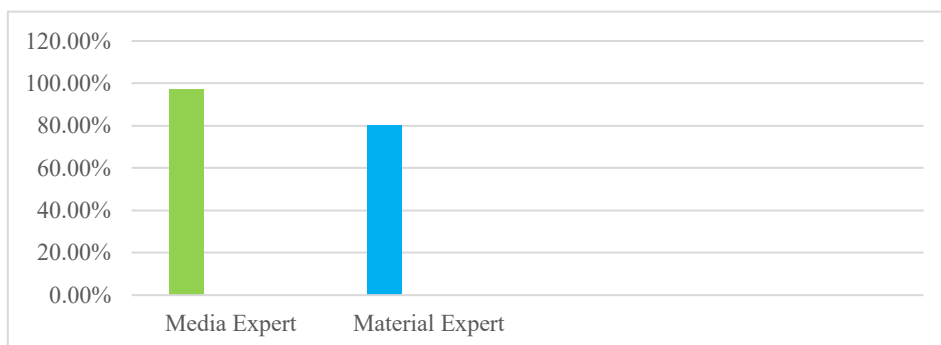


Fig 1. Validation ResultsAugmented Reality-Assisted E-Module

Based on the results of table 1 and figure 1, it is known that the validation results by media experts obtained a percentage of 96.85%, which is included in the very feasible category. These results indicate that in terms of appearance, design, navigation, and utilization of augmented reality features, the developed learning media has met the criteria for very good feasibility. This assessment indicates that the designed e-module has attractive visual quality, is easy to use, and is able to effectively support the learning process for elementary school students.

Meanwhile, validation results by material experts showed a percentage of 80.00%, categorized as feasible. This indicates that the content of the e-module aligns with basic competencies, learning objectives, and student development levels, although there are still several aspects that can be improved. Overall, the validation results from the two experts indicate that the developed augmented reality assisted e-module meets the eligibility criteria for use in learning, both in terms of media and content.

2. Product Trial Results

Table 5. Product Trial Results

No	Student Name	Pretest	Posttest
1	S1	55	78
2	S2	60	80
3	S3	50	75
4	S4	58	82
5	S5	62	85
6	S6	57	79
7	S7	54	77
8	S8	59	81
9	S9	61	84
10	S10	56	78
11	S11	53	77
12	S12	60	83
13	S13	58	80
14	S14	55	79
15	S15	57	82
16	S16	52	76
17	S17	59	81
18	S18	63	86
19	S19	54	77
20	S20	56	80

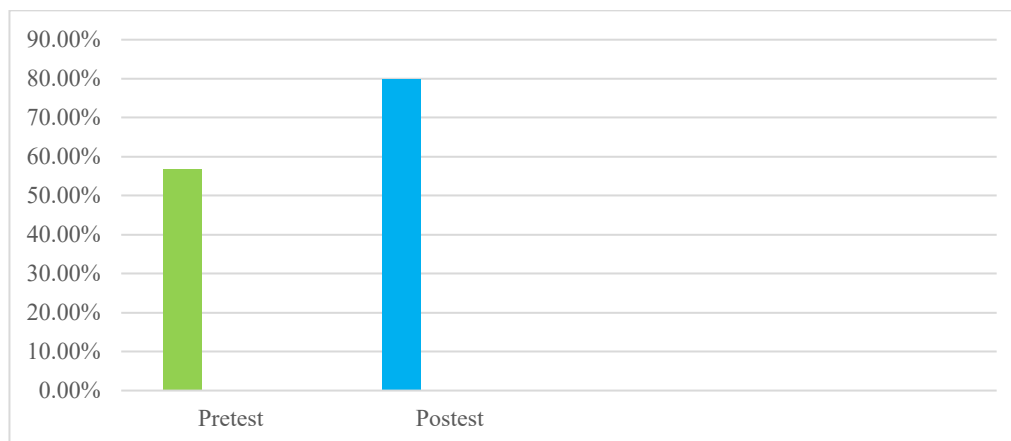


Fig 2. Product Trial Results

Based on the results of table 2 and figure 2 above, the pretest score of 56.95% indicates that students' writing skills before the treatment were still in the low category. This reflects that most students still had difficulty developing ideas, constructing coherent sentences, and using appropriate language structures. This situation indicates the need for innovation in the learning process to optimally improve students' writing skills.

After implementing e-module learning with augmented reality, posttest scores increased to 80%. This improvement demonstrates that the use of interactive, technology based learning media can positively impact students' writing skills. Through engaging visualization features, students more easily understand the material, discover ideas, and express them in more structured writing. Furthermore, the more varied learning environment also increases student motivation and engagement throughout the learning process.

The 23.05% difference in improvement between the pretest and posttest confirms that the learning implemented was effective in improving elementary school students' writing skills. Therefore, augmented reality assisted e-modules can be used as an alternative learning medium that is innovative and relevant to current technological developments. The use of this medium not only helps improve learning outcomes but also creates a more engaging and meaningful learning experience for students.

D. Stage Disseminate

The final stage is the dissemination of the developed product. At this stage, the e-module is introduced and implemented more widely in classroom learning. Several activities are carried out, namely (a) socializing the use of the e-module to teachers, (b) implementing the e-module in writing learning activities in the classroom, and (c) distributing the product in digital file form to schools. The results of this stage indicate that the e-module assisted by augmented reality can be used as an effective alternative learning medium in improving the writing skills of elementary school students.

4. CONCLUSION

Based on the research results, it can be concluded that the e-module developed with the help of augmented reality has a positive impact on improving elementary school students' writing skills. This is evident in the increase in student learning outcomes, where the average pretest score of 56.95% increased to 80% in the posttest, with a difference of 23.05%. These findings indicate that the use of interactive technology based learning media can help students develop ideas, structure sentences more coherently, and improve their writing skills.

Furthermore, the product feasibility test results also showed a good rating. Media experts scored 96.85%, categorizing it as very feasible, while material experts scored 80.00%, categorizing it as feasible. These results indicate that the developed e-module meets eligibility standards in terms of appearance, design, and content suitability. Therefore, this augmented reality assisted e-module can be declared feasible and effective as a learning medium to support the improvement of elementary school students' writing skills.

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