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# Augmented Reality in Improving Writing Skills Learning Experiences in Vocational High School Students

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**Abstract**

This arises from adapting 21st century learning in the form of learning skills, literacy skills, life skills, skills and attitudes, as well as mastery of technology. 21st century learning will improve students' learning experience, especially learning Indonesian with the topic of writing internship reports even though the teacher still provides stimulants in class using learning media. *Augmented Reality* (AR). The purpose of this research is for media development *Augmented Reality* (AR) in improving the learning experience of writing skills, knowing the suitability of the media *Augmented Reality* (AR) in improving the experience of learning writing skills, and knowing the effectiveness of the media *Augmented Reality* (AR) in improving the experience of learning writing skills Research methods used is research and development or *Research and Development* (R&D) which adopts the Lee and Owen development model with 5 stages, namely needs analysis, analysis *front-end*, design, development, implementation, and evaluation (ADDIE). The results of the development are application products with learning media augmented reality.

**Keywords:** *Instructional Media; Augmented Reality; Learning Experience; Writing Skills*

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## INTRODUCTION

*Augmented reality* (AR) is present as a product of technological development that can be utilized in all aspects of life. *Augmented reality*, *artificial intelligence, internet of thing* are some examples of technology in society 5.0 (Fricticarani et al., 2023). *Augmented Reality (AR)* as a direct or indirect physical appearance *real-time* a real-world environment that has been enhanced/augmented by adding virtual *that information* computer generated into it (P. Milgram & A.F. Kishino, 1994).

*Augmented Reality* (AR) aims to simplify users' lives by presenting virtual information not only to their immediate environment, but also to indirect views of the real-world environment, such as *streaming video* direct. *Augmented Reality* (AR) is interactive and 3D registered and combines real and virtual objects. The deeply felt differences between the real environment and the virtual environment consist of *Augmented Reality* (AR) And *Augmented Virtuality* (AV) including, *Augmented Reality* (AR) is closer to the reality of the world and lebih mendekati *Augmented Virtuality* (AV) is closer to a pure virtual environment. *Augmented*

*Reality* (AR) aims to simplify users' lives by presenting virtual information not only to their immediate environment, but also to indirect views of the real-world environment, such as *streaming video* direct. *Augmented Reality* (AR) improves the user's ability to perceive and interact with the real world. Temporary Reality *Augmented Virtuality* (AV) technology or Virtual Environment as Milgram called it, completely immerses the user in the world without seeing the real world, AR technology increases the sense of reality by releasing virtual objects and signals in the real world in real time.

The research results of Azuma et al (1999) stated *Augmented Reality* (AR) is not limited to certain types of display technology such as *head-mounted display* (HMD) and there are no limitations to the sense of sight. *Augmented Reality* (AR) can be used for all senses, adding smell, touch and hearing as well. *Augmented Reality* (AR) can also be used to supplement or replace a user's lost senses with sensory substitution, such as increasing vision for blind or visually impaired users through the use of audio cues, or increasing hearing for deaf users using visual cues.

Application *Augmented Reality* (AR) requires the removal of real objects from the environment, which is more commonly called mediated or minimized reality, in addition to adding virtual objects. Indeed, removing an object from its original nature corresponds to covering the object with virtual information that matches the background to give the user the impression that the object does not exist. Virtual objects added to a real environment show information to the user that the user cannot detect directly with his or her senses. Information delivered virtually by these objects can help users in carrying out daily work tasks, for example guiding workers through electrical cables in aircraft by displaying digital information via *headset*. The information can also serve an interesting purpose. Still many *Augmented Reality* (AR) other applications, such as medical visualization, entertainment, advertising, maintenance and repair, annotation, robot path planning, etc.

Augmented Reality (AR) was first introduced in the 1950s by Morton Heilig, a cinematographer, who considered cinema to be an activity that could be carried out with the ability to draw the viewer into the activity on the screen by paying attention to all the senses effectively. In 1962, Heilig built a prototype of his vision, which he described in 1955 in *"The Cinema of the Future,"* called Sensorama, which precedes digital computing (Miyashita T., et al., 2008).

Sutherland was the first to create the system *Augmented Reality* (AR) uses a see-through optical display mounted on the head (Daniel, 2009). L.B Rosenberg (1968) developed it from the system *Augmented Reality* (AR) first working, called Virtual Gear and demonstrated benefits on human performance while Steven Feiner, Blair MacIntyre and Doree Seligmann presented the first major paper on a system prototype *Augmented Reality* (AR) which is named KARMA. The main devices for augmented reality are displays, input devices, tracking and computers.

System *Augmented Reality* (AR) requires a powerful CPU and a large amount of RAM for camera image processing. So far, mobile computing systems have used a laptop in a backpack configuration, but with the advent of smartphone and iPad technology, researchers hope to see this backpack configuration replaced with a lighter and more sophisticated search system. Stationary systems can use traditional workstations with powerful graphics cards.

Augmented reality mobile systems also include mobile phone applications

such as wireless systems. cell phone *Augmented Reality* (AR) systems involve the use of wearable mobile interfaces to enable users to interact with overlapping digital information on physical objects or surfaces in a natural and socially acceptable manner. Mobile phones for augmented reality present advantages and disadvantages. Indeed, most mobile devices today are equipped with cameras, making cellphones one of them *platform* most convenient for implementing augmented reality. Additionally, most phones provide accelerometers, magnetometers, and GPS that AR can take advantage of.

Application *Augmented Reality* (AR) is still limited if done using a mobile phone platform. As a result, many applications send data to a remote computer that performs the computation and sends the results back to the mobile device, but this approach is not well adapted to AR due to limited bandwidth. However, considering the rapid development of mobile device computing power, it can be considered feasible to develop AR applications *real-time* which will be processed locally in the near future.

Researchers define a successful mobile AR system as an application that allows the user to focus on the application or computing device system, interacts with the device in a natural and socially acceptable way, and provides the user with personal information that can be shared if necessary. This shows the need for lightweight, wearable or mobile devices that are fashionable, private and have robust tracking technology.

Many research groups have raised the issue of socially acceptable technology. Mobile systems in particular are continually faced with social acceptance issues moving from the laboratory to industry. For a system to be successful in the market, developers need to consider that the device must be socially acceptable, natural to interact with, and fashionably acceptable.

Application *Augmented Reality* (AR) can also be used for learning purposes in the field of education. Application *Augmented Reality* (AR) has recently emerged in the educational field to support many educational applications in various domains, such as history, mathematics, etc. For example, Billinghurst (2001) developed the Magic Book, a book whose pages incorporate simple AR technology to make reading more captivating. Malaka et all (2004) built a mobile outdoor augmented reality system application using previously developed GEIST to assist users in studying the history of a *game* tells the story of users being able to release ghosts from the past.

One of the characteristics of the new science of learning is its emphasis on learning with understanding. Intuitively, understanding is good, but it is true that it is difficult to learn from a scientific point of view. At the same time, students often have limited opportunities to comprehend or understand a topic because many curricula emphasize memory over experiential learning. The emphasis on understanding points to one of the main characteristics of the new science of learning: its focus on the process of knowing (e.g., Piaget, 1978; Vygotsky, 1978). Humans are seen as beings who are goal-directed learning agents who actively seek information. Students expect to come to school with a set of prior knowledge, skills, beliefs, and concepts that significantly influence what they notice about the environment and how they organize and interpret it. This, in turn, affects their ability to remember, reason, solve problems, and acquire new knowledge. There are

three ways to improve students' learning experiences, which have implications for the way teachers teach, involving students so they do not fail to understand new concepts and information, bringing out students' pre-existing understanding of the subject matter to be taught and providing opportunities to build or improve initial understanding, and The understanding that students bring to class can already be quite strong in the early grades.

Experiential Learning Theory (ELT) has its roots in the experiential work of Dewey, Lewin, and Piaget. In contrast to cognitive learning theory, which tends to emphasize cognition over influence, and behavioral learning theory, which does not allow for the role of consciousness and subjective experience in the learning process, experience plays a central role in the ELT process. ELT is intended as a holistic adaptive process in learning that combines experience, perception, cognition, and behavior. Previous research shows that learning styles are influenced by personality type, educational specialization, career choices, current job roles and duties, and cultural influences (Kolb, 1984, Kolb & Kolb, 2005).

Experiential learning, or active learning, interactive learning, or "Learning by doing" has produced positive results. Most experts agree that when students play an active role in the learning process, student learning will be optimal (Smart & Csapo, 2007). Hawtrey (2007) defines experiential learning as the incorporation of active and participatory learning opportunities in courses. Students can enter and progress through any stage and tend to have advantages at certain stages of learning. Weaker preferences in the learning cycle can be strengthened to assist students in adapting to various teaching styles while strengths can also improve learning outcomes. The characteristic of this learning experience is that it provides a rationale for various learning methods, including independent learning, learning by doing, work-based learning, and problem-based learning.

*Augmented Reality* (AR) refers to a direct view of a real-world physical environment whose elements are combined by creating a computer-generated image with a mixed reality. Augmentation is usually carried out *real time* and semantic context with environmental elements. By using the latest AR techniques and technology, information about the real world around it becomes interactive and can be used digitally. *Augmented reality* makes it easy to provide comprehensive guidance on current and future trends in augmented reality technology and applications. see various aspects of life without going directly to the place or object of interest. In the world of education, AR is present as a transformation of traditional teaching methods into modern ones. With AR in the world of education, it is hoped that learners and students will have an interesting learning experience.

The learning experience becomes very different when using AR because students feel involved and motivated to follow the instructions given, especially material that is difficult to conceptualize (Shonima & Sowmya, 2024). Learning experiences also encourage the implementation of teaching methods *student centered learning*. The learning experience requires stimulants from the learner. Learning experiences are important for students' language skills because good learning experiences enable students to further develop their skills, especially writing skills.

Writing skills are one of the language skills. In essence, writing skills are an effort to strengthen words and strengthen language and lexical features of language

(Sudrajat & Sari, 2022). However, learners and students have four obstacles when writing. First, motivation and learning styles as well as students' personal attitudes influence writing. Second, students' teaching methods and styles in providing feedback influence students' writing abilities. Third, the classroom environment such as the size and breadth of the class and the available resources holds urgency in students' writing skills. Fourth, student learning continuity will be hampered or motivated by the teaching materials used by students (Luan et al., 2024). This research will discuss writing internship reports for Ash Shoheh 2 Vocational School students.

From the results of in-depth study and research, it is hoped that it will be possible identified factors that can increase the learning experience in improving writing skills. It is hoped that this research will be able to provide alternative learning media options that are appropriate for the vocational school education unit level in improving writing skills.

## METHODS

The research method that will be carried out is a type of research and development which is often known as *Research and Development (R & D).* In the media development process *Augmented Reality* This research adopts the Lee & Owen (2004) model with 5 stages of development starting from needs analysis, analysis *front-end*, design, development, implementation, and evaluation. Based on the characteristics of the various development models mentioned above, in this development research the researcher chose to use the Lee & Owen development model in developing media *augmented reality*.

Steps in media development *augmented reality* This will go through five stages which include:

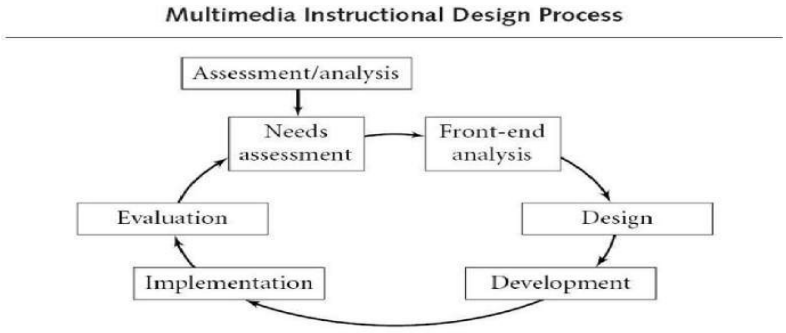


**Figure 1.** Lee and Owen (2004)

Research Steps

Lee Owen (Lee and Owen, 2004) begins the development process by carrying out analysis, with the aim of systematically searching for basic (fundamental) information about one or more objects.

1. **First Level *(Assessment / analysis*)**
   The first stage is the assessment and analysis stage. This stage is divided into two parts, namely:

a. Part one needs assessment *(need assessment).* Initial observations at the research site were direct interviews with teachers in the field of Indonesian language studies and heads of industrial units, in this case specifically those who handle internships and internship reports.
b. The second part analyzes the beginning and end *(front-and analysis).* At this level obtained complete information regarding what will be developed and The form of internship report that has been made by the student is then analyzed based on the level of need.

**2. Second Level *(Design)***

At this design stage, there are a series of activities in creating a media development schedule in the form of AR, designing specifications for the media to be developed, designing the material structure to be developed based on the results of the analysis, preparing the tools needed for product validation and testing.

**3. Third Level *(Development)***

This stage develops media by translating product specifications into form *storyboard* as a guideline for the use of media in learning materials, developing media designs that will be used in the learning process, developing the presentation of content that will be presented in learning media, reviewing or improving what is needed so that learning media is suitable for implementation in the learning process, media packaging.

**4. Fourth Level *(Implementation)***

The implementation stage is the stage where media expert and material expert validation is carried out. The instrument is a validation sheet or validation instrument. After the media is declared suitable by experts, it is then tested on students. This stage consists of small group trials and large group trials. Before the trial, students make daily activity plan small group and large group trial activities involve students as subjects in trials. Small group trials involve several samples of students taken based on the level of understanding of the material or learning outcomes achieved through grade data from class students. Large group trials involve students from one class, but students who take part in small group trials are not included in large group trials.

**5. The Fifth Level *(Evaluation)***

The fifth stage is the evaluation stage, the researcher evaluates the learning media. The evaluation carried out is oriented towards the validity of the learning media developed through media validation experts, material expert validation as well as the results of learning media trials using one to one and large class trials. The first trial was carried out on Indonesian language study teachers and the industrial relations team at the school.

## RESULTS & DISCUSSION

The research method used is Analysis, Design, Development,

Implementation, and Evaluation (ADDIE). The ADDIE method is a development model for developing teaching media. This research was used to develop Indonesian language subjects and Industrial Work Practice subjects for students at SMK 2 Ash Shoheh, Citeureup, Bogor. In the ADDIE model, the first stage carried out is the analysis stage. The analysis stage began with in- depth interviews with the principal, curriculum representatives, teachers and students of SMK 2 Ash Shoheh. Interviews were conducted to obtain the needs of SMK 2 Ash Shoheh. The second stage was learning media design. In accordance with the results of the first stage of needs analysis, the learning media that will be designed is the SMK 2 Ash Shohehinternship report. The third stage, development of augmented reality (AR) in writing internship reports. The third stage begins with creating an internship report storyboard, creating a good and correct latest internship report template. Then, the media is checked to see its readiness. The fourth stage, implementation, is validated by media experts and material experts. After being declared valid, the media is tested on learners and students. Trial with a small group of three students. The final stage is evaluation of the results of the trial in a small group of three students.

1. **Assessment/ Analysis**
   The assessment section starts with looking at the needs analysis of the SMK 2 Ash Shoheh and continues with the front and analysis stage.
   a. Need assessment: the author conducted interviews with the principal teacher of SMK 2 Ash Shoheh, the curriculum representative, and the Indonesian language subject teacher.
   b. Front and Analysis: The author digs up information about the material that dominates students getting the lowest to highest grades, then synchronizes the writing of internship reports with Indonesian language subjects.
2. **Design**
   The author designs an internship report that will be used as research. The design process begins by creating an internship report so that it conforms to the rules used and generalities in writing internship reports. At this stage, the author makes a focused discussion to adjust the internship report starting from the cover to the bibliography. After finalizing the internship report guide, the author started by creating a storyboard for creating augmented reality (AR).

**Figure 2.** Ash Shoheh Internship Report Cover 2 (Left: Before and Right: After Research)

The cover of the internship report (Figure 2) is a composition, according to Samara (Samara, 2011) p.17 composition or gestalt is the organization of various characters in one medium in which there is contrast (opposition, difference and tension) but these differences are connected by looking for similarity and closeness, for example angles with curves, lines with mass, or vertical with horizontal. The cover composition (figure 2) is composed of two geometric triangular planes and one arbitrary trapezoidal plane. Another composition of the internship report cover employs angular aspects with curves. The composition of this gestalt is based on the information above, so it is arranged by placing the position of each plane by bringing it closer together, namely the corners of the triangle with the plane of the trapezoid and also the vertical lines with the horizontal lines. The other cover applies an organic plane composition (with curved lines) to the corner of its placement on the right side.

Color according to Samara (Samara, 2011) p.81 has a perception that tends to be subjective, but color has the ability to influence brand imaging or identity. Samara added that if the design created already has one or two corporate colors, a simple palette can be used. An important aspect based on the Samara design concept (Samara, 2011; 81) emphasizes the importance of considering the emotional and cultural aspects of the target user. The cover of the internship report (figure 2) uses yellow–blue–grey with white added as a neutral element.

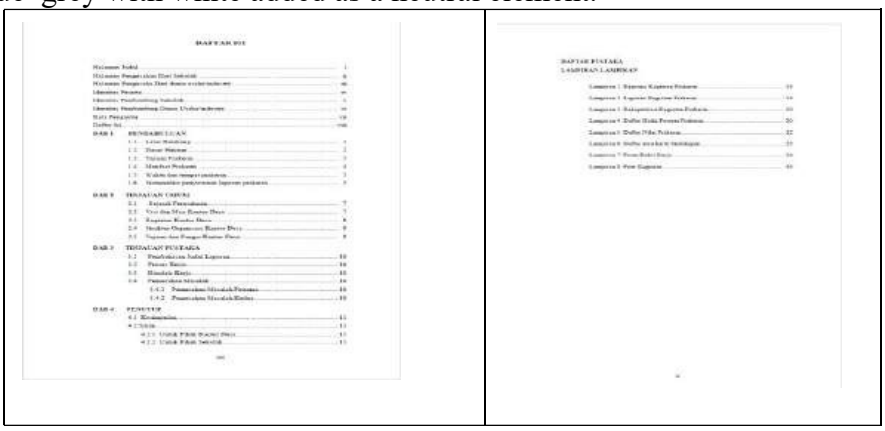

**Figure 3**. Table of Contents of the Prakerin Report Before Research

### *3. Development*

The following is a storyboard in the AR creation guidelines

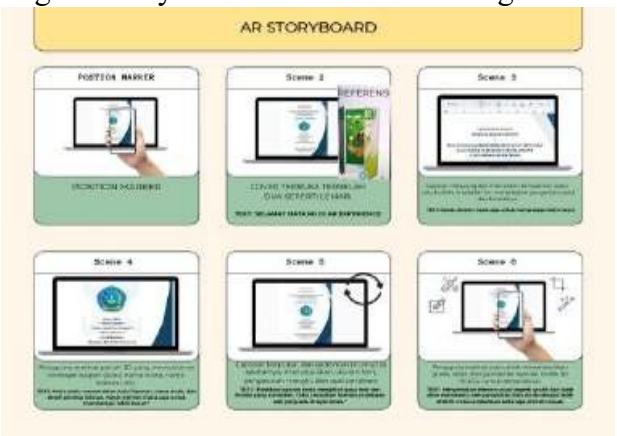


**Figure 4.** Storyboard Pengembangan Media AR

### *4. Implementation*

In the implementation stage, teachers and students use augmented reality (AR) when practicing writing skills. The augmented reality display starts with the following:


**Figure 5.** Views 1—3 Augmented Reality

Figure 5 shows the Augmented Reality display with an opening (left side) with the words "AR Industrial Work Practices Report". Followed by the teacher and students filling in their personal data. After filling in personal data, teachers and students can continue by pressing the green arrow. Filling in personal data in Augmented Reality provides a more personal learning experience for teachers and students.


**Figure 6.** Views 4—6 Augmented Reality

Figure 6 shows the display with the words "Welcome, .... Let's Learn to Write Scientific Reports". Personalization is visible in the leftmost image. Next, the teacher and students tap the device screen to continue. Then, the teacher and students direct their devices to the cover image of the report that has been prepared. In the rightmost image you can see that there is a box that needs to be filled in. The Augmented Reality created is gamified so that teachers and students get an interesting and fun learning experience. Teachers and students are asked to fill in the empty boxes with the correct answers. If there is a wrong answer, the pop up teacher and student will still return to the beginning and cannot continue to the next writing.


**Figure 7.** Views 7—9 Augmented Reality

### *5. Evaluation*

AR Product Due Test Procedures

Researchers created a product feasibility test procedure as shown in the image below:

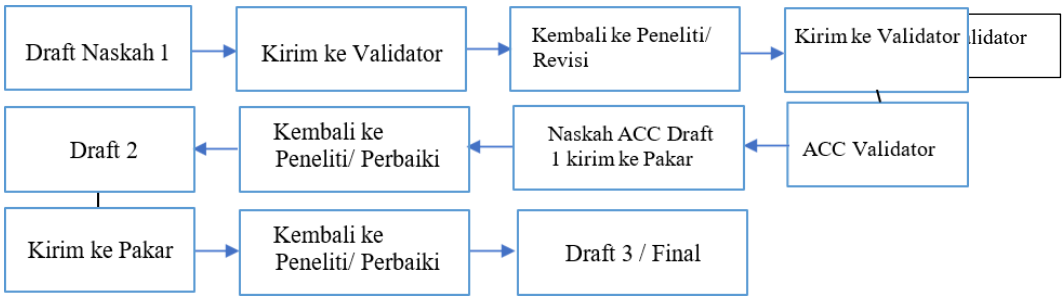


**Figure 8.** Feasibility Test Procedure

Product Validity and Effectiveness

For the validity, practicality and effectiveness of this research product, the researcher carried out: Researchers measure the level of validity by the instrument validator, then valid instruments that have been validated by the validator will also be validated by experts. The experts who were assessors in this research were learning design experts, language experts, and learning media experts. The product testing step is carried out after revisions have been made in accordance with expert recommendations in the product validation step.

The instrument used was a response questionnaire from Indonesian language teachers and the industrial relations team, with assessment criteria scoring as in the following table.

**Tabel 1.** Guidelines for Questionnaire Scores for Indonesian Language Teachers and Industrial Relations Teams

| **Response** | **Statement Score** | |
|---|---|---|
| | **Positive** | **Negative** |
| Very Impractical | 1 | 5 |
| Impractical | 2 | 4 |
| Enough | 3 | 3 |
| Practical | 4 | 2 |
| Very Practical | 5 | 1 |

Materials refers to the skills of writing internship reports by learning independently to use the product so that they understand and master it through field trials, namely by assessing the results of the product in the product manufacturing task and the results. activities in the presentation and physical quality of the product with the help of a rubric with a score of 100 and a score of 85. This effectiveness analysis is used to calculate the learning completeness of prospective trainers. The training model developed is said to be effective if it meets the minimum good classification.

**Table 2.** Kriteria Keefektivan Produk

| No | Completeness Value | Effectiveness Criteria |
|---|---|---|
| 1 | X > 85 | Very good |
| 2 | 75 ≤ X < 80 | Good |
| 3 | 50 < X < 75 | Enough |
| 4 | 20 < X < 50 | Not enough |
| 5 | X < 20 | Very less |

## Current existing products

So far, the products made are still conventional using the help of the Word application without any accompanying learning media. The discrepancy between learning outcomes and the expected grades obtained can be caused by many factors, including different teachers' initial knowledge, the material presented is in the form of theoretical knowledge, making internship reports instead of practice, the unavailability of interesting teaching media/infographics in the form of teaching materials and teacher handbooks.

## Product Revision Based on trials

Below we will present suggestions from experts as input for improving learning media. Based on advice from learning material experts, the substance of this learning material is appropriate and easy to understand. According to learning materials experts, motivation-based training teaching materials are suitable for use in learning, but there are several things that need to be revised. Suggestions from learning material experts are presented in the table below.

**Table 3. Suggestions for Improvement from Material Experts**

| No | Suggestion | Revision |
|---|---|---|
| 1 | *Typo error* needs to be repaired | Repair *Typo error* |
| 2 | Add material about Writing Internship Reports | Added material about Internship Reports |

According to media experts, teaching materials are suitable for use in learning but there are several things that need to be revised. Advice from media experts is presented in the table below.

**Table 4.** Suggestions for Improvement from Media Experts

| No | Suggestion | Revision |
|---|---|---|
| 1 | Don't have too many cover designs | Fixed the book cover |
| 2 | Don't fill the book with too many illustrations | Delete the illustration has 1 function |

**One-on-one Test Results *(one to one)***

One-on-one trials were carried out on 3 teachers Indonesian language teacher and internship supervisor with craft backgrounds and discipline in attending classes, namely diligently guiding internship reports. This one-on-one trial was carried out to determine the suitability of teaching material products seen from the learning design aspect, curriculum aspect, material suitability aspect, media suitability aspect, cover design aspect, content design aspect, and benefits aspect with a total of 30 indicators. From the results instrument from a one-on-one test, it can be concluded that the training materials are suitable for use.

**Small Group Trial Results**

The small group test was carried out on 9 teachers Indonesian language teacher and internship supervisor with a background in diligently conducting internship report guidance. Small group trials were carried out to determine the feasibility of teaching material products seen from the learning design aspect, material feasibility aspect, media feasibility aspect, cover design aspect, content design aspect, and benefits aspect with a total of 35 indicators. From the instrument the results of the small group test can be drawn conclusion that the training materials are suitable for use.

## CONCLUSION

After conducting research, the conclusion obtained is that augmented reality (AR) industrial work practice reports (Prakerin) can provide an excellent, interesting and fun learning experience for learning Indonesian. The results of validation tests carried out by expert's state that augmented reality industrial work practice reports are suitable for use when writing.

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