Development of Teaching Materials for Digital Basic Teaching Skills Based on Flipped Learning

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Abstract. The digital era has changed all lines of life to continue to develop and utilize the latest technology, including the world of education. One component of education in the digital era that is interesting to develop is Basic Teaching Skills. Basic Teaching Skills are implemented in the form of blended learning. One of the blended learning models that condition learning in a blended situation is flipped learning. Flipped learning is blended learning that is designed in two learning spaces, one learning space in an offline situation and one space in an online situation. The research objective is to produce teaching materials based on flipped learning that are valid, practical, and effective. This research uses the category of development research, stages namely: pre-development, development, and post-development. Results of the research included: (1) Flipped learning-based digital basic teaching skills teaching materials meet the acceptability aspects of micro-learning material experts, learning design developer experts, and product users by students. The results of the assessment of multimedia teaching material development experts get an average score of 76, which is a very good category. Furthermore, the assessment results on the criteria for the use aspect get a score of 74.5 in the very good category, so that the finalization of teaching material development can be carried out further; and (2) the results of research on five digital basic teaching skills using Flipped learning provide specific skills that aim to in-crease the effectiveness of teaching and learning, motivate students, and encourage active class participation.

Keywords: Teaching Materials, Basic Teaching Skills, Flipped Learning.

1 Introduction

The digital age has significantly transformed education, particularly in the development of Basic Teaching Skills (KDM) through blended learning approaches. This integration of technology not only enhances teaching methodologies but also fosters active student engagement and personalized learning experiences. Digital education has emerged as a vital component, offering advantages over traditional methods, such as increased accessibility and improved communication [1,2]. The shift towards a blended learning

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model combines face-to-face instruction with digital tools, promoting a more interactive learning environment [3].

Effective learning strategies, including blended and mobile learning, are essential for engaging students and achieving educational goals [4]. The use of digital platforms and tools facilitates a more flexible and contemporary approach to education, aligning with the needs of modern learners [5]. Despite the benefits, challenges such as the digital divide and the need for professional development for educators persist, a balanced approach to technology integration is crucial to ensure equitable access and effective learning outcomes [6]. While the digital transformation in education presents numerous opportunities, it also necessitates careful consideration of the challenges involved, ensuring that all students can benefit from these advancements.

In the world of education, teaching materials are important learning tools to be well prepared in order to meet learning outcomes [7,8]. Currently, teaching materials are developing not only in printed form, but also in a more attractive and interactive electronic form [9,10]. One of the teaching materials that need to be packaged attractively is Basic Teaching Skills (KDM), which is part of the micro teaching course in the Agricultural Technology Education undergraduate study program. KDM teaching materials are designed to equip prospective teacher students with micro teaching knowledge and skills, which are presented in printed, electronic, and video learning forms that support understanding and practice of KDM simulations.

Currently, KDM teaching materials can be found in both printed and electronic versions. The design of the printed version of teaching materials generally consists of text and images, while the electronic version available is almost the same, namely text and image information. The text presented is in the printed version that is scanned and the electronic version. Both can be said to be digital teaching materials, because they are already in an accessible electronic version. The problem is that for learning in today's era, blended learning with a flipped model requires a truly digital version of teaching material packaging whose contents are a combination of text, images and videos that can be accessed online. The use of digital teaching materials is empirically able to encourage interest in learning [11,12]. This is due to the content of teaching materials that become more attractive. The use of fonts, images, colors, video links, learning activities that are active become one package contained in digital teaching materials [13].

Based on this, it is necessary to develop teaching materials that meet the demands of learning needs in the era of learning today. Today's teaching materials needed are teaching materials that can be accessed digitally in online learning [14], which have advantages in terms of quality, quantity, and accessibility [15,16], which are used as a guide, source of material, and fulfillment of competency achievement [17].

This research aims to develop digital teaching materials that are truly adaptive and friendly, in addition to meeting the characteristics of teaching materials that should be, such as self-instructional, self-contained, and stand alone. Adaptive to follow the development and characteristics of students with varied learning styles. Teaching materials can be studied anytime and anywhere in a flipped book package that is permanently embedded in an online learning application or Learning Management System (LMS). Quantitatively the number of teaching materials available in the LMS repository, especially the UNM SYAM-OK LMS, makes it easier for lecturers and students to update

material information from available teaching materials, including teaching materials for Basic Teaching Skills as part of the micro-learning course potential.

This research is designed to develop a digital-based teaching material design. The teaching materials developed are micro-learning courses that contain basic teaching skills. In practice, basic teaching skills are packaged in a flipped learning format which aims to make prospective teacher students have readiness in simulating micro teaching practice. To achieve that, this research was conducted to: (1) develop a digital-based basic teaching skills teaching material model; and (2) develop a valid, practical, and efficient basic teaching skills teaching material design.

2 Research Method

This study is a digital-based basic teaching skills teaching material development research that adopts the instructional system development model from Dick and Carry [18,19] with the following instructional model indicators: (1) identify teaching objectives, (2) analyze teaching, (3) identify entry behavior, (4) formulate performance objectives, (5) develop benchmark reference test items, (6) develop teaching strategies, (7) develop and assign modules or teaching guides, (8) design and conduct formative assessments, (9) revise teaching and (10) develop and conduct summative evaluations. Implementation procedure the development of digital-based basic teaching skills teaching materials is carried out through the following stages:

2.1 Pre-Development Stage

The first stage of the development procedure is a theoretical study of various concepts and facts of learning that use digital-based basic teaching skills teaching materials. The study of the concept of digital-based basic teaching skills teaching materials that can facilitate learner characteristics related to the level of basic teaching skills such as: opening and closing skills, basic and advanced questioning skills, reinforcement skills, explaining skills, and variety skills. At this stage, conceptual analysis is also carried out which is directed at studying various principles, concepts, and rules regarding the development of digital-based basic teaching skills teaching materials from micro-learning 2 courses. In pre-development activities, a theoretical basis is obtained that supports the development of digital-based basic teaching skills teaching materials tailored to the characteristics of prospective teacher students.

2.2 Development stage

In this development stage, the activities carried out are: (1) compiling research instruments, (2) developing basic teaching skills teaching materials, and (3) evaluation. The instrument used in this research is a digital teaching material assessment instrument based on the rules for writing good and correct digital teaching materials according to the standards for writing textbooks issued by the Ministry of Research Technology and Higher Education. The teaching book assessment instrument is also given to students as product users.

The assessment format is used to assess the quality of digital-based basic teaching skills teaching materials by material experts and learning design experts. The assessment questionnaire is in the form of a scale (1-2-3-4). Each number is given the following meaning: (1) less good (given the number 1), (2) quite good (given the number 2), (3) good (given the number 3), and (4) very good (given the number 4).

Quantitative data obtained from expert trials and trials of prospective product users (lecturers), and students through questionnaires were analyzed using a 1 to 4 scoring scale. In the instrument for assessing the acceptability of multimedia learning materials, there are 20 questions, each of which is scored on a scale of 1 - 4.

Based on this, the minimum score value is 20 (the product of 20 questions with a minimum score of 1, so 20 x 1 = 20) and the maximum score is 80 (the product of 20 questions with a maximum score of 4, so 20 x 4 = 80). Furthermore, to determine the criteria from the results of expert assessments, and prospective users of this multimedia learning material product, 4 criteria were made with the following steps: First, see the maximum score, which is 80. Second, see the minimum score, which is 10. Third, calculate the difference between the maximum score and the minimum score, namely (80 - 20) = 60. Fourth, determine the interval for obtaining the 4 criteria, by dividing 4 on the difference between the maximum score and the minimum (60/4) = 15. Furthermore, determine the criteria based on the classification of these scores using an interval of 15, as an example which can be seen in table 1 below:

Table 1. Category for The Quality Level of Teaching Materials

Category	Description
20,00 - < 35,00	Not good enough
35,00 - < 50,00	Good enough
50,00 - < 65,00	Good
65,00 - 80,00	Very good

Based on the table, decisions are made regarding the level of assessment of teaching materials, whether they are in the category of not good enough, good enough, good, and very good. These criteria determine the level of revision of teaching materials. The less the assessment of experts and potential users of the product, the more improvements are made or vice versa, the less improvement, the less revision of teaching materials.

Developing teaching materials for basic teaching skills is done by writing in full all the materials obtained in the previous stage, into the prototype design of the development of teaching materials for basic digital-based teaching skills that are already intact. Evaluation activities are intended to determine the quality of the development of digital-based basic teaching skills teaching materials by expert tests, small group tests (lecturers) and large group tests (students).

2.3 Post Development Stage

The activity of this stage is to determine the effectiveness of the application of digital-based basic teaching skills teaching materials in improving student teaching skills using

a pre-experimental research approach. The target is students majoring in Agricultural Technology Education, Faculty of Engineering, State University of Makassar.

3 Research Findings

This research has produced digital-based basic teaching skills teaching materials that meet the acceptability aspects of micro-learning material experts, learning design developer experts, and product users by students. To achieve the level of acceptability, a series of research trials were conducted, including: (1) expert trials (material and learning design), (2) individual trials, (3) small group trials (limited), and (4) field group trials (large group). Although this research is only one year, the research product is expected to be tested for effectiveness in the coming year (large group) when the micro-learning course runs in the even semester programmed by students majoring in Agricultural Technology Education.

This research involved two experts, namely micro-learning material experts and learning design experts. Each expert assessed the acceptability of the developed Micro Learning course teaching materials. Experts were asked to assess the level of acceptability of teaching materials, which included: introduction of teaching materials, substance of teaching materials, and presentation of materials. The approach in expert assessment is quantitative and qualitative, so the data generated from the two experts are data in quantitative form and qualitative data.

3.1 Expert Assessment Of Teaching Materials

The assessment was obtained by distributing an assessment questionnaire to experts, namely micro-learning material experts and learning design experts.To get an assessment from experts about the acceptability of teaching materials, an assessment of teaching materials is carried out which includes: the introduction of teaching materials, the substance of teaching materials, and the presentation of materials. The three aspects of the assessment will be assessed by both experts using an acceptability assessment questionnaire. Expert assessment is an expert group trial stage as an effort to obtain teaching materials that have good acceptability for future users. The trial was carried out by giving an assessment questionnaire to the expert and then followed by a discussion.

The assessment questionnaire is in the form of a scale (1-2-3-4). Each number is given the following meaning: (1) less good (given the number 1), (2) quite good (given the number 2), (3) good (given the number 3), and (4) very good (given the number 4). The results of the trial assessment of micro-learning teaching materials by material experts and learning design experts are presented in table 2 below.

Table 2. Assessment of Material Experts and Learning Design Experts

No	Assessment Description	Expert Assessment	
		Material	Learning Design
1	Describes the overall content of KDM teaching materials including general and specific learning outcomes.	4	4
2	Describe the benefits of teaching materials in real life in the field	4	4
3	Explaining the strategy instructions for studying teaching materials	4	4
4	Explain the time allocation to complete the implementation of teaching materials	4	4
5	Contains the breadth / completeness of the material	3	4
6	Contains the depth of teaching material	3	3
7	Contains the accuracy / truth of the facts	4	3
8	Contains the accuracy/truth of the Concept/Principle/Law/Theory	4	3
9	Contains the accuracy / correctness of the Procedure / Method	4	4
10	Suitability with the current development of KDM Digital teaching materials	4	4
11	Consistency of systematic presentation in chapter by chapter	4	4
12	Logicality of presentation of teaching materials	3	4
13	The orderliness of the presentation of teaching materials	4	4
14	Coherence	4	4
15	Suitability and accuracy of illustrations with material in teaching materials	3	4
16	Contains a bibliography/reference that are referenced	3	4
17	The form of assessment presented is in accordance with the learning outcomes	4	4
18	Loading practicum project assignments in certain chapters in teaching materials	4	4
19	There is an answer key to the exercise questions at the end of the chapter	3	3
20	Accuracy of numbering and naming tables/images and attachments	4	4
	Total	74	76

Based on table 2, the results of the assessment of material experts and learning design experts are obtained. Both experts gave an assessment with a high score, which on average gave a score of 4 on most of the teaching material assessment question items. The average score level given by learning multimedia material experts reached a total score of 74, and learning design experts reached a score of 76. Thus, the development of this learning multimedia teaching material is included in the very good category because it is in the interval 65 < 80, so that the finalization of teaching material development can be carried out further.

In general, the assessment of two experts on multimedia learning teaching materials both through questionnaires and discussions is good, meaning that this book is suitable for use. It can be concluded that the development of this learning multimedia teaching material is acceptable, but this product needs to be improved, especially when the scope and depth of material is not only in the field of Agricultural Technology, but the media material can see engineering. Therefore, input from experts is very useful for the perfection of the products prepared.

3.2 Expert Assessment of Teaching Materials for Basic Teaching Skills

In addition to using a questionnaire in order to test the material experts, in this study also conducted direct discussions. Summary of data from questionnaires and discussions with both experts, namely material experts and learning design experts, suggestions and comments for improving development products that are technical in nature and the content of the design.

Qualitative expert test activities are obtained by discussion and commenting, which are complete. According to the material experts, the content of the coursebook material values shows that there is no explanation of how students participate actively in thinking and doing learning activities. In addition, teaching materials need to include the steps taken in learning. These inputs were positively received by researchers, because input from experts greatly supported the quality of the textbooks prepared.

According to learning design experts, the design of the resulting book is quite interesting, but the author should further simplify the language used to make it easier to understand. In addition, the instructions in the book are still less operational, so they still confuse readers. Based on the input from the expert, the researcher then used it as material to make revisions to improve the standard teaching materials. Currently the product validation process is ongoing, finalizing teaching materials will be carried out while receiving input from experts in the framework of improving teaching materials.

3.3 Product User Test Results (Students)

This research will produce teaching materials for Digital-based Basic Teaching Skills. This teaching material will be used by lecturers and students in carrying out micro-learning 2 courses. A total of 5 students assessed this teaching material on the appearance of the introduction, the substance of the teaching material content, and the presentation of teaching material. Based on the data from the first stage assessment results, several improvements were made to the multimedia learning materials. Furthermore, the teaching materials were tested on a group of prospective product users. The second

stage assessment was carried out in the form of a small group test. The purpose of small group assessment is to find out the acceptance of learning multimedia teaching materials. The acceptance of learning multimedia teaching materials is concluded from the results of discussions, and assessment questionnaires. The data obtained is also used to revise the form, procedure, and content of teaching materials that are perceived as difficult to understand and apply. Individual trial subject assessment data are qualitative and quantitative. Qualitative data in the form of assessment results from prospective product users (as many as 5 students) about the quality of teaching materials. The quantitative data is in the form of assessment results from prospective product users (as many as 5 students) about the acceptability of teaching materials. More details are described as follows:

Discussion with Individual Test Subjects. The data from the discussion of individual trial subjects is intended to determine the acceptability of teaching materials. From the results of the discussion, it was found that the material in the teaching materials was clearly arranged and easily understood by students, because it included basic knowledge about learning multimedia which was used as the main material in the learning multimedia course. In addition, the tasks and examples included in the teaching materials are quite numerous and varied, which encourages students to actively practice micro-learning 2. The material is also attractively designed, using many pictures that support the explanation so as to attract students' attention and increase their interest in learning the content presented.

Table 3. Qualitative Data

No	Subject	Assessment Objectives	Comments/Suggestions
1.	Prospective users (students)	Implementation instructions	Basically, it is clear and understandable.
		Material	The material is good, the pictures are quite interesting, easy to understand and according to the characteristics of students in everyday life on campus.
		Tasks	The assignments are quite interesting.
		Example	The examples provided are very helpful in doing student assignments.
		Feedback	Helps students in developing understanding and improving
			Knowledge related to KDM from micro learning courses

No	Subject	Assessment Objectives	Comments/Suggestions
		General comments	Teaching materials need to be revised in certain parts, especially the problem of KDM video examples as a hallmark of micro teaching materials 2

Individual Group Assessment Results. The following are the results of the assessment by the Micro Learning Lecturers based on individual groups.

Table 4. Assessment of Prospective Users of KDM Teaching Materials Products by Lecturers

No	Assessment Description	Expert Assessment	
		Lecture 1	Lecture 2
1	Describes the overall content of KDM teaching materials including general and specific learning outcomes.	4	3
2	Describe the benefits of teaching materials in real life in the field	4	4
3	Explaining the strategy instructions for studying teaching materials	3	4
4	Explain the time allocation to complete the implementation of teaching materials	3	4
5	Contains the breadth / completeness of the material	3	4
6	Contains the depth of teaching material	3	3
7	Contains the accuracy / truth of the facts	4	3
8	Contains the accuracy/truth of the Concept/Principle/Law/Theory	4	3
9	Contains the accuracy / correctness of the Procedure / Method	4	4
10	Suitability with the current development of KDM Digital teaching materials	4	4
11	Consistency of systematic presentation in chapter by chapter	4	3
12	Logicality of presentation of teaching materials	3	4
13	The orderliness of the presentation of teaching materials	4	3
14	Coherence	4	3
15	Suitability and accuracy of illustrations with material in teaching materials	4	4
16	Contains a bibliography/reference that are referenced	3	4
17	The form of assessment presented is in accordance with the learning outcomes	4	4

No	Assessment Description	Expert Assessment	
		Lecture 1	Lecture 2
18	Loading practicum project assignments in certain chapters in teaching materials	4	4
19	There is an answer key to the exercise questions at the end of the chapter	4	4
20	Accuracy of numbering and naming tables/images and attachments	4	4
	Total	74	73

According to the criteria for assessment by prospective users of Teaching Basic Skills teaching materials products as shown in the assessment results above, based on the results of the product user group assessment (2 individual group lecturers) with a total score of 74 and 73 respectively, it can be concluded that Teaching Basic Skills teaching materials are included in very good criteria because the scores given by prospective users of products from lecturers teaching multimedia learning courses give scores in the interval 65 < 80. Thus, Teaching Basic Skills teaching materials can be implemented further.

Assessment by Student Prospective Product Users. The following are the results of the assessment by prospective product users in small groups.

Table 5. Assessment of Prospective Users of KDM Teaching Materials Products by Students

No	Assessment Description	Student Assessment				
		S-1	S-2	S-3	S-4	S-5
1	Describes the overall content of KDM teaching materials including general and specific learning outcomes.	4	4	3	4	4
2	Describe the benefits of teaching materials in real life in the field	4	4	4	4	4
3	Explaining the strategy instructions for studying teaching materials	4	4	4	4	4
4	Explain the time allocation to complete the implementation of teaching materials	4	4	3	4	4
5	Contains the breadth/completeness of the material	3	4	3	4	4
6	Contains the depth of teaching material	3	3	3	3	3
7	Contains the accuracy/truth of the facts	4	3	4	3	3

No	Assessment Description	Student Assessment				
		S-1	S-2	S-3	S-4	S-5
8	Contains the accuracy/truth of the Concept/Principle/Law/Theory	4	3	4	3	3
9	Contains the accuracy / correctness of the Procedure / Method	4	4	4	4	4
10	Suitability with the current development of KDM Digital teaching materials	4	4	4	4	4
11	Consistency of systematic presentation in chapter by chapter	4	3	4	3	3
12	Logicality of presentation of teaching materials	3	4	4	3	4
13	The orderliness of the presentation of teaching materials	4	4	4	4	4
14	Coherence	3	4	3	4	4
15	Suitability and accuracy of illustrations with material in teaching materials	3	4	3	4	4
16	Contains a bibliography/reference that are referenced	3	3	4	4	3
17	The form of assessment presented is in accordance with the learning outcomes	4	3	4	4	3
18	Loading practicum project assignments in certain chapters in teaching materials	4	4	4	4	4
19	There is an answer key to the exercise questions at the end of the chapter	3	4	4	4	4
20	Accuracy of numbering and naming tables/images and attachments	4	4	4	4	4
	Total	73	74	74	75	76

According to the assessment criteria on the usability aspect as shown in the provisions above, then based on the results of the assessment of the product user group of 5 individual group students) with a total score of 73, 74, 74, 75 and 76 respectively, from the five component data, the average result obtained is 74.5 Thus the development of teaching materials for Basic Teaching Skills is included in the very good category because based on the results of the assessment of student users the product is in the interval 65 < 80, so that the finalization of the development of teaching materials can be carried out further.

4 Discussion

The discussion in this study focuses on the types of KDM developed including: (1) KDM opening and closing, (2) KDM asking basic and advanced questions, (3) KDM giving reinforcement, (4) KDM making variations, and (5) KDM explaining, the five KDM will be discussed as follows:

4.1 KDM in Indicators Opening and Closing the Learning

KDM opening and closing is one KDM that provides skills for prospective teacher students in starting every learning activity. This KDM is the first step in creating a conducive and effective learning atmosphere in influencing students' attention and motivation in participating in learning [20]. KDM opening learning is very important in: (1) building interest and motivation, (2) setting the focus of learning, (3) creating connections between students. KDM opening conditions the class at the beginning of the learning session so that it can be better prepared to take part in learning activities. The opening KDM requires the ability to start in an interesting and relevant way and help increase students' interest and motivation in the material to be learned. In addition, by conveying clear learning objectives, students can understand the direction and purpose of the lesson, so they can be more focused and motivated. In opening lessons, the ability to connect material with real life is also needed, linking new material with previous knowledge helps students see the connection and relevance of the material, making it easier for students to understand and remember new information [21]. Opening KDM has an influence in increasing student motivation and activeness in learning [20,22].

Different from opening KDM, closing KDM creates conditions so that students who learn can end learning activities is very well [23]. Therefore, student teachers can end learning activities by providing opportunities for learning reflection. In reflection, student teachers practice the opportunity to make conclusions about the subject matter. The closing component can be seen from the opportunity to review the material in the form of material points, provide evaluation to encourage reinforcement of new material ideas and provide follow-up such as remedial. Closing skills are activities carried out to provide feedback for students after the teaching and learning process is carried out and provide reinforcement or revision regarding activities carried out during the teaching and learning process [24,25]. Developing digital-based opening and closing KDM teaching materials provides a supplement to knowledge and skills tools in improving the KDM of prospective teacher students [7,26,27].

4.2 KDM in Indicators Basic and Advanced Questioning Skills

For future teachers, skillful questioning, both basic and advanced, is an integral part of the skill of explaining material. Sometimes the material explained requires confirmation from students to ensure that the material explained is understood very well. For this reason, both basic and advanced questioning skills are needed to ensure that students understand the subject matter well. Basic and advanced questioning KDM.

Basic and advanced questioning skills are a way to check understanding of the learning skills that have been acquired. Basic questioning skills include several components,

namely the use of correct and brief questions, giving time to think or assume, turn taking, spreading, giving time to think, and giving demands. Furthermore, advanced questioning skills involve several components, namely changing the demands on the cognitive level in answering some questions, setting for questions, using tracer questions and also increasing interaction. Questioning simple knowledge such as memory and comprehension can be represented by basic questioning skills, and knowledge of application, analysis, synthesis and evaluation can be done by asking advanced questions. Starting the question in the form of basic memory, for example, do you still remember the concept of packaging? try to explain!.... (basic questioning), then it can be continued by asking to criticize a case of food whose packaging label has been damaged while asking for further efforts to protect food with appropriate packaging (follow-up questioning).

The development of basic and advanced questioning KDM teaching materials helps prospective teacher students in practicing basic and advanced questioning. Through KDM asking basic and advanced questions, the learning process can be created more effectively and actively, establishing two-way communication between prospective teachers in conducting micro-learning practices, stimulating critical thinking skills, respecting friends' opinions, fostering creativity, instilling self-confidence, forging divergent thinking skills, and cultivating the habit of expressing opinions in the classroom [28]. Developing basic and advanced questioning KDM teaching materials digitally makes it easier for prospective teacher students to use, because it can be used throughout teaching practice activities [29].

4.3 KDM in Indicators Giving Reinforcement

In the teaching process, the role of reinforcement is very important in motivating students to learn. Teachers can objectively provide reinforcement to students either verbally, gestures, approaching movements or other forms of reinforcement such as giving gifts in the form of grades or objects related to student characteristics. Micro teaching practice 2 teaches prospective teacher students to practice how to simulate reinforcement activities by first asking questions or providing learning challenges for students. The performance of learning outcomes shown by students in KDM reinforcement requires it to be carried out by considering students' learning needs.

Digital teaching materials packaged in the Canva application present material descriptions and examples of video recordings of reinforcement that can be practiced directly. Prospective teacher students can simulate the practice of reinforcement by viewing KDM reinforcement teaching materials in digital form. The practice of giving reinforcement to students is important as an effort to foster an attitude and culture of respect. No matter how small the performance shown by students is, teachers should appreciate it even if it is only in hand clapping or verbal speech, yells. Reinforcement in KDM has proven to be able to foster students' enthusiasm and motivation in participating in learning [27,30,31].

4.4 KDM in Indicators Explaining the Material

KDM in the explanation indicator is one of the basic teaching skills that are important for prospective teacher students. The ability to explain for prospective teachers shows their professional abilities. Professional competence of teachers is shown by a deep mastery of the teaching material presented. Therefore, the development of teaching materials related to KDM explains by considering the accompanying components such as: (1) the ability to design teaching materials, (2) the ability to develop teaching content with differentiation, (3) the ability to sort the structure of teaching materials ranging from easy, medium and difficult material, and (4) the ability to emphasize, illustrative examples of material.

In addition to the content that must be mastered, it is also important to be able to present various types of material (concepts, facts, principles, and procedures) with intonation and expression so as to develop students' interest in being actively involved. Intonation and expression in teachers' explaining skills can have an impact on students' interest in active involvement [16,32]. KDM explaining that is practiced innovatively and creatively, adjusted to the characteristics of the subject, will encourage students to achieve better learning outcomes. In KDM, the material is explained orally, organized systematically and shows the relationship between one message and another, between cause and effect, definition and example, or with something that is not yet known [33].

The development of KDM teaching materials explained in digital form has provided significant convenience for prospective teacher students. With digital packaging, teaching materials are not only more accessible but also more effective in helping students understand and practice teaching skills [14,34,35]. Live visualization through teaching simulations allows student teachers to be more practically engaged, improving their ability to deliver material clearly and systematically, which in turn improves their professional competence in teaching.

4.5 KDM in the indicator of Providing Variety

KDM in the indicator of making variations is a KDM that substantially helps strengthen other KDMs. The material that is packaged with interesting variations in shape, media and forms of activities increases the confidence of prospective teacher students in presenting the material to make learning more meaningful. Including how prospective teachers practice forms of group organization, both small groups in one class working independently to develop discussion activities, is part of the KDM of making variations. Varying the position of oneself in teaching a teacher is also part of the variation activities in teaching. Including designing seating patterns as part of classroom management, it is necessary to vary seating patterns and grouping.

KDM teaching materials hold visualized variations in the form of presenting various types and forms of teaching materials and media, providing interesting and digital-based quiz types. Variations can be in the form of: (1) media variation, (2) teaching variation, and (3) interaction variation [4,36]. In the developed teaching materials, the variations of the three are shown in the form of video recordings practiced by student teachers. Practicing KDM to hold variations can be a solution in the classroom in

overcoming boredom, and boredom, and instead generate enthusiasm, can focus more on the material, and actively engage in the learning activities provided [37].

5 Conclusion

Based on the results of research in the development of digital KDM teaching materials based on Flipped learning, it meets the acceptability aspects of micro-learning material experts, learning design developer experts, and product users by students. The results of the assessment of multimedia teaching material development experts get an average score of 76 with a very good category. Furthermore, the assessment results on the criteria for the use aspect get a score of 74.5 in the very good category, so that the finalization of teaching material development can be carried out further.

KDM includes various aspects such as opening and closing lessons, asking basic and advanced questions, giving reinforcement, explaining, and making variations in learning. Opening and closing KDM teaches how to start and end a lesson well to increase student motivation. KDM asking questions helps in checking students' understanding, while KDM giving reinforcement focuses on motivating students through appreciation. KDM explaining emphasizes the ability to explain material clearly and interestingly, and KDM making variations aims to make learning more dynamic and interesting. The development of KDM-based digital teaching materials is important to support student teachers in practicing and improving their teaching skills effectively and efficiently.

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