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Developing Teaching Materials of Academic Writing Using Mobile Learning

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ABSTRACT

This study aimed to develop teaching material of academic writing skill using mobile learning. The innovation of this study was the teaching material of academic writing skill in form of application which could be easily installed on smartphones. This study implemented R&D method level 4 which includes 162 students and 7 lecturers. The techniques used in this study to collect data were tests, questionnaires, interviews, and focus group discussions (FGD). To design this teaching material, the researchers needed strategies that were started from the stages of 1) research, 2) designing product, and 3) development. Data was analyzed using Lilliefors technique. This study concluded that in the stage of research, students and lecturers needed mobile learning-assisted academic teaching materials in the form of application. The second stage was designing the product. In this stage, the design of the product was created in a storyboard, which was divided into scenes. Furthermore, design validation was carried out by material and media experts. It needed to revise the design. The third stage was developing. In this stage, the product was created using the Kodular website. Furthermore, it needed to conduct trials and revisions of product. The last step was conducting dissemination.

1. INTRODUCTION

The society 5.0 era is a concept of a human-centered society [1] which has an impact on change because advances in information technology have become an important color instrument of a series of activities in all aspects of human life, including education [2]. Learning in this era provides more advanced teaching materials, online systems, and various informatics sources [3]. In this way, teachers are possible to create teaching materials that are more interesting and efficient for students.

The presence of various teaching materials will be needed for learning that is easily adapted to circumstances [4] and can be elaborated depending on the requirements of the teaching and learning process [5]. Creating teaching materials is very needed [6]. Additionally, the availability of teaching materials will significantly impact the effectiveness of the teaching process and serve as a part of preparing students for future education [7]. Teaching materials as another educational innovation that can increase students' skills [8]. Materials that can maximize learning acceptability and raise the likelihood of obtaining learning outcomes are considered to be appropriate teaching materials.

Learning in the Society 5.0 age can add new value by developing cutting-edge technology. Students now have the chance to sharpen their abilities and learning techniques [9] with the aid of the fusion of real-world and online environments [10] utilizing the idea of big data technology collected by the Internet of Things [11] through mobile learning [12]. Mobile learning or m-learning has become a common experience in higher education and the professional workforce [13] due to the rapid development of mobile-based telecommunications technology [14]. It provides a more meaningful experience [15] by utilizing a laptop, notebook, cell phone [16], personal digital assistant or PDA, and smartphone [17]. It enabled mobile learning to facilitate and design the educational-content based on technological advances [18].

Mobile learning may be described as a teaching and learning process that takes place when students can access material using mobile technology during learning activities without being restricted by time or place [19]. Mobile learning, as the name suggests, refers to learning that involves mobile devices [20], which is the trend of new technology applications in the world of education today [21]. The concept of mobile learning itself is considered a broad concept because users can obtain information from many sources, ranging from e-books, audio lectures, and even videos [22] so that they can show the potential and value of mobile learning tools or materials in the education world [23]. Following this explanation, with the use of mobile devices as a supplement to learning, the phrase "mobile learning" refers to a broad notion that encompasses the teaching and learning process.

Hwang et al. [24] shows that mobile learning can motivate students, so they can create positive perceptions. The results of the study can serve future researchers to sign learning activities using mobile learning effectively. It has a language study object. However, it just focuses on listening and speaking skills without writing skills. Another research conducted by Imelda et al. [25] implements mobile learning in teaching English writing skills. The results are quite satisfactory because they can improve students' English writing skills and optimize their creativity. The research only discusses about English writing skills and mobile learning in the video materials. While this study will focus on academic writing skills and mobile learning applications. Based on the

existing research, educators in the society 5.0 era face challenges to integrating technology in the teaching and learning process effectively inside the classroom for creating a superior generation that has the competencies needed in the future. For example, 1) communication, 2) the ability to think clearly and critically, 3) the ability to live in a globalized society, and 4) having a broad interest in life [26].

The choice of academic writing skills as the research object is based on several reasons. Academic writing belongs to the genre of professional writing that encourages the formation of brain-storming through the preparation process and the peer review process [27]. Writers need to be competent in using standard sequences according to disciplines when engaging in academic writing [28] and pass through several stages including, 1) the presentation of three or more broad-scope arguments, 2) the feasibility of choosing a topic, 3) there is no clear explanation on the topic, and 4) the contribution of the authors is considered to be instrumental [29] which has developed into a field of research as a new direction of the lack of learning to write in the educational institutions [30].

Even though writing skill is important for students, the facts of previous research studies prove that many students find difficulties in mastering them. A study conducted by Mustakim and Ismail [31] shows that academic writing skill is a difficult skill to be mastered. The quality of students' academic writing skills has to be improved by paying attention to the teaching techniques and materials provided. Therefore, it is necessary to prepare the appropriate teaching materials for writing skills. Moreover, a study by Tantawi et al. [32] shows that teaching writing skills using games provides quite a satisfactory result. However, students' satisfaction with traditional games is low, so their willingness to take part in the learning process is also low. It needs innovation of teaching material such as the use of mobile learning which has many advantages on academic writing skills so it can improve students' motivation and satisfaction.

The results of earlier studies show that academic writing instruction has not completely embraced the benefits of mobile learning, especially the use of teaching materials. The survey results indicated that the teaching materials used by lecturers are packaged in printed textbooks with International Standard Book Number. These textbooks were distributed to students before the lecture takes place. During the lecture, some students did not bring their textbooks because they forgot them because they were in a hurry, some of the students' textbooks were damaged and torn because they were opened and closed too often, in addition, some students had no textbooks because of not buying on the ground that the students can borrow from the senior students or other friends. These constraints indicate that the teaching materials for academic writing skills have not yet used a mobile learning base.

Based on the benefits of mobile learning and the survey results, a strategy for developing academic writing teaching materials to support writing learning in the Society 5.0 era is required.

2. METHODS AND MATERIAL

2.1 Research design

This development research designed the teaching materials for mobile learning-assisted academic writing. The materials were presented in an application that was easy to install on a device.

2.2 Respondents

The respondents of this study were 162 students who joined the course on academic writing skill and 7 lecturers with functional positions of assistant professor until professor who taught the course on academic writing skill. The researchers also involved two lecturers as experts in material ad two lecturers as experts in media.

2.3 Research techniques and instruments

The techniques used in this study to collect data were tests, questionnaires, interviews, and focus group discussions (FGD). The test question was the testing instrument. The researchers have to provide testing for the research samples. A test was conducted to investigate the effectiveness of teaching materials in academic writing. The instrument of the questionnaire was the questionnaire guidelines. The researchers had to create the questionnaires for need analysis, experts, and eligibility of users (students and lecturers). The interview guidelines were the data instrument for the unstructured interview. It followed the results of a questionnaire filled out by the research subject. The data instrument for FGD was the FGD guidelines.

2.4 Research procedure

To design this teaching material, the researchers need strategies that starts from the stages of 1) research, 2) designing product, and 3) development [33]. The three strategies are presented in Figure 1.

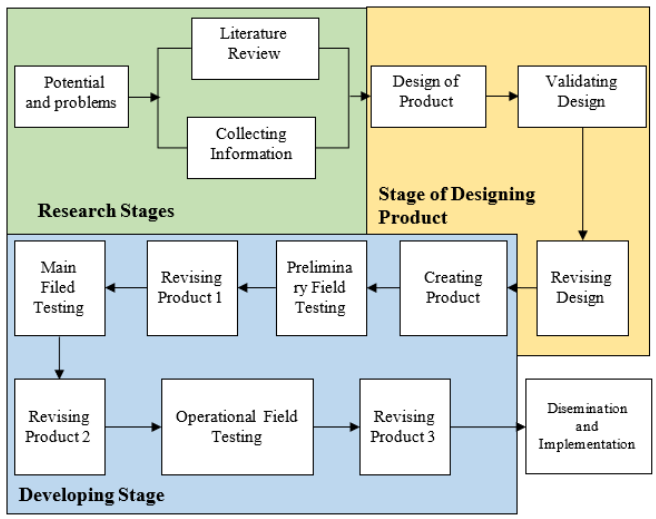

Figure 1. Stages of research and development level 4

2.4.1 Stage of research

Firstly, researchers found out problems with writing skills in the Indonesian Language and Literature Education Undergraduate Program. The problems had the potential to be researched and used in product design. Secondly, the researchers conducted literature reviews on national and international books and journals. The results of it would be matched with the problems found in the first step to answer them. Thirdly, the researchers collected information from students who joined the course on academic writing skills and from lecturers who taught the course on academic writing skills. It was conducted to find the teaching need for academic

writing skills using a questionnaire that had been validated by the validator through a Google form to be filled out by lecturers of writing skills courses and students who took writing skills courses. The results of the questionnaire were recapitulated and analysed, and then they were cross-checked by conducting interviews with several lecturers and students. The interview was conducted with the consideration that the subject had given a very good and logical answer. In addition, the researchers conducted interviews with several heads of the Indonesian language education study program to find out the curriculum used.

2.4.2 Stage of designing product

First, the researchers carried out the process of drafting the teaching materials for academic writing and carried out the validation process. In the step of drafting the teaching materials for academic writing, the researchers considered the materials needed by students and lecturers based on the results of the needs analysis and made a draft of the menus used in the application. The making of this draft utilized a storyboard. Second, the draft of academic writing teaching materials was validated by the material and media experts. The validation process by the material experts used an instrument grid as shown in Table 1:

Table 1. Instrument grid for the material experts

No.	Aspect	Indicator	Evaluation				
			1	2	3	4	5
1	Content eligibility	The suitability of the material with the Learning Outcomes of the Course (CPMK)					
		Material completeness					
		Material breadth					
		Material depth					
		Material accuracy					
		Material updates					
		Encourage curiosity					
2	Presentation eligibility	Presentation technique					
		Presentation support					
		Presentation of learning					
		The flow of thought					
3	Linguistic eligibility	Communicative					
		Straightforward					
		Interactive					
		Easy to understand					
		use of terms, symbols, or icons					
4	Assessment of higher order thinking oriented academic writing skills	Elements of higher order thinking					
		Steps for higher order thinking-oriented writing					

Notes: Developed from reference [34]

Media experts used media instruments during the validation process. The instruments were adopted from reference [35] which contained 8 aspects. Moreover, materials and media experts could give a score by Table 2.

Table 2. Scoring guideliness

Rating/score	Description
5	Excellent
4	Good
3	Fair
2	Poor
1	Bad

After that, the researchers conducted a descriptive statistical analysis. This analysis was conducted by converting the data in percentage. The formula used by researchers was as follows:

$$P = \frac{x}{xi} \times 100\% \quad (1)$$

Eq. (1) was the formula for converting data into the presentation form, where P was the percentage of each criterion, x was the score for each criterion, and xi was the maximum score for each criterion. The results of the p-values were then matched in Table 3 to determine the feasibility criteria for the teaching materials.

The materials and media experts can also provide criticism, suggestions, and comments. Data of criticism, suggestions, and comments from experts belong to qualitative data. The data was then processed using qualitative descriptive data analysis. The analysis was carried out by grouping and describing the qualitative information obtained from the expert validation sheet. Third, researchers revised the design of the product. As a result, it served as the foundation for developing products of teaching materials for academic writing skills.

Table 3. Feasibility criteria for the teaching materials

Scale (%)	Feasibility criteria
85 - 100	Feasible with an excellent predicate
65 - 84	Feasible with a good predicate
45 - 64	Feasible with a fair predicate
0 - 44	Not feasible

Notes: Adopted from reference [36]

2.4.3 Stage of developing

First, researchers created products using the Modular website. Kodular is a platform that can be used to build applications with several advantages to facilitate users. Kodular is an open-source platform or open software with a web base that can produce Android applications without the need to enter programming code, accompanied by the mini-dbase feature as a storage function with adjustable data sizes. Furthermore, Kodular can be used to create application updates, and many tools are currently being developed to assist users in creating applications [37]. These conveniences make Kodular the choice to learn, especially in android

programming [38]. This is reinforced by the results of the study, which prove that the application programmed with Kodular obtained a score of 94.25% for the results of the small group analysis and 88.38% for the larger group. Thus, the development of learning applications with Kodular was considered feasible.

Second, researchers conducted preliminary field testing by carrying out observations, interviews, and providing questionnaires in private universities in East Java, Indonesia. Third, researchers revised the product by reviewing the data obtained in preliminary field testing. Moreover, it was used to revise the product of teaching materials for academic writing skills. Fourth, researchers conducted primary field testing at two private universities in East Java, Indonesia, by conducting observations, interviews, and administering questionnaires. Fifth, researchers revised products after reviewing data from primary field testing. The results of the review were used to revise the teaching materials for academic writing skills. Sixth, researchers conducted operational field testing by carrying out observations, interviews, and providing questionnaires and tests in private universities in Central Java, Indonesia. The private university in West Java, Indonesia, became a testing ground. The private university in East Java, Indonesia, was the control class. Seventh, researchers revised the product again by reviewing the data obtained in operational field testing. The results of the review were used to revise the teaching materials for academic writing skills. Finally, researchers conducted dissemination with students and lecturers, who are the research subjects and the experts in materials and media.

2.5 Data analysis technique

The Lilliefors normality test was used as a prerequisite test before beginning data analysis techniques because the data was single. The homogeneity test used the *F*-test. The procedure for the balance test in this study employed a two-tailed *t*-test with a significance level of α 0.05.

3. RESULTS

3.1 Stage of research on teaching materials for academic writing skill

The input required in the first academic writing teaching materials was the existing curriculum. Based on the results of interviews with the head of the study program, some study programs still use the Indonesian National Qualifications Framework (KKNI) curriculum, while other study programs have implemented an independent curriculum. In the curriculum, in general, the learning achievement of an academic writing course states that, at the end of the lecture, the students can write well academically; in addition, the learning achievement at other universities is that the students can write well academically and publish writing at the end of the lecture.

Based on the syllabus and lesson plans that have been prepared by the lecturer, broadly speaking, the contents of the material in academic writing consist of organizing scientific essays, how to find topics and essay titles, stages of writing essays, language and paragraphs in essay development, effective sentences, paragraph development, editing, citation techniques, reference writing techniques, plagiarism avoidance techniques, and review techniques.

The second input needed was the students' responses and needs related to the teaching materials for academic writing. In this second input, the data was collected by providing a semi-open questionnaire using Google Forms. This questionnaire contained questions about the material and the desired form of media for teaching materials. Based on the data collected on the Google form, there were 162 students from several universities in Indonesia filling it out and conveyed their desired needs for the teaching materials for academic writing. First, 127 students or 78.4%, needed mobile learning-assisted academic teaching materials in the form of applications. Second, 158 students or 97.5%, needed teaching materials for academic writing that could motivate students to produce scientific works.

Third, 152 students or 93.8%, needed the writing stage material, starting from 1) the problem analysis stage, 2) the writing idea analysis stage, 3) the stage of detailing the plot and sub-chapters of writing, 4) the stage of comparing between references, 5) the stage of combining ideas and references, 6) the writing correction stage, 7) the writing creation stage based on input from colleagues, supervisors, and lecturers, and 8) the displaying writing stage (publication). Fourth, 159 students or 98.1%, required academic writing teaching materials that contain 1) effective sentences. 2) cohesion and coherence, 3) sentence pattern, 4) Indonesian spelling, 5) writing steps/stages, and 6) strategy for publication of works (the writing results). Fifth, 114 students or 70.4%, needed a quiz menu on the teaching materials for academic writing. Sixth, 157 students or 96.9%, needed an evaluation menu on the teaching materials for academic writing.

The third input needed was the lecturers' responses and needs related to the teaching materials of academic writing. In this third input, the data were collected by providing a semi-open questionnaire using a Google Form. This questionnaire contained questions about the material and the desired form of media for teaching materials. Based on the data collected on the Google form, there were seven lecturers from several universities in Indonesia who are filling it out and conveying the desired needs for the teaching materials for academic writing. First, six lecturers or 85.7%, needed higher-order thinking-oriented teaching materials. Second, five lecturers or 71.4%, needed teaching materials on academic writing skills that can help students become skilled in writing scientific papers.

Third, seven lecturers or 100% of the teaching materials needed could accommodate visual, auditory, and kinaesthetic learning styles. Fourth, six lecturers or 85.7%, required the application display for the teaching materials of academic writing to be set in portrait. Fifth, four lecturers, or 57.1%, needed Kodular software in producing the teaching materials for academic writing.

3.2 Stage of designing product on teaching materials of academic writing skill

The process of drafting the teaching materials for academic writing in this study utilizes storyboards arranged in each scene. Each scene created represents each menu, which can be explained as follows: First, the draft of the main page contains the title and identity of the program, which includes the functions of opening, animation, text, background, text color, and navigation buttons with an audio music instrument designed as shown in Figure 2.

Figure 2. Main page storyboard

Second, the draft of an invitation to pray—this draft is a pause frame from the main page to the main menu. The function of this frame is to serve as a reminder for students to always read prayers before doing activities. This is an implementation of one of the internalizations of character values. The draft of the invitation to pray has the function of animated running text and images of people praying according to the religions in Indonesia. The draft of the invitation to pray can be seen in the following Figure 3.

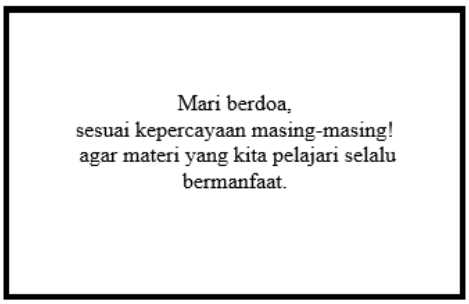

Figure 3. The frame of invitation to pray

Third, the main menu draft contained the overall menu contained in the mobile learning-assisted teaching materials. The menu draft can be seen in Figure 4.

Figure 4. Main menu storyboard

Fourth, the menu draft of contents contained materials needed by students and lecturers. The menu draft of contents can be seen in Figure 5.

Figure 5. Contents menu storyboard

Fifth, the quiz menu draft. The quiz contained questions to measure students' knowledge after using this teaching material. The quiz menu draft can be seen in Figure 6.

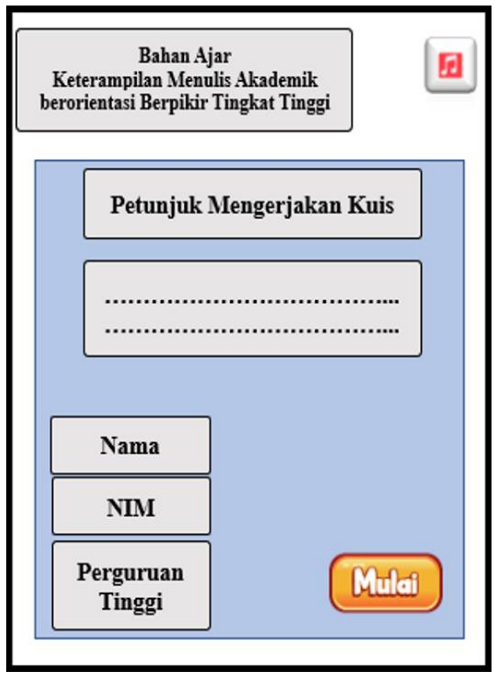

Figure 6. Menu storyboard

Following the completion of the draft, the researchers validated the draft with material experts and media experts. The material experts in this study were writing skills course lecturers who were not given a needs questionnaire, whereas the media experts were learning media course lecturers or learning technology lecturers. The material and media experts were chosen because they are very experienced in this field.

Suggestions and feedback from material and media experts became examples of ways to improve the draft of academic writing teaching materials. Table 4 shows the results of data analysis by material experts and media experts.

Table 4. Results of data analysis

	Material Expert 1	Material Expert 2	Media Expert 1	Media Expert 2
x	83	76	84	86
xi	90	90	100	100
p	92.2	84.4	84	86

Based on the table of results from the descriptive statistical analysis, the *p*-value of each expert was matched with the table of feasibility criteria for teaching materials. From the results of this matching, the feasibility criteria for the teaching materials of mobile learning-assisted academic writing, according to the material expert 1, it was feasible with an excellent predicate; according to the material expert 2, it was feasible with a good predicate; according to the media expert 1, it was feasible with a good predicate; and according to the media expert 2, it was feasible with an excellent predicate. Based on the assessments from the material and media experts, it could be concluded that the teaching materials for mobile learning-assisted academic writing are feasible to prototype.

3.3 Stage of developing teaching materials for academic writing skill

The product of teaching material in academic writing skill was created using the Kodular website. The prototype of homepage in academic writing material can be viewed in Figure 7.

Figure 7. Main page prototype

Meanwhile, the prototype of the main menu of mobile learning-assisted academic writing teaching materials can be seen in Figure 8.

Figure 8. Main page prototype

While the prototype quiz on the mobile learning-assisted academic writing teaching materials can be seen in the following Figure 9.

Figure 9. Quiz prototype

The idea behind creating quizzes on the Kodular website is to first prepare global data to accommodate the number of questions and answers. Once the global data were ready, we created a procedure for the questions in which the questions would be numbered 1-10 and each answer had also been associated with global data through a procedure that had been created. We then made logic "when" and added "if-then" to determine "true" or "false" and got a score.

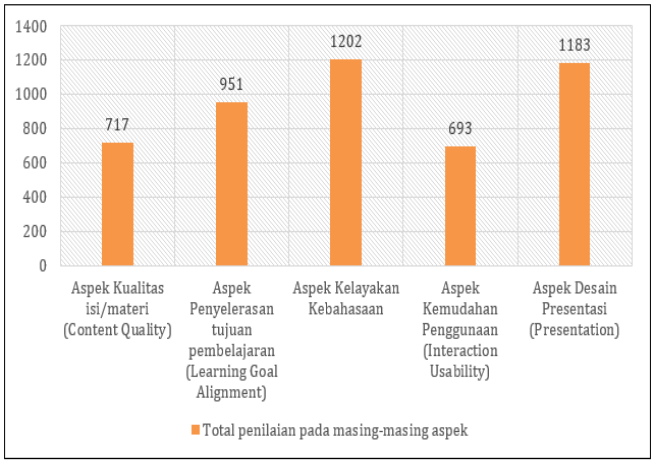

Figure 10. Feasibility assessment conducted by students at Indonesian Language and Literature Department of private universities in East Java, Indonesia

Furthermore, researchers conducted preliminary field testing at one of the private universities in East Java, Indonesia. The implementation of the limited trial was in hybrid learning using teaching materials for academic writing skills at the Indonesian Language and Literature Department of private universities in East Java, Indonesia. It included 60 students from classes A and B as well as one lecturer. Six meetings were held to observe and assess based on the observation guidelines. After that, researchers provided a questionnaire of user eligibility to the lecturers and students to assess the teaching material for academic writing skills. Moreover, the researchers revised the product of the teaching material based on students' and lecturers' suggestions. The feasibility assessment conducted by students at Indonesian Language and Literature Department of private universities in East Java, Indonesia could be viewed in Figure 10.

The primary field testing was done in hybrid learning with teaching materials for academic writing skills. It involved two departments at different universities. First was the Indonesian Language and Literature Department of a private university in East Java, Indonesia, which consisted of 14 students in the course of writing. Second was the Indonesian Language Department of a private university in East Java, Indonesia, which consists of 32 students in the course of technical writing in science. Six meetings were held to observe and assess based on the observation guidelines. After that, researchers revised the product of the teaching materials based on the students' and lecturers' suggestions. Feasibility assessment conducted by students at two departments at different universities could be viewed in Figure 11.

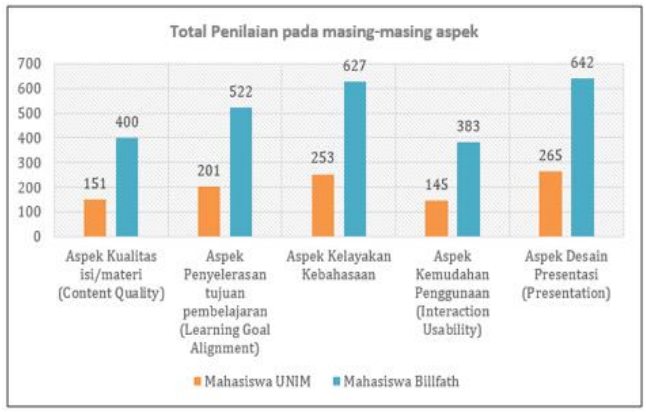

Figure 11. Feasibility assessment conducted by students at two departments at different universities

In three private universities in West Java, Central Java, and East Java, Indonesia, operational field testing was carried out through hybrid learning. The private universities from West Java and Central Java were part of an experimental class that implements teaching materials for academic writing skills using mobile learning. A private university from East Java acted as the control group that implements other teaching materials.

Based on normality test using Lilliefors method, the value of statistical test with significance level of 0.05 in each sample could be viewed in Table 5.

Table 5. Results of normality test

Normality test	$L_{observation}$	$L_{critique}$	Decision	Conclusion
Teaching material of academic writing skill using mobile learning	0,1008	0,1016	H_0 was accepted	Normal
Teaching material of academic writing skill not using mobile learning	0,1138	0,1566	H_0 was accepted	Normal

Based on Table 5, the value of $L_{observation}$ was lower than $L_{critique}$ for each sample. In other words, it could be said that each sample came from normally distributed population.

The goal of this operational field test was to compare the effectiveness of teaching materials on academic writing skills using mobile learning with printed versions. Based on the results of effectiveness, it can be known that the result of the *t*-test with a significance level of 0.05 was 21.0891; T0.05/106=1.6594. DK= $\{t \mid t>1.6594\}$ was calculated using the t-table. The value of tobs ∈ less than DK, so H_0 was rejected. It can be concluded that the teaching material for academic writing skills using mobile learning was more effective than printed teaching material. The last step was conducting dissemination.

4. DISCUSSION

The development of teaching material of academic writing skill using mobile learning was started from the stages of 1) research, 2) product design, and 3) development. In the first step, it is necessary to pay attention to the needs of the curriculum used, whether the KKNI curriculum or the independent curriculum, then the students' responses and needs, as well as the lecturers' responses and needs. The KKNI Curriculum and the concept of the Independent Curriculum

became the orientation of the learning process, especially in higher education [39].

In the second step, it is necessary to make a draft of a storyboard and validate it with the material and media experts. A storyboard is a technique that can help teachers convey material or ideas visually so that students can participate in authentic and active teaching and learning activities [40]. In addition to the storyboard, the description of the application that will be produced also requires validation from the media and material experts, especially at the development stage so that the feasibility and quality of the learning media can be revised before reaching the experimental stage [41]. Thus, the presence of a storyboard and validation from material and media experts will be extremely beneficial in the process of creating and developing drafts of academic writing teaching materials because they can provide an overview of the application that will be produced and assess its feasibility and quality.

In the third step, it is necessary to make a prototype based on the suggestions and input from the material and media experts. Academic writing teaching materials should be prototyped with an emphasis on innovation. Learning media innovation can have an impact on the effectiveness of learning because it plays an important role in increasing the success rate of the teaching and learning process. One form of learning innovation can now be designed with the Kodular website base [42]. In another study, the development of learning media using the Kodular website also managed to get a score of 81% in the excellent category based on the media and material experts' tests so it was said to be very feasible [43]. Therefore, the Kodular website for prototyping the teaching materials for academic writing is considered very appropriate because it can increase the effectiveness and feasibility of the learning media.

5. CONCLUSION

Conclusion of this study was that in developing teaching material of academic writing skill using mobile learning was started from the stage of research. In this stage, academic writing skill was taught to students at Indonesian language and literature from several universities in Indonesia filling it out and conveyed their desired needs for the teaching materials for academic writing. Lecturers and students needed mobile learning-assisted academic teaching materials in the form of application. The second stage was designing the product. In this stage, the design of the product was created in a storyboard, which was divided into scenes. Furthermore, design validation was carried out by material and media experts. It needed to revise the design. The third stage was developing. In this stage, the product was created using the Kodular website. Preliminary field testing at one of the universities needed to be carried out. Then, it had to revise the product of the first teaching material. The following step was to conduct main field testing in two universities and revised the second teaching material's product. Furthermore, operational field testing was carried out in three universities, and the third teaching material's product was revised. The last step was conducting dissemination.

6. RECOMMENDATION

In order to assist learning in the Social 5.0 era, the researchers suggest future researchers to investigate teaching material strategies in different topic areas.

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