Implementation of Just Basic Software in Lecture on Numerical Method

Triananda Putri[a*], Anwar[b*], Hajidin[c*]

[a,b,c]*Syiah Kuala University, Jl. Teungku Chik Pante Kulu No. 5 Banda Aceh 23111,Indonesia*
[a]*Email: trianandaputri03@gmail.com*
[b]*Email: anwarramli@unsyiah.ac.id*
[c]*Email: hajidin@unsyiah.ac.id*

Abstract

One of the subjects must be mastered by mathematics students is the Numerical Method. In this lecture, software assistance is needed for difficult and complicated questions to be solved manually. However, based on the needs analysis carried out, the software assistance has not been applied in lecturer of Numerical Method all this time. This study aims to describe the application of Just Basic software in lectures of Numerical Method. This study follows the implementation steps in the ADDIE model (Analysis, Design, Development, Implementation and Evaluation). The subject of this research trial was the students of the Mathematics Education Study Program at Serambi Mekkah University in the 6th semester of 2015. Numerical Method Lecture assisted by Just Basic software was very helpful for students in the lecture process seen from the results of lecture implementation observations which showed excellent results. Then the results of observations of student activities are more than 90%, as well as an increase in formative scores in every meeting. Based on the results of this study, it can be concluded that the lecture on Numerical Method was greatly helped by the application of software.

Keywords: Numerical Method; Just Basic Software.

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* Corresponding author.

1. Introduction

Numerical Method is one branch or field of mathematics that must be mastered by students. Numerical methods are methods for solving problems on computers with numerical calculations in the form of numbers and graphical representations or images [1]. Numerical methods can provide better estimates for solving large numbers non-linearly and can be solved uncomplicated . Basically the Numerical Method is a method for determining numerical solutions, in this case the real approach value of a mathematical model.

The learning process of the Numerical Method is one of them by giving practice questions to students. Practice questions consist of easy questions to difficult questions. Students need a long time and need precision in solving difficult problems. Therefore, in difficult material related to the number of variables and requires a long time to complete, other media are needed to facilitate students in solving problems. This is in accordance with [7] saying that to calculate the number of n equations with an unknown number of n from a very large and complex system, a computer is needed to calculate the equation, one of the uses of computers is to use learning software.

Some numerical method material requires the use of Information Technology (IT) which is useful for solving Mathematical problems that cannot be solved manually. Based on the description, it can be said that the subject learning Numerical Method can be implemented by integrating IT and is expected to help students to understand and solve problems related to the material of the Numerical Method. Numerical Method is one branch or field of science in mathematics that has a very important role. Numerical methods are techniques for solving problems that are formulated mathematically by means of count operations [9]. The numerical solution is determined by performing a certain repetition procedure, so that each result will be more accurate than previously thought. By performing a sufficient repetition procedure, finally the approximate results are obtained which are close to the exact results.

The use of software in mathematics is influential in learning in order to assist students in understanding a material. The use of software / mathematical programs has a great influence on students' understanding in mathematics and in their subsequent performance in the lesson [6]. There are many types of software used on Mathematics such as Autograph, Geogebra, Matlab, Maple, Just Basic and so on. However, the software used in this study is Just Basic, because Just Basic software is a mathematical program whose programming language is very simple and easy to understand and able to solve problems on a large scale. Just Basic is a program that runs on the Windows operating system. Just Basic is a part of Basic language, this Basic language has a characteristic that does not require variable declarations at the beginning of the program. Just basic was also chosen because the subjects of this study were students from one of the universities who were not accustomed to applying the software in the lecture, so Just Basic was chosen with a simple programming language.

In fact, the lectures on Numerical Method have so far been lacking in applying software. Based on the results of a preliminary study conducted by researcher at Mathematics Education Study Program of Serambi Mekkah University, students still find it difficult to study the Numerical Method course because the university has not facilitated a Mathematics laboratory so students cannot apply the software in lectures, even though the software

is very helpful in the lecture. Besides, the interview with the Numerical Method lecturer that the Numerical Method program assisted by software is very helpful for students in their learning, many students find it difficult to work on large-scale questions manually, if there is software that helps, students are easier to complete the problem of the Numerical Method.

From the explanation that has been stated, it can be said that the Numerical Method requires software in learning, because if the problem of the Numerical Method is only solved manually, it will take a long time. In accordance with the existing situation and conditions, for the Numerical Method course which is only two credits in one week, it is not possible if the lecture is only done manually. Therefore, software assistance is needed. Many software can be used in the Numerical Method lecture, but researchers use Just Basic software as the programming language is more simple and easier to understand. Based on the description, the problem statement in this study is how is the application of Just Basic software in the lecture on Numerical Method?

2. Theoretical Study

2.1 Numerical Method

A numerical method is a method for solving problems on a computer with numerical calculations in the form of numbers and graphical or image representations. The numerical method is one branch or field of mathematics. The numerical method is a technique to solve problems that are formulated mathematically by counting operations [9]. Numerical methods can provide better estimates for solving large numbers of nonlinearities and can be solved uncomplicated [1]. Basically a numerical method is a method for determining numerical solutions, in this case the real approach value of a mathematical model.

The numerical method is a method used to find the numerical solution of a mathematical model and is used if the analytical method is difficult to determine and requires a long time. The numerical method is one method that has a very strategic role in mathematics. Problems that are difficult or even impossible to solve analytically can be solved by numerical methods. Numerical solutions are determined by performing certain iteration procedures, so that each result will be more accurate than previously thought. By performing a repetition procedure which is considered sufficient, finally the approximate results are obtained which are close to the exact value.

2.2 Just Basic

Just Basic is a programming language for Windows, this software is free to access and is perfect for making all types of applications for business, industry, education and entertainment. Just Basic is based on the classic Basic programming language, so it's easy to learn and has been expanded with structured programming facilities and easy-to-use GUI commands [4]. Just Basic is a simplified version of Liberty Basic software. Liberty Basic has been a popular language since 1992 and Liberty Basic makes Windows programming easier [5].

The advantages of basic language are versatile and can be used in any application, are light and don't take up much memory, the resulting files are small, the learning process is relatively short because basic languages are very simple, free to download and use and complete tutorials and many sample programs . Aside from the

advantages possessed by basic languages there are also some disadvantages, namely the language is less structured, not suitable for making large applications, vulnerable to viruses, not multi-operating system because basic language can only be used on the operating system itself, namely windows.

In this study Just Basic was chosen because it was in accordance with the needs analysis that had been carried out by the researcher, where students as the subject of development research were not too familiar with programming languages. Students need software that can solve complex problems and also the software is not too difficult for them to understand. From the description that has been delivered, Just Basic software is quite in accordance with the needs of students in this study.

3. Method

This type of research is descriptive research. This research was conducted at the Mathematics Education Program at the University of Serambi Mecca and the trial subjects in this study were students of the Mathematics Education Program at the University of Mecca Serambi in the seventh semester of 2015, amounting to 13 people. The instruments in this study are lecture implementation sheet, student activity observation sheet and formative test. Data collection in research is following the implementation stage in the ADDIE development model (Analysis, Design, Development, Implementation and Evaluation) [3]. In this study three trials were conducted and at each meeting lecture observations were carried out, student activities and training were given at the end of each meeting. The data obtained was analyzed and described for each meeting.

4. Result

This research has developed and produced a product in the form of a practicum module in the course of Numerical Methods assisted by Just Basic software which is valid, practical and effective. The results of the development research were obtained by following the steps of the ADDIE development model (Analysis, Design, Development, Implementation and Evaluation). It is said that vaild can be seen from the results of the validator comments which show the practicum module meets the valid criteria. It is practically and effectively based on the recommendation of the validator that the practicum module can be used with a slight revision, the tendency to increase formative scores, observers and students give a positive response to the use of practicum modules, the average student activity and the implementation of lectures are in the good category. This study only examines the results of the implementation phase, namely the implementation of lectures, student activities and formative tests. The following will be described one by one the results.

4.1 Observation of the Implementation of Lectures

The first result described in this study is the observation of the implementation of lectures conducted by the observer. This observation aims to find out how the implementation of the Numerical Method program is assisted by Just Basic software. Analysis of observation data by looking at observers' comments in accordance with the implementation of lectures at each meeting.

The implementation of lectures at the first meeting, researchers still lacked examples from everyday life, then

the way to provide motivation to students is still lacking, and in the delivery of goals and steps in the lecture is good and quite clear. In the application of Just Basic software, researchers have been quite good at explaining to students. It's just that when the question and answer session is not too active, because students are still awkward and students are not familiar with learning using software. Furthermore, for the suitability of time, researchers have not been able to allocate time well, and the way researchers reflect on lecture material is still not optimal, but lecture activities are in accordance with the Semester Learning Plan used by researchers.

In the second meeting, researchers still did not provide examples of daily life, then how to provide motivation to students was good enough, and in the delivery of goals and steps in the lecture was good and quite clear. In the application of Just Basic software, researchers have been quite good at explaining to students and during the question and answer session students have begun to look active. Furthermore, for the suitability of time, researchers have allocated time well, but the way researchers reflect on lecture material is still not optimal, and lecture activities are in accordance with the Semester Learning Plan used by researchers.

At meeting III, researchers were clear enough to provide examples from daily life, then how to provide motivation to students was also quite good, and in the delivery of goals and steps in the lecture was good and quite clear. In the application of Just Basic software, the researchers were quite good at explaining to students and the question and answer process went very well. Furthermore, for the suitability of time, researchers have been able to allocate time well, and the way researchers reflect on lecture material is good enough and lecture activities are in accordance with the Semester Learning Plan used by researchers. Based on the description, the accuracy of the lecture is good. That is, the lecturer activities and lecture atmosphere of the Numerical Method assisted by Just Basic software are good.

4.2 Observation of Student Activities

The second result in this study is to describe the observations of student activities carried out with the aim of knowing the feasibility of lecturing the Numerical Method assisted by Just Basic software. Observations were carried out by one observer who assessed student activities during the lecture. Observer is a colleague of a researcher who has also attended the Numerical Method lecture, the observer has been willing to assist the researcher as an observer during the research, the researcher has also explained the assessment procedure and assessment criteria. Assessment criteria for student activities are seen from the following aspects: listening to the appreciation/motivation given, sitting according to each group, presenting/listening to the results of work in front of the class, working on the exercises and concluding the learning outcomes. The following are the results of a brief description of student activities.

At the first meeting, students did not respond to the motivation given by the researcher. Then the students were still less active in the question and answer session after presenting the results of group work, and were still lacking in understanding the practice questions either completing manually or using Just Basic software. Students are also not active in asking for material that they don't understand.

At the second meeting, students had begun to respond to the motivation given by the researchers, students had

begun to be active in the question and answer session when presenting the results of group work, but there were still few students who could solve the training questions manually or using Just Basic software and students were not active in asking questions which they don't understand yet.

At the III meeting, all students were active and responded to each activity carried out, starting from question and answer, orderly work in groups, good discussion and conclusions, except that there were some students who could not understand the editorial questions properly. Observers' assessment data were analyzed using percentage descriptive analysis. The results of the analysis of student observation data are as follows.

Table 1: Results of Student Activity Observation Analysis

Meeting	Percentage of Assessment
I	83,33%
II	91,67%
III	95,83%
Total Average	**90,27%**

Based on the results of the observation analysis, the first meeting of student activities reached an average of 83.33%, the second meeting was 91.67% and the third meeting was 95.83%. Overall the average activity of students from the three meetings is 90.27%. That is, the activities of students on the Numerical Method lectures assisted by Just Basic software have gone very well.

4.3 Formative tests

Formative tests are the third result described in this study, namely in the form of a question consisting of several items and given to students at the end of each meeting and evaluation test. The purpose of this test is to see the mastery of the material that has been studied. The questions in the first meeting consisted of 3 (three) questions, namely 2 (two) questions about methods for two and 1 (one) questions about the false position method.

The second meeting consisted of 1 (one) question which was divided into 2 (two) questions about the Newton Raphson method. In the third meeting consists of 2 (two) questions, namely 1 (one) question of the upper triangle linear system and 1 (one) question about the bottom triangle linear system. The evaluation consists of 5 (five) questions each one for one sub-material. The results of the formative test analysis are as follows.

On the results of the analysis of the formative test scores above, the average score at the first meeting reached 71.53. At the second meeting the average score reached 76.15. At the third meeting the average score reached 82.69. Whereas in the final evaluation the average score obtained reached 83.07. Based on these achievements, it can be seen that there is a tendency to increase scores from each meeting.

Table 2: Results of Formative Test Analysis

No.	Name	Score			
		Exercise 1	**Exercise 2**	**Exercise 3**	**Evaluation**
1	Student 01	75	85	85	80
2	Student 02	75	85	85	80
3	Student 03	80	85	100	80
4	Student 04	70	75	80	90
5	Student 05	65	70	80	90
6	Student 06	70	75	75	90
7	Student 07	65	75	80	90
8	Student 08	75	75	85	85
9	Student 09	75	75	85	85
10	Student 10	75	75	85	85
11	Student 11	75	75	85	85
12	Student 12	65	70	75	70
13	Student 13	65	70	75	70
Average		**71,53**	**76,15**	**82,69**	**83,07**

5. Discussion

The findings in this study were the feasibility of lectures and student activities while learning the Numerical Method assisted by Just Basic software very well and an increase in formative scores at each meeting. This means that the application of Just Basic software in lectures on the Numerical Method is in the good category. This information is in line with the results of the research of Asih and Mulyono [2] that the implementation of NHT cooperative learning with the application of Maple can improve Numerical Method learning outcomes, then this is also in line with [8] which is developing teaching materials based on Matlab software. The results obtained are the development of Matlab software-based teaching materials in the Numerical Method course where students have reached the stage that approaches the need. From some of the results of these studies it can be said that the lecture on the Numerical Method is indeed greatly helped by the help of software in solving complicated problems in the material of the Numerical Method.

This research has advantages, namely with simple Just Basic programs that can help students in the Numerical Method lectures, so that with a simple program students feel easier to apply. In addition to the advantages, this study also has the disadvantage that researchers do not explore how students' respond and observers' respond about the application of Just Basic software in the Numerical Method lecture, so researchers do not have data whether students and observers give negative or positive responses to the lectures. Therefore, other researchers can examine how students and observers respond to lectures using software assistance.

6. Conclusion

The lecture on Numerical Method assisted by Just Basic software is very helpful for students in the lecture process, it was seen from the results of the implementation of lecture observations which showed very good results. Then the results of observations of student activities are more than 90%, as well as an increase in formative scores at each meeting.

7. Recommendation

The practicum module of the Numerical Method assisted by Just Basic software can be a literature if you want to develop a module with a variety of software and materials that exist in mathematics learning in schools and colleges.

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