
A NEED ANALYSIS OF MATERIAL DEVELOPMENT OF QUR'ANIC INTEGRATIVE CALCULUS

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ABSTRACT

This study was motivated by the demands of the National Standards for Higher Education (SNPT) Permendikbud No.49 in 2014 Chapter 11 Line 1 of the learning process in college. It is also in line with the vision and mission of Mathematics Teaching Department of STAIN Batusangkar. As a first step, the lecturers are required to develop learning materials based on an integrative approach. Integrating these learning materials should be started from the basic material in mathematics, namely the basic calculus. Due to it, there should be a need analysis for the development of Interactive Qur'anic Calculus. The type of research was a descriptive study which deals with three activities include: analyzing curriculum and course syllabus of Calculus 1, distributing questionnaires to students, and interviewing peers. The instrument used were the documents, closed questionnaire and interview guide. The techniques of data analysis was conducted qualitatively, as suggested by Miles & Huberman. The results showed that (1) the implementation of learning Calculus 1 only meet the standards of the learning process in college on interactive characteristics, contextual and collaboration, while for the characteristics of scientific and student-centered are still in the enough category. (2) Learning Calculus does not meet the characteristics of integrative learning. Integrative paradigm for this still partial, that is by inserting religious subjects in the curriculum of Mathematics Teaching Department of STAIN Batusangkar. Results of this study provide a recommendation that the development of teaching materials of Qur'anic Integrative Calculus needs to be done in order to realize the vision of the mission of the department.

Index Terms— *Need Analysis, Integrative Qur'an, Calculus*

1. INTRODUCTION

Mathematics Teaching Department is one of department of Tarbiyah Faculty that deals with mathematics education at STAIN Batusangkar. It has a vision and mission as well. For the first, it is a "Pioneers and Best in education, research, and the development of the islamic and mathematics integration". For the later, it is formulated into several points as below:

1. To produce excellent scholars in knowledge, skills, and attitudes of mathematics education and Islamic aspects.
2. To develop an innovative and current research on mathematics education.
3. To familiarize mathematics education through cooperation with other parties, publication of the research result and scientific-based dedication.

Referring to the above points, it is obviously seen that the mission of Mathematics Teaching Department of STAIN Batusangkar already refers to the competency standards set by Permendikbud No.49 in 2014 chapter 5 line 1 which says "The competency standards of graduates is the minimal criteria of the qualification of graduates' ability includes attitude, knowledge, and skill that are expressed in the formulation of the learning achievements of the graduates" [1]. This competency standards set out in the learning outcomes of graduates that will affect the depth and breadth of learning materials for each course.

The implementation of learning process to obtain graduates' learning outcomes are set out in the Standards of Learning Process on Permendikbud No.49 in 2014 chapter 11 line 1. It states, "The characteristics of the learning process consists of the interactive nature, holistic, integrative, scientific, contextual, thematic, effective, collaborative and student-centered" [1]. Thus, the learning process should bring the above characteristics in order to accomplish the mission of Mathematics Teaching Department of STAIN Batusangkar.

In addition, the learning process an work well if the lecturer prepares lesson plans in the form of Semester Lesson Plan (RPS). Permendikbud No.49 in 2014 chapter 12 line 3 reveals "RPS or other terms at least consists [1];

1. Name of the department, course's name and code, semester, credits, lecturer's name;
2. Achievement of learning graduates imposed on each subjects;
3. Planned ability on each stage of learning weeks to meet the learning outcomes of the graduates;
4. Literature used related to the ability to be achieved;
5. Learning method;
6. Time for reaching capabilities at each stage of learning;
7. Student's learning experience that is embodied in the task's description for one semester;
8. Criteria, indicators and rating scales;
9. List of references used.

To support the RPS that elicits learning characteristics above, the lecturer must have the appropriate learning resources, particularly an integrative and scientific handbook. An integrative book means the learning contents are the integration between various disciplines and Qur'an, especially in islamic material, as the mission of department has. While a scientific handbook is the learning contents are arranged in accordance with scientific approach.

Currently, these two types of handbook are not available for the students, and the library of STAIN Batusangkar. As the result, both students and lecturers are overwhelmed in finding the references and the development of learning materials. While, they are forced to center the learning proces to be in line with the vission and mission of the department. Due to this, the lecturer are required to develop learning materials based on an integrative approach.

Integrative learning material is a kind of knowledge which combines various disciplines like science, mathematics, Qur'an, hadith and culture. The development of this learning materials is the usage of Qur'anic integrative approach. This approach should be started from the basic material in mathematics.

In the early stages, the development of Qur'anic integrative learning materials are done for basic calculus; Calculus 1 and Calculus 2. It is because two reasons. First, they are presented at the first and second semester. Second, this learning materials will also used on other subjects such as Mathematics Statistics, Ordinary Differential Equations, and so forth.

Before learning materials are developed, there should be an analysis on the learning of basic calculus that have been implemented so far in the course. This analysis refers to the learning characteristics described in Permendikbud No.49 in 2014 chapter 11 line1.This can be done through interviews with lecturer or students.

2. METHODOLOGY

The type of this research was a descriptive study. It dealt with several activities: analyzing the curriculum, analyzing the course syllabus of Calculus 1, distributing questionnaires to students, and interviewing peers.

The instrument used were documents, closed questionnaire and interview guide. For the first, the data were taken from available documents of Mathematics Teaching Department such as mathematics curriculum, and syllabus and RPP of Calculus 1. For the second, it was designed to explore the problems faced by students in achieving competency standards in the course of Calculus. This questionnaire indicators refer to the characteristics of learning process based SNPT, namely: interactive, integrative, scientific, contextual, collaborative and student-centered. The questionnaire itself was developed using Likert Scale in five categories;

strongly agree (SA), agree(A), Less Agree (LA), disagree (D), and strongly disagree (SD). The grid of the closed questionnaire can be seen in Table1 and The questionnaire is in Table 2.

Table 1. The Grid of Closed Questionnaire to Students

Indicator	Description	Statement
Interactive	Two-way interaction between students and lecturer	20, 27, 28
Integrative	Integrated in learning through inter-disciplinary and multidisciplinary education	2, 3, 4, 5, 6, 7, 9,11,13
Scientific	Prioritizing the scientific approach in order to create an academic environment based on systems, values, norms, and rules of science and uphold the values of religion and nationality	15, 16, 24, 25, 26
Contextual	Demands on the ability to solve the problem in the realm of expertise	1, 8, 17,18
Collaborative	Learning together involving interaction between individual learners to yield capitalization of attitudes, knowledge and family	14, 19
Student centered	Giving priority to the development of creativity, capacity, personality, students' needs, and developing self-reliance in searching and finding knowledge	12, 21, 22, 23

Table 2. Questionnaire for Students

No.	Statement
1	Calculus is required for the provision to be

No.	Statement
	educators/teachers
2	Calculus is associated to the material of Tafsir Tarbawi
3	Tafsir Tarbawi is associated to the material of Calculus
4	Calculus is associated to the material of Hadith Tarbawi
5	Hadith Tarbawi is associated to the material of Calculus
6	Calculus is associated to the material of Kapita Selekt Fiqh
7	Kapita Selekt Fiqh is associated to the material of Calculus
8	Calculus presented is associated with the context of everyday life
9	The presented materials of Calculus is associated with mathematical topics such as algebra, geometry and statistics
10	Lecturer recommends reading materials that help students find the correlation between calculus and Qur'anic
11	Lecturer gives examples of questions and exercises that includes Islamic studies context
12	Lecturer gives the task to find a link or value between materials of Calculus and Qur'anic.
13	Lecturer uses the media/learning tool to facilitate students' competencies and find its association with Qur'anic
14	Lecturer facilitates students to learn collaboratively by providing students' worksheets
15	Lecturer guides students to solve problems by using scientific methods
16	Lecturer in stills Islamic values is associated to Calculus
17	Lecturer uses certain methods make students actively construct knowledge
18	Lecturer uses particular methods make students actively solve problems
19	The lecturer asks students to learn together to comprehend competency in accordance with the lecture's syllabus.
20	Lecturer is able to create an interactive classroom atmosphere
21	Students read reference books required by lecturer
22	Students find literature on the relationship between Calculus and Qur'anic in the library or the internet.
23	Lecturer demanding students' independence to achieve competence in accordance with the course syllabus
24	Lecturer does assessment on cognitive aspects
25	Lecturer does assessment on attitude aspect
26	Lecturer does assessment on skill aspect
27	Lecturer gives feedback to the structured

No.	Statement
	and independent task
28	Lecturer and students agree on the system of scoring used

For the last is interview guide which was used as the reference in digging information from students and peers or colleagues. The grid of the questionnaire is also refer to the grid of closed questionnaire. Before analyzing the data qualitatively as suggested by Miles & Huberman, firstly, the data which is got from the questionnaire is totaled and interpreted, as seen on Table 3 [2].

Table 3. The Interpretation of Students' Total Score Value

No.	Total Score Value	Criteria
1	91-100	Very Good
2	76-90	Good
3	61-75	Enough
4	51-60	Fair
5	< 50	Less

As described earlier, the data were analysed qualitatively by using Miles & Huberman activities; data reduction, data presentation, and conclusion [3].

1. Data reduction covers selecting process, categorization and data transformation with the aim to ease the categorization, purpose of data analysis, and conclusion. After the data collected, the process of data reduction is obtained by summarizing and classifying data. Then, it is continued by shifting, coding, categorizing, and transforming the data intensively.
2. The classification of the data is an activity of classifying data based on characteristics of the data classification. Data codification is an activity of marking the data. Each group of data is selected according to the characteristics of each category shown for the purpose of practicality in referring to the implementation of the data exposure. The data categorization is intended for the need of data analysis based on the characteristics of the data category. Data transformation is intended to divert or incorporate some form of data into one another category that has the same characteristics. Overall data reduction activities are part of data analysis that allows to researcher to be focus on revealing evidence for the conclusion.
3. The next activity is the data presentation which is arranged systematically. It showed a correlation of the data flows, described on what actually happened so that it will be easy in drawing conclusion. Conclusion will be made since the data collection activity done. It can be accomplished through noting and interpreting all statements that showed the dominant concepts and repetitive patterns. This conclusion is still

tentative because it will be reviewed till got the final conclusion.

3. RESULTS AND DISCUSSION

The results of this research reveals about the learning characteristics of Calculus 1 in Mathematics Teaching Department of STAIN Batusangkar. The scope of the results display refers to the standard process of learning in college according to Permendikbud No. 49 in 2014 since it is accordance with the vision and mission of Mathematics Teaching Department of STAIN Batusangkar and standard of integrative islamic Mathematics as well. The research results is exposed through two sequential steps. First, it is started with data description of the research results from some instruments like closed questionnaire, documents, and interviews with colleagues and students. Then it is proceed with the results of the qualitative analysis of all data obtained.

The following are the results of students' responses who have ever learning Calculus 1, as summarized in the Table 4.

Table 4. Total Scores of Students' Responses on the Learning of Calculus 1.

Learning Characteristics	Total Scores	Criteria
Interactive	81	Good
Integrated	58	Fair
Scientific	78	Good
Contextual	84	Good
Collaborative	81	Good
Student-centered	69	Enough

In Table 4 it looks that the learning of Calculus 1 in Mathematics Teaching Department of STAIN Batusangkar has meet some characteristics on standards of learning in college according to the Permendiknas No. 49 in 2014. It can be seen that a good criteria is for interactive, scientific, and contextual learning characteristics, while enough criteria is for student-centered learning characteristics. Unlike the previous ones, integrative learning characteristics has not meet this standards. It is clearly seen from the total scores (51-60) which indicates in fair criteria. It means the learning problem in Calculus 1 is on this part; integrative learning characteristics which focused on the integration of Mathematics and Islam. All in all, the learning of Calculus 1 have not been implemented to achieve the vision and mission of the Department. As the result, this failure will bring the undergraduates become unable to integrate Mathematics and Islam (in this paper, it is limited to the Qur'an).

Furthermore, the following characteristics describes learning of Calculus 1 based on the standard of college learning process; interactive, scientific, contextual, collaborative, and students-centered. For

the first is characteristics of learning Calculus 1 that meet interactive standards, as elaborated below.

1. Lecturer is able to create an interactive classroom atmosphere.
2. Lecturer gives feed back to structured and independent task.
3. Lecturer and students agree on the scoring system used.

Second, characteristics of learning Calculus 1 that meet scientific standards, as seen below.

1. Lecturer guides students to solve problems using scientific methods.
2. Lecturer inculcates Islamic values that is associated with Calculus 1.
3. Lecturer assess cognitive aspects.
4. Lecturer assess attitude aspects.
5. Lecturer assess psychomotor aspects.

Third, characteristics of learning Calculus 1 that meet contextual standards, as written below.

1. Learning Calculus 1 is necessary for the provision to be educators or teachers.
2. The material presented in Calculus is associated with the context of everyday life.
3. Lecturer uses learning methods to make the students actively construct knowledge.
4. Lecturer uses learning methods to make the students actively solve problems.

Fourth, characteristics of learning Calculus 1 that meet the collaborative standards, as presented below.

1. Lecturer facilitates students to learn collaboratively by providing worksheets.
2. Lecturer guides students to solve problems by using scientific methods.

Fifth, characteristics of learning Calculus 1 that meet the students-centered standards, as explained below.

1. Lecturer gives a task to find a correlation between material or the value of the material between Calculus and Qur'an.
2. Students read reference books required by lecturer.
3. Students find literatures on the correlation Calculus and Qur'an in the library or the internet.
4. Lecturer demands the independency of students to achieve competence in accordance with the course syllabus.

Meanwhile, the research results on some available documents like curriculum of mathematics, syllabus and lesson plan of Calculus 1 showed the students are given Calculus 1 on the First semester with 3 credits hours of course weight. The materials are System Numbers, inequality, and coordinates Cartesian, function and Limit, derivative and its usage. However, in the syllabus and lesson plans, the provision of material is not yet integrative ones; the integration between Calculus 1 and Qur'an. It means the syllabus and lesson plan that is used has not been in line with the mission and vision of Mathematics Teaching Department of STAIN Batusangkar.

Likewise, the same research results were also obtained from interviews with colleagues and students. It was found some information, as listed below.

1. Do not introduce facts in Calculus attached in the verses of Qur'an.
2. Do not give Questions on Calculus with the context of Qur'an.
3. Do not use the literature and instructional media that integrated Calculus and Qur'an.
4. Do not convey Islamic values attached in the material of Calculus 1.
5. Implementation of Calculus semesters plan does not use an integrative learning model of Qur'an.

Although only one of the six characteristics of teaching Calculus 1, which is in the category fair, but it has become the central issue in learning process. Integrative learning characteristics has become the signatures curriculum of Mathematics Teaching Department of STAIN Batusangkar. Hadisubroto in Trianto explain integrative learning is learning that begins with a specific subject or theme associated with other subjects, a particular concept related with another concept, done in spontaneous or planned ways, either in the field or more, and with a variety of students' learning experiences, then the learning itself will be meaningful [4]. In this case, learning calculus integrative with Qur'an.

There are several causes of failure in the integrative learning of Calculus and Qur'an, for example, integrative knowledge possessed Qur'an lecturer. Actually, this can be overcome by holding a focus group discussion that examines the alignment of facts even in Calculus concepts and principles with the verses of Qur'an. Other factors that cause is the absence of an adequate reference book on integrative Calculus with Qur'an, that feels heavier and difficult.

Another obstacles in the realization of learning Calculus 1 is the lecturer's thinking. They think that it is impossible to integrate Qur'an and Calculus. In reality, there are so many facts in Calculus that can be integrated with islamic values and Qur'an. For example, in mathematics there is the concept of prime numbers. A number called a prime number if the number has two factors, namely 1 or number itself. Here 1 as the first factor is God, while the number itself is a human. Numbers that (man) is said to be prime if it is very close to God, there is nothing that can prevent [5]. Thus, the purpose of learning mathematics is oriented on preparing high-quality human being, namely the generation *ulul albab*.

From of all identified problems in this preliminary study, it is necessary to develop teaching materials of Calculus as a first step on the development of integrated learning model. At this stage, it also does a review of the literature related to integrative concept of Calculus with Qur'an.

5. SUMMARY

The research results shows that (1) the implementation of learning calculus only meet the standards of the learning process in college on interactive, contextual and collaboration characteristics, while for the characteristics of scientific and students-centered are still in the enough category. (2) Learning Calculus does not meet the characteristics of integrative learning. Integrative paradigm for this is still partial, that is by inserting religious subjects in the curriculum of Mathematics Teaching Department of STAIN Batusangkar. It is recommended that the development of teaching materials of Qur'anic Integrative Calculus needs to be done in order to realize the vision of the mission of the department.

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