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LEARNING INTERACTIVE MEDIA IN DISCRETE MATHEMATICS COURSE OF THE DEVELOPMENT OF MOBILE SEMESTER V STUDENTS

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Abstract

This study aims to develop mobile learning interactive media in fifth-semester students' discrete mathematics courses to motivate students in learning discrete mathematics material via mobile phones anywhere and anytime. The population in this study were all mathematics education students at Universitas Muhammadiyah Purworejo and the sample in this study were fifth-semester students. The subjects of this study were VB semester students, totaling 30 students of the mathematics education study program Universitas Muhammadiyah Purworejo for broad trial and VA semester for trials limited to 7 students. This type of research is developed with the ADDIE stages, Design, Development, Implementation, Evaluation, and feedback. The results of this study show that interactive mobile learning media in discrete mathematics courses for fifth-semester students is feasible to use. This can be seen from the validity test, both material and media validity is stated to be very feasible, practicality reaches a value of 3.70 which is stated to be very practical, and in terms of effectiveness 80% of students meet the predetermined minimum value of 75.

Keywords: *interactive media, mobile learning*

Abstrak

Tujuan penelitian ini adalah untuk mengembangkan media interaktif mobile learning pada matakuliah matematika diskret mahasiswa semester V sehingga mahasiswa dapat belajar materi matematika diskret melalui handphone dimanapun dan kapanpun. Populasi pada penelitian ini adalah seluruh mahasiswa pendidikan matematika Universitas Muhammadiyah Purworejo dan sampel pada penelitian ini adalah mahasiswa semester V. Subjek penelitian ini adalah mahasiswa semester VB yang berjumlah 30 mahasiswa program studi pendidikan matematika Universitas Muhammadiyah Purworejo untuk uji coba luas dan semester VA untuk uji coba terbatas yang berjumlah 7 mahasiswa. Jenis penelitian adalah pengembangan dengan tahapan ADDIE yaitu *Analysis* (Analisis), *Design* (Desain/perancangan), *Development* (Pengembangan), *Implementation* (Implementasi/ eksekusi), *Evaluation* (Evaluasi/ umpan balik). Hasil penelitian ini menunjukan Media interaktif mobile learning pada matakuliah matematika diskret mahasiswa semester V layak digunakan ini terlihat dari uji validitas baik validitas materi maupun media dinyatakan sangat layak, kepraktisan mencapai nilai 3,70 yang dinyatakan sangat praktis, dan dari segi ke efektifan 80% mahasiswa memenuhi nilai minimalyang suda ditentukan yaitu 75.

Keywords: media interaktif, mobile learning

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PENDAHULUAN

The development of technology is part of the development of education in Indonesia, every time technology is growing, even now it is being developed at 5.0, which was previously 4.0. For this reason, the world of education also inevitably has to always keep abreast of technological developments. With the existence of Covid in 2020, all aspects are required to have alternatives so that life continues, as well as the world of education, where previously the learning system was carried out offline with the presence of Covid. Like it or not, the government and all elements at the level of education are trying to keep learning going. conditions where students and all academics are not allowed to meet each other. There are many learning ceilings that can be used including Zoom, google Meet, and not a few educational institutions have made learning ceilings to assist online learning.

With these conditions and the demands of the times in terms of technology, a lecturer must also be creative in lectures so that learning can run smoothly, besides lecturers are required to develop various learning models that can be used online, and lecturers must also be able to develop learning media. Learning media developed should be adapted to conditions.

One of the compulsory subjects in the mathematics education study program at the University of Muhammadiyah Purworejo is discrete mathematics, where this subject is a subject that is considered difficult by students. Based on my experience as a lecturer, so far lecturers only use textbooks and lecture modules, in fact in class students still experience difficulties in following discrete mathematics courses, this is shown from 30 students in one class less than 10% achieve a minimum score of 75. This is of course very concerning because mathematics education students will later become mathematics teachers. Under these conditions, lecturers must be able to develop learning so that students can more easily understand course material and of course they are not limited to studying in class, but they can study material anywhere and anytime. One of them is by developing interactive mobile learning media. The purpose of this research is to develop mobile learning interactive media for discrete mathematics courses for fifth semester students so that students can learn discrete mathematics material via mobile phones anywhere and anytime.

The word media comes from the Latin word medius which literally means "middle" intermediary or delivery of messages from the sender to the recipient of the message (Azhari, 2015) AECT (*Association of Education and Communication Technology*) defines media as all forms and channels used to convey messages or information. Aside from being a delivery or delivery system, media is often replaced with the word mediator, with the term media mediator showing its function or role. (Mahnun, 2012). The definition

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of learning media is everything both physical and technical in the learning process that can help teachers to make it easier to convey subject matter to students so as to facilitate the achievement of learning objectives that have been formulated (Adam, S., & Syastra, 2015). Learning media can be understood as anything that can channel information from information sources to information recipients (Falahudin, 2014). In essence, the learning process is also a communication, so learning media can be understood as a communication medium used in the communication process, learning media has an important role as a means to channel learning messages. Learning media as a whole is a tool or material used in the teaching and learning process which has a function as a carrier of information from learning sources.

Opinion based (Lestari, 2013) regarding interactive related to two-way communication or more of communication components where the communication component in an interactive multimedia is in the form of human relations (as users/users) and computers (software/applications/products with certain files). Interactive media in general refers to multimedia products and digital services in IT systems that respond to user actions by presenting audio, visual and audiovisual content. Learning with interactive learning media aims to facilitate the learning process and foster teacher creativity and innovation in designing the learning process (Saluky, 2016). The presence of interactive learning media in the learning process makes the learning atmosphere more different because it can be varied with displays containing text, sound, moving images, and videos (Putri, I. P., & Sibuea, 2014). According to Hamalik, argues that the use of learning media in the teaching and learning process can generate new desires and interests, generate motivation and stimulate learning activities, and bring psychological influences on students (Arsyad, 2010). The use of instructional media in a learning orientation will greatly assist the liveliness of the learning process and convey the message and content of the lesson at that time. In addition to arousing student motivation and interest, instructional media can also help students improve understanding, present data in an interesting and reliable way.

The media used in learning must be in accordance with the conditions of the school, students and the selection of media must be adjusted to the learning objectives. The purpose of using learning media in general according to is to assist teachers in conveying messages or subject matter to their students so that messages are easier to understand, more interesting and more enjoyable for students (Lestari, N. D., Ariani. S.R, 2014) . learning using media recently is effective for student to scaffold the difficulties (Edi Sunjayanto Masykuri, 2022; Sunjayanto Masykuri, 2022). Mobile learning (m-learning) is learning that utilizes mobile technology and devices. In this case, these devices can be PDAs, cell phones, laptops, tablet

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PCs, and so on. Mobile learning users can access learning content anywhere and anytime, without having to visit a certain place at a certain time. This is reinforced by the opinion namely the use of smartphones in learning to create a learning innovation that can be carried out anywhere and anytime (Ariputri, G.A, 2015; Parapi et al., 2020). So, users can access education without being bound by space and time. Mobile learning can make smartphones that were previously used for telephone calls, send messages, internet and social media, now act as learning media equipped with subject matter, evaluation questions, and other supporting features. The purpose of developing mobile learning itself according to is a learning process all the time (long life learning), students can be more active in the learning process, saving time because if it is applied in the learning process, students do not need to be present in class just to collect assignments, just send the assignments via the mobile application phone which will indirectly improve the quality of the learning process itself (Majid, 2012; Ying et al., 2020). Researchers use iSpring Suite 9 and several other applications that support it to anticipate these deficiencies, so that there are several options for the form of questions, questions can also be randomized and accessed in html form without going through Android.

METHOD

This study uses the research development method (Research and Development) with the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). According to Sugiyono, Research and Development is a method used to produce certain products and can test the effectiveness of these products (Sugiyono, 2010). This method has been widely used in various fields. One of them is the field of education, where to create a new product that is used as a learning medium. The ADDIE model provides an opportunity to evaluate or revise continuously in every phase that is passed. Learning Media in the form of mobile learning interactive media. ADDIE which consists of 5 stages of development, they are; Analysis, Design), Development, Implementation), Evaluation(Mulyatiningsih, 2014).

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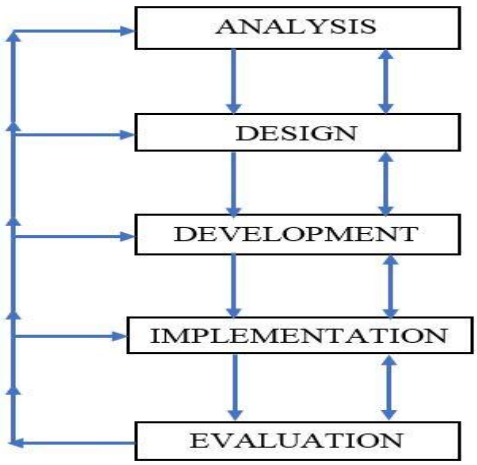

Bagan 1. The step of ADDIE

Instruments for media development consist of: media validation sheets, validation sheets are used for validators to assess whether the media being developed is valid, response questionnaire sheets, response questionnaire sheets are used to assess practicality. The steps in analyzing the product being developed are as follows: 1) Product Validity Analysis. The quality of a product is said to be valid when viewed from its relation to the objectives of the product development itself which must be seriously considered. Stages of product validity level analysis namely as follows: 1) Create a table of validation instruments for validating media experts, material experts (Agustin, E., & Wintarti, 2021). Data tabulation is made by giving scores of 4, 3, 2, and 1.

Tabel 1.

Category	Score
Perfect	4
Good	3
Fair	2
bad	1

(Nusaibah, N., & Murdiyani, 2017)

Calculate the average score by dividing the total score by the number of statement items.

$$\text{Average} = \frac{\text{Total score}}{\text{Total item}}$$

Convert the values obtained into qualitative scale values of four according to the assessment criteria in the table.

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Table 2. Development Product Validity Criteria

Interval Score	Criteria
$\bar{x} > 3{,}25$	very valid
$2{,}5 < \bar{x} \leq 3{,}25$	valid
$1{,}75 < \bar{x} \leq 2{,}5$	less Valid
$\bar{x} \leq 1{,}75$	invalid

The product developed is said to be feasible based on the validity aspect, if the minimum level of validity achieved is included in the valid criteria. If the minimum category validity is > 2.5, then the product is feasible to be tested.

Product Practicality Analysis. The practicality analysis of the developed media is seen from the responses of students and teachers. Product practicality analysis Giving a score on the student response questionnaire table with answers (Agustin, E., & Wintarti, 2021).

Table 3. Guidelines for Scoring Student and Teacher Response Questionnaires

Kategori	Skor
perfect	4
Good	3
Fair	2
bad	1

Calculate the average score by dividing the total score by the number of statement items.

$$\text{Average} = \frac{\text{Total score}}{\text{Total item}}$$

Convert the values obtained into qualitative scale values of four according to the assessment criteria in the table.

Table 4. Product Development Practicality Criteria

Interval Score	Criteria
$\bar{x} > 3{,}25$	Very practical
$2{,}5 < \bar{x} \leq 3{,}25$	practical
$1{,}75 < \bar{x} \leq 2{,}5$	Fair practical
$\bar{x} \leq 1{,}75$	Less practical

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Analyzing product practicality. The average value of the students' response anchorage was then matched with table 5 of practicality criteria based on student responses. The product being developed is said to be practical if the minimum level of practicality achieved falls within practical criteria > 2.5. If the score obtained is <2.5 then the product cannot be said to be practical for use later.

Product Effectiveness Analysis. Students work on evaluation test questions after trials using media that have been completed. A student is said to be complete if the results of the student test on a certain competency standard have reached the criterion value of 75. The maximum score of the learning outcomes test is 100. The data obtained is then analyzed to determine the effectiveness of the product. The learning test result indicator that must be met to say an effective mathematics learning media is the average value of the evaluation test results of all students taking the test adjusted to the effectiveness guidelines. (Agustin, E., & Wintarti, 2021) product effectiveness analysis, namely by calculating the average assessment results with a KKM limit of 75, after that calculating the percentage of learning completeness, and then converting the presentation into qualitative data with the following criteria:

Table 6. percentage of classical learning completeness

Percentage of completeness	Criteria
$p > 85\%$	very effective
$65\% < p \leq 85\%$	effective
$45\% < p \leq 65\%$	Fair effective
$p \leq 45\%$	Kurang Efektif

(Nusaibah, N., & Murdiyani, 2017)
p = percentage of classical learning completeness

In this study the product is said to be effective if it achieves the completeness percentage of the test scores. The results of learning completeness are at least > 65% who take part in learning. After knowing the feasibility of the product.

FINDINGS AND DISCUSSION

Analysis needs analysis is based on teaching experience, especially during the pandemic, when students' motivation to study decreases if they only use zoom or other online learning applications. Therefore, researchers develop media that are interactive so that students become more enthusiastic about participating in lectures both online and offline and can study anywhere and anytime.

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Design: the product design that I created is as follows:

Picture 1. Design interactive quiz

Development: Product Validity: To find out whether the resulting product is valid or not, use content validity with 2 validators for media and 2 validators from material lecturers according to their respective expertise. The average result of the media validator is 3.50 which means that the product is stated to be very valid and from the validator there are no product revisions, while for the material the average validator is 3.75 which means that the product in terms of material is stated to be very valid and there are no revisions for material. For product display there is no revision of the initial design

Product implementation: Limited trial: limited trial using 7 students from different classes, namely VA semester students. The limited trial consisted of two meetings and ended with a questionnaire to find

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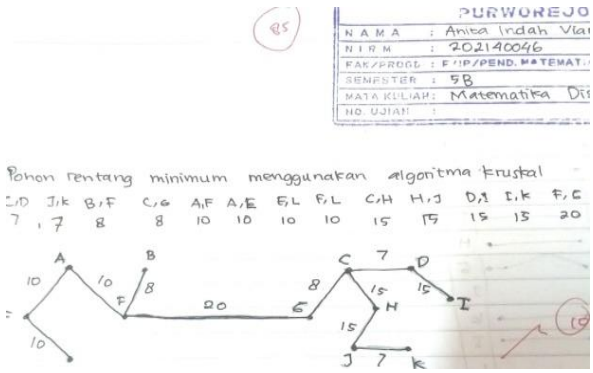
out whether there were suggestions from students in the limited trial for improvement/revision. And from the results of the questionnaire there were no revisions from students in the limited trial class.

Extensive trials: Limited trials were carried out in semester VB of discrete mathematics courses with 30 students, extensive trials were carried out in two meetings and each meeting received 3 credits, the first meeting was learning using applications and the second meeting was testing and giving questionnaires. For the results of the questionnaire there is no revision for the application.

Evaluation: Practicality of the product: to assess the practicality of the product using a practicality questionnaire given to students, the result of practicality is 3.70 with very practical criteria, this means that the product can be used from a practical standpoint.

Product effectiveness: Product evaluation uses the results of tests carried out by students after treatment using the product, using descriptive questions and getting results of 80% of students getting scores above 75. This states that the product is said to be effective .



Picture 2. Students' Work

CONCLUSION

Interactive mobile learning media in discrete mathematics courses for fifth semester students is feasible to use, as can be seen from the validity test, both material and media validity are stated to be very feasible, practicality reaches a value of 3.70 which is stated to be very practical, and in terms of effectiveness 80% of students meet the minimum score that has been set is 75.

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