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Research Article

Differentiated teaching materials with an Islamic values approach in the differential calculus course

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Abstract: Students' needs in the learning process are different. For this reason, learning needs to be designed according to student characteristics in order to obtain optimal results. Apart from that, it is also necessary to pay attention to the values that will be given in each learning process. This is because the aim of education is not only human development, apart from science and technology, but also development from the faith and piety side, so that it can optimize the potential that is possessed both cognitively and socio-emotionally. So the aim of this research is to develop teaching materials based on differentiated learning with an Islamic values approach in the Differential Calculus course. This research uses a Research and Development approach. The development model used is the ADDIE model. Limited trials showed that the teaching materials developed obtained a percentage of 85% (very suitable) for use. There is differentiation in processes, material content and learning products and integration of Islamic values in the teaching materials developed.

Keywords: differentiated learning; Islamic values; teaching materials

1. Introduction

Innovation is a keyword in learning in the 21st century. Innovation is needed to be able to adapt to a dynamic environment. Innovation needs to be developed in learning, including in higher education. Learning in higher education develops students' creative thinking in improving and constructing new knowledge as an effort to master and develop learning materials. One of the learning innovations in higher education that can be developed is by designing learning that is in line with the student's learning profile. Every individual has different learning needs so some adjustments are needed. These adjustments look at students' interests, learning styles (learning profiles), and learning readiness. Learning that is conditioned on learning interests and preferences is what is called differentiated learning (Alhafiz, 2022; Yanti, et al., 2020). Educators, in this case lecturers, should understand the uniqueness of students who have different abilities, intelligence, talents and dreams (Faiz, et al., 2022; Handiyani & Muhtar 2019; Sudaryanto, et al., 2020). However, currently, students have not been provided with effective learning provisions with learning offerings that suit their learning profile (Ahmad & Doyin, 2015; Pohan, 2018; Simanulang, 2014).

Apart from student learning profiles, it is also necessary to pay attention to the values that will be given to each learning process. This is in accordance with the goals of education, where human development is not only from the side of science and technology, but also from the side of faith and piety, so that it can optimize the potential that is possessed both cognitively and socio-emotionally. This especially must be implemented by Muhammadiyah Universities, where the integration of Islamic values in learning is a characteristic of Islamic educational institutions. This is in accordance with the statement (Soleha & Rada, 2011) that Islamic education, apart from instilling and forming an attitude of life that is imbued with these values, also develops scientific abilities in line with the underlying Islamic values, which is an endeavor process that is pedagogically capable of developing life towards maturity. or maturity. Mathematics education that contains

Islamic values places mathematics as a way for students to improve morals (Rahmawati, & Rizki, 2017). However, creating learning that makes students have a balance between Faith and Piety and Science and Technology is not an easy thing.

Differential Calculus is one of the courses that students take in the first semester of study and is a prerequisite for various courses in the following semester. If students do not master Differential Calculus material, it is possible that students will experience difficulties in various courses that use Differential Calculus as a prerequisite. Differential calculus is a branch of mathematics that studies changes and instantaneous calculations. The concept of differential calculus is related to infinite series, limits, and derivatives. The concept of differential calculus plays an important role in science and its applications in various fields such as physics, economics, and engineering.

The aim of this research is to develop differential calculus teaching materials based on differential learning with an Islamic values approach. Teaching materials are an important part of learning because they can be used as a learning resource for both lecturers and students. Teaching materials are one part of learning resources which can be interpreted as something that contains learning messages, both specific and general in nature which can be used for learning purposes (Mardiana, 2018). In another opinion, teaching materials are a set of learning facilities or tools that contain learning materials, methods, in order to achieve the expected goals (Kusumam, et al., 2016). The development of teaching materials is a form of activity and the teaching and learning process can make the quality of existing learning better. These teaching materials can collect material from various sources so that they are more varied and can provide more learning experiences for students.

The development of teaching materials certainly requires appropriate strategies so that students can follow them well (Alba, et al., 2019; Mayandri, 2022; Rahmayantis & Nurlailiyah, 2021). The design of teaching materials that supports student learning profiles has the ability to grow potential by bringing happiness in every activity presented (Bagir, 2020). The concept prioritizes students' interests, potential and talents (Faiz, et al., 2022; Herwina, 2021; Iskandar, 2021). The explanation should be adapted to the learning profile and stated in detail and simply so that it is easy for students to understand (Aisyah, et al., 2020).

In previous research, research was carried out related to the development of teaching materials. Research related to the development of differential calculus teaching materials has been carried out using a contextual approach and local wisdom (Novianti & Shodikin, 2018). Meanwhile, the development of calculus teaching materials has also been researched using a guided discovery approach (Suprihatingsih & Sudibyo, 2020). Apart from that, the development of ahar materials with the help of technology such as geogebra has also been carried out (Sopiany & Rikayanti, 2018). Of the three, no one has developed differential calculus teaching materials with an Islamic values approach. Research with an Islamic values approach has been carried out but not on differential calculus material (Pratiwi, 2019; Mulyanti, et al., 2017; Rahmawati & Rizki, 2017; Susilowati, 2017; Kurniati, 2016). Base on the research that has been conducted, no one has developed differentiated learning-based teaching materials. So research was carried out to develop differential calculus teaching materials based on differentiated learning with an Islamic values approach.

2. Materials and Methods

The research object is differential calculus teaching materials based on differentiation learning with an Islamic values approach. The subjects in the trial were students of the Mathematics Education Study Program, Semester 2, Muhammadiyah University, Sukabumi. The type of data taken in this research is primary data, namely data obtained directly from a questionnaire in the form of the feasibility of the product being developed. The data collection instruments are validity test questionnaires carried out by validators and practicality test questionnaires for student responses. The data obtained was then

analyzed using descriptive analysis techniques. Validators consist of material expert validators, differentiated learning validators, religious expert validators.

This research was carried out in several core activities, namely preliminary studies, product development and design validation, limited trials, and presentation of research results. This research uses a research and development approach. The development model used as the basis for this research is the ADDIE model. As the name suggests, the ADDIE model consists of five main phases, namely Analysis, Design, Development, Implementation, Evaluation (Pribadi, 2014), an in Figure 1.

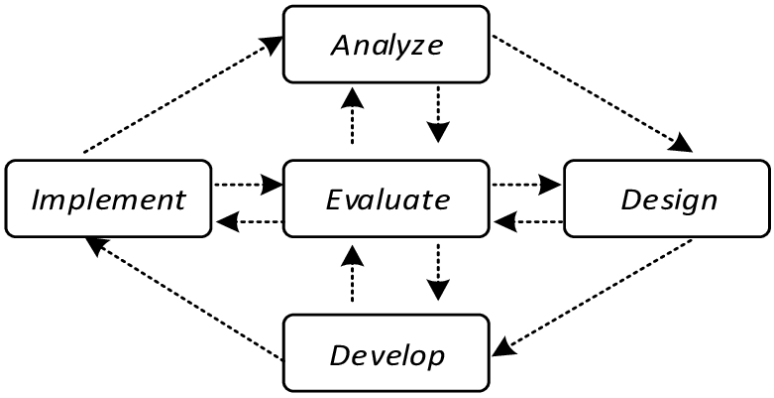

Figure 1. ADDIE model

2.1 Analysis

In this stage the main activity is conducting a preliminary study, including a field survey and literature study regarding the importance of developing differentiated learning-based teaching materials with an Islamic values approach and the indicators that will be used.

2.2 Design and Development

Activities carried out at this stage include: 1) reviewing student learning profiles to determine learning materials based on facts, concepts, principles and procedures, allocation of learning time, indicators and student assessment instruments; 2) designing learning scenarios or teaching and learning activities with an Islamic values approach; 3) compose routine and non-routine questions on selected material, adapted to Islamic values and the answers; 4) create a layout or appearance design for the teaching materials to be developed; 5) compiling and developing differentiated learning-based teaching materials with an Islamic values approach in accordance with a predetermined layout; and 6) validating the product content of differential calculus teaching materials based on differentiated learning with an Islamic values approach with a team of experts.

2.3 Implementation

Activities carried out at the implementation stage are the use of teaching materials in limited trial classes. In this activity, a practicality test questionnaire was used for student responses to the use of the teaching materials that have been developed.

2.4 Evaluation

The activity at this stage is to provide an assessment, measure the advantages and disadvantages of differential calculus teaching materials based on differential learning with an Islamic values approach that has been developed and its application.

3. Results

Based on the model used, namely ADDIE (analysis, design and development, implementation, and evaluation) in developing Differentiated Learning-Based teaching

materials with an Islamic Values Approach in the Differential Calculus Course, the results obtained at each stage are as follows.

3.1. Analysis

In the first stage, a preliminary study was carried out including a field survey and literature study. In the field survey, data was obtained as in Table 1 and Table 2.

Table 1. Learning planning for differential calculus learning

No	Aspect	Description
1	Learning Outcomes of Study Program	S1 devoted to God Almighty and able to show a religious attitude; S8 internalize academic values, norms and ethics KK3 Able to use various learning resources and media to support the implementation of innovative science and technology-based mathematics learning
2	Course Learning Outcomes	M1 Students are able to explain the real number system M2 Students are able to explain the real number system M3 Students are able to explain the concept of limits M4 Students are able to determine the derivative of a function M5 Students are able to solve everyday problems using derivative concepts
3	Instructional Media	LCD dan Projector
4	Assessment form	essay
5	Learning methods	Lectures and Discussions

Table 2. Analysis of Needs for Differential Calculus Teaching Materials

No	Aspect	Description
1	Student responses to classroom learning	Students are quite able to follow the learning process which is carried out using the discussion method, but some have difficulty understanding the material so they add to it by accessing material discussions on YouTube
2	Student learning outcomes	Only 10% got satisfactory learning results, the rest got adequate and unsatisfactory learning results
3	Learning innovation that needs to be done	• Discussion of varied questions • There is an ice breaker • Practicum involving the surrounding environment • Using more varied learning methods • Using varied learning media
4	Learning media that need to be used	• Tutorial video • Mathematics software • Teaching materials equipped with explanations of the use of differential calculus in everyday life
5	Learning resources used	• Teaching materials equipped with learning videos • Teaching materials with complete explanations in problem solving examples
6	Islamic values during learning	It is only manifested by starting and ending learning with prayer

Based on the results of the field survey, it was obtained: (a) Differentiated learning indicators, namely: 1) There is differentiation in the learning process; 2) There is differentiation in the content of the lesson material; and 3) There is differentiation in learning products; (b) Indicators of integration of Islamic values, namely: 1) There are

verses from the Koran at the beginning of each chapter that relate to the material in that chapter; 2) There are examples of the application of Differential Calculus in life with Islamic values; and 3) There is an evaluation of the material and student attitudes regarding Islamic values.

3.2. Design and Development

At this stage several stages are carried out, namely:

a) Examine student learning profiles

The student learning profiles observed were student learning styles based on their information intake styles, namely auditory, visual, kinesthetic and writing/reading. There are 50 students in the Differential Calculus learning class. The Figure 2 is data on student learning styles.

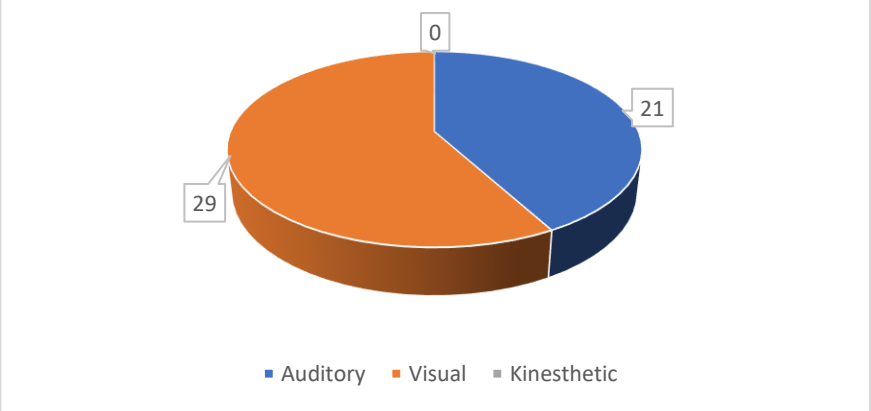

Figure 2. Data on Student Learning Styles

b) Designing learning scenarios or teaching and learning activities

In the learning scenario that was developed, additions were made to the learning media used, the form of assessment given, and the learning methods implemented (Table 3).

Table 3. The additions to the learning media used

No	Aspect	Primarily	Become
1	Instructional Media	LCD, Projector	Posters, Videos, Scientific Journals
2	Form of Assessment	Essay	Written assessment (description), performance assessment (presentation), and product assessment (article, collection of questions and discussion)
3	Learning methods	Lectures, Discussions	Lectures, discussions, collaborative, games, visuals, modeling and training

c) Compose routine and non-routine questions on selected material

The percentage of routine and non-routine questions in the teaching materials developed is 70% and 30%.

d) Create a layout or appearance design for the teaching materials to be developed

The layout of the teaching materials developed is teaching materials which contain course descriptions, basic competencies, material maps, and in each chapter there are learning objectives, indicators of success, arrangement of learning activities, tools or materials needed during learning, as well as evaluations. will be done.

e) Validate the product content of teaching materials

The teaching materials that have been prepared and developed are then submitted to the validator for validation. Validators consist of material expert validators, differentiated learning validators, religious expert validators. Material experts stated that 87% of the teaching materials developed were very valid (without revision). However, there are several suggestions as follows: 1) Deleting several aspects of the same assessment in the assessment instrument; and 2) Increase the quantity of evaluations.

Learning experts stated that 83% of the teaching materials developed were valid (without revision). However, there is a suggestion to write down the learning steps that will be taken in the arrangement of learning activities at the beginning of each chapter in more detail. Religious experts stated that 87% of the teaching materials developed were very valid (without revision).

3.3. Implementation

Activities carried out at the implementation stage are the use of teaching materials in limited trial classes. In this activity, a practicality test questionnaire was used for student responses to the use of the teaching materials that have been developed. This practicality test was attended by 6 students who were taking the Differential Calculus course. This trial was carried out to find out whether the product produced was suitable both in terms of learning aspects, content or material, and appearance so that it was suitable for use. Based on a questionnaire given to 6 students (users), a percentage of 85% (very feasible) was obtained.

3.4. Evaluation

Based on the results of the validity and practicality tests carried out, the results were obtained that the teaching materials developed, namely teaching materials based on Differentiated Learning with an Islamic Values Approach in the Differential Calculus Course, are suitable for use.

4. Discussion

4.1. Analysis

Analysis carried out on Differential Calculus learning planning found that the learning carried out so far did not fulfill the elements of differentiation. This can be seen from the learning media, learning methods, and forms of assessment that are not yet varied. In fact, looking at one of the CPL study programs, the expected achievement is that students are able to use learning resources and media to support the implementation of innovative science and technology-based mathematics learning. Apart from that, looking at the CPL Study Program whose achievement is being devoted to God Almighty and being able to show a religious attitude, it is necessary to learn mathematics, in this case Differential Calculus which integrates Islamic values. Judging from the CP MK, where students are able to solve everyday problems, Islamic values are also integrated into them. This will also be an advantage or advantage of learning at Muhammadiyah Higher Education where learning is integrated with Islamic values. This will also answer the challenges of the growing development of religious-based schools, in this case the Islamic religion as a stakeholder.

The need for teaching materials based on differentiated learning with an Islamic values approach in calculus courses can also be seen from the results of the needs analysis carried out on students. By using a needs analysis questionnaire, data was obtained that some students still had difficulty understanding Differential Calculus learning. This is because the methods used are only lectures and discussions. Students want more varied learning methods so that their motivation for learning differential calculus is high, making it easier to understand the material being studied. Apart from that, students also need to be able to use various types of media during learning to increase their understanding of the Differential Calculus material. The integration of Islamic values in the learning of Differential Calculus has so far not been optimal because it has not been linked to the

material studied and is not yet written in the teaching materials. Thus, it was found that it is necessary to develop teaching materials based on differential learning with an Islamic values approach to learning differential calculus. The indicators used are the existence of differentiation in processes, material content and learning products in teaching materials.

4.2. *Design and Development*

After carrying out the analysis stage to determine the need for teaching materials to be developed, the next stage is to design and develop the teaching materials. Teaching materials are designed taking into account student learning profiles, in this case learning styles. (Silitonga & Ina, 2020) states that learning styles are efforts to absorb, process, remember and implement facts. So learning style is an important thing in the student learning process. According to (Widayanti, 2013) there are three types of learning styles consisting of visual, auditory and kinesthetic learning styles. Based on the teaching styles found from 50 students, it was found that there were students with auditory and visual learning styles. Meanwhile, the kinesthetic learning style was not found.

Auditory learners do their best learning when the information is in a way that they can listen and hear. They excel when they can listen to lectures, engage in group discussions, and talk about ideas. Visual learners learn best when they can see information through visual aids and pictures. They are naturally drawn to visual stimuli and find it helpful to use charts, graphs, diagrams and videos to understand and remember information. Visual learners also benefit from using color to organize notes and creating visual maps to organize information spatially. Kinesthetic learners prefer to process information through physical experiences and hands-on activities such as role playing. They tend to remember information best when they can interact physically and use their sense of touch and body movement.

Based on the characteristics of each learning style, the learning methods that will be used must be able to facilitate each learning style, so that in the teaching materials designed there are learning methods that will be used, namely lectures, discussions, collaborative, games, visuals, modeling, and training. This is as stated by (Kusumam, et al., 2016) where teaching materials are a set of learning facilities or tools that contain learning materials, methods, in order to achieve the expected goals.

a) Discussion Method: The discussion method is a teaching method that allows students to talk and interact with the teacher and their classmates. This method can help students to understand calculus concepts better. In the discussion method, students can ask, answer, and debate about the topic being studied. This method is suitable for the auditory learning style.
b) Collaborative Method: Collaborative method is a teaching method that allows students to work together in groups to complete assignments or projects. This method can help students understand calculus concepts better because they can help each other and discuss the topics being studied. This method is suitable for the auditory learning style
c) Game Method: The game method is a teaching method that uses games to help students understand calculus concepts. This method can make learning calculus more fun and interesting for students. This method is suitable for all learning styles.
d) Visual Method: The visual method is a teaching method that uses pictures, diagrams and graphs to help students understand calculus concepts. This method suits the visual learning style.
e) Modeling Method: Modeling method is a teaching method that uses mathematical models to model real world situations. This method can help students understand how calculus can be used in everyday life. This method is suitable for all learning styles.
f) Training Method: The training method is a teaching method that uses exercises to help students understand calculus concepts. This method can help students to deepen their understanding of calculus concepts. This method is suitable for all learning styles.

Meanwhile, the learning media used are posters (for visual learning styles), videos (for auditory and visual learning styles), and scientific journals (for writing/reading learning styles). Meanwhile, the learning methods that will be used are lectures, discussions, collaborative, games, visuals, modeling and training.

4.3. Implementation

The teaching materials that have been developed are then tested on users, namely students. Trials are carried out to obtain assessments on learning aspects, content or materials, and the appearance of the teaching materials being developed. In the trial, a percentage of 85% was obtained (very feasible). However, there are several suggestions regarding the appearance where it is necessary to add several images as illustrations to make it more interesting and use several different colors for key words in each material. This is as stated by (Kristian, et al., 2016), that the display of teaching materials must be arranged as attractively as possible with the aim of fostering motivation and enthusiasm for learning.

4.4. Evaluation

Based on the evaluation results, it was found that the teaching materials developed were suitable for use. The advantage of this teaching material is that it accommodates several student learning styles which are manifested in the variety of methods, media and evaluations used in the teaching material. This is in accordance with the opinion of (Wahyuningsari, 2022) where differentiated learning is a strategy to meet students' learning needs. Apart from that, the teaching materials developed also use Islamic values to help students relate differential calculus material to day life activities.

5. Conclusions

The teaching materials developed accommodate differentiated learning and contain Islamic values. In this way, learning has its own characteristics as a characteristic form of Muhammadiyah higher education. This is expected to be an added value for the graduates produced. The shortcomings of this teaching material are that it is still limited in providing examples of the application of differential calculus in daylife activities.

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