



## **Multimedia Development Using Visual Basic for Application (VBA) to Improve Students' Learning Motivation in Studying Mathematics of Economics**

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### **Abstract**

For Mathematics Education Study Program, Mathematics of Economics is a subject where Mathematics is applied in Economics. In this course, mathematical concepts and theories which have been studied in the previous semesters have to be applied in Economics that is new for the students. For this kind of subject, the lecturer has to be more creative in the class so that the lesson will be more interesting and understandable. The aim of this research is to know the improvement of learning motivation in Mathematics of Economics through the use of multimedia development using Visual Basic for Application (VBA) in the class. This multimedia is presented in the form of a game in Microsoft PowerPoint (PPT) program. Respondents of this study were 34 students of class A in the fourth semester of Mathematics Education study program of Teacher Training and Education Faculty at Universitas Islam Malang who were taking this course. This study uses a qualitative descriptive approach with data collection techniques using observation and interview techniques. The observation sheet and the interview guidelines used here are arranged based on indicators measuring learning motivation. The result shows that the use of multimedia development with VBA can improve the students' learning motivation to study Mathematics of Economics. The recalling of mathematical concepts and theories which have been studied before can be more interesting in the form of a game, while the new Economics concepts and theories with the mathematical application inside can be understood easily in the form of competition that enhances the motivation.

**Keywords:** multimedia, visual basic for application (VBA), learning motivation

### **INTRODUCTION**

In Faculty of Teacher Training and Education at Universitas Islam Malang, there are professional courses to provide each student with the knowledge to be a professional teacher in the future. These professional courses are applied to subjects. By taking this course, a prospective teacher is considered to be able to apply theories that have been learned before in other fields. Therefore, Universitas Islam Malang has qualified prospective teachers with higher

professionalism because they have provided not only with main courses which they should learn in their study program but also applied for courses as their added-values.

One of the professional courses in Mathematics Education study program of Teacher Training and Education Faculty at Universitas Islam Malang is Mathematics of Economics. This provision is based on curriculum aligned with KKNi and SN Dikti which is authorized in 2016. This course is given in the fourth semester and contains Mathematics concepts and theories applied in

Economics. In Mathematics of Economics, students will relearn and recall Mathematics concepts and theories they have known before as well as learn new theories in Economics as an application of Mathematics. The learning outcome of this course is that students are able to elaborate the functions in Economics theories based on mathematical theories they have learned before and they can explain and discuss the application of those mathematical theories into the functions in the Economics field.

For this kind of subject, the lecturer has to be more creative in the class so that the lesson will be more interesting and understandable. In learning Mathematics of Economics, it is better if it begins with elaborating the pure mathematical models before an explanation about the logic of those model applications in Economics concepts, then it is followed by giving the applications' steps and practical examples (Dumairy, 2007). It will be a big challenge for students of Mathematics Education because this course will ask them to recall the previous materials and give them new ones in the Economics field they never learned before all at once. Learning innovations are needed in order to make the students recall the previous materials as well as to understand the new ones easier.

The use of an interesting learning media can be an alternative in learning Mathematics of Economics. One of the factors that influence the learning quality is a technology application and also the use of technological development in the class (Nursit, 2016). Nowadays, multimedia is the most favorite technological development to be used in the learning process. Multimedia is a complete media, it is a combination of texts, graphics, audio, moving pictures, etc. The learning multimedia should be designed in order to make the learning process easier and fun. It should help the students to learn and understand the lesson in the class easily (Hasana & Maharani, 2017).

To design attractive learning multimedia, a teacher needs helpful software which is practical and easy to be used as well

as not time-consuming. A result of the study states that time constraints and lack of skills for teachers to make information and communication technology-based learning media is one of the problems faced by teachers in order to apply multimedia in the class (Pramita, 2009). Furthermore, mastering in applying information and communication technology in the learning process has become a responsibility and challenge that the teachers should deal with for learning management nowadays (Setiawati, 2013).

In 2017, development has been carried out and produced multimedia based on Microsoft PPT with Visual Basic for Application (VBA) programming algorithm (Hasana & Maharani, 2017). This is very easy to compile the contents of its multimedia. The usage scenario can also be easily adjusted to the desired learning material. Further, interesting learning multimedia will be formed and it is expected to be able to improve student's learning motivation. This multimedia is also based on Microsoft PPT so that the teacher will not have difficulty to use it because Microsoft PPT has already been widely used among teachers so they are familiar with running it. The advantage of using VBA is that Visual Basic is one of the programming languages which is easy to be learned where its visual programming techniques allow users to be better in creating an application program. VBA is a macro in the form of a series of commands and functions stored in a Microsoft Visual Basic Editor module and can be run at any time (Lestari et al., 2014).

Multimedia learning is the use of media that involves more than one format in a learning activity. Multimedia integrates several elements of media, such as audio, video, graphics, text and animation that are synergistic and can provide benefits to users when it is compared to the use of only one media (Hidayah, 2015). Multimedia presentation in the form of games is one of the ways to utilize multimedia interactively. Games are generally used for the practice of giving material without a restricted delivering

structure of the material contents (Munir, 2013). Therefore, multimedia development based on Microsoft PPT with VBA is presented in the form of games. Teachers can easily modify and develop multimedia in the form of this game so that it can be their innovative work that is adjusted to their own subjects (Hasana & Maharani, 2017).

This multimedia game based on Microsoft PPT with VBA can be an alternative in learning Mathematics of Economics. This multimedia will make mathematical material, which should be studied again, can be presented attractively and the students will not get bored. On the other hand, the economic material, which is considered new and has never been studied before, can be presented more interestingly. Any multimedia can be chosen in helping the learning process provided that it can efficiently and effectively help achieve learning goals. The selection of learning media should be fitted to the purpose of teaching, which supports the content of teaching materials, it should be easy to obtain, and the instructor can use it easily (Djamarah & Zain, 2010). Learning media can be a tool to clarify learning the material, a learning stimulus for students, and also a source of learning for students (Sagala, 2006)). The use of this multimedia is expected to be able to improve the student learning motivation in taking the Mathematics of Economics course.

The essence of learning is a communication process between students with educators and also with other students which aim to change attitudes and behavior (Jihad, 2013). The preparation of the right multimedia will be able to make the learning process better. The success of the use of a learning media can be measured by the increase of students' learning motivation because one of the benefits of using media in the learning process is the learning process becomes more attractive so that it can increase learning motivation (Arsyad, 2013). Learning motivation is an internal factor that can influence the students' learning process. Motivation itself is a power of the movement

that arises from within to do certain activities in order to achieve the desired learning goals (Glynn, et al., 2011). A study shows that intellectual ability and learning motivation have a positive correlation with learning achievement (Busato, et al., 2000). Therefore, motivation to learn is a psychological condition that can spur learners to be able to study happily but still with a vengeance so that a systematic way of learning can be arranged and can improve the achievement of learning outcomes.

The Mathematics of Economics is a course which has a big challenge for students of Mathematics Education because, in this course, they should relearn the material that they have studied every day and should learn new material that they do not know before. The material in a course like this will be bored if it is presented only by the lecture method. An interesting presentation is needed so that the learning can run pleasantly. Accordingly, students' learning motivation will improve which will result in increased learning achievement in the Mathematics of Economics class. This study aims to determine the improvement in students' learning motivation in the Mathematics of Economics course which applies Microsoft PPT-based multimedia with VBA in its learning process.

## **METHOD**

This study uses a qualitative descriptive approach with data collection techniques using observation and interviews. The qualitative approach was chosen in order to obtain the full description of the improvement in students' learning motivation at Mathematics of Economics class after using Microsoft PPT-based multimedia with VBA. Data collection techniques through interviews were conducted by researchers with the type of unstructured interviews, while observations were conducted to observe student activities using observation sheets. Indicators of learning motivation include the desire and eagerness to be successful, the encouragement and need for learning, the hopes and aspirations of the

future, the appreciation of learning, the existence of interesting activities in learning, and the existence of a conducive learning environment (Uno, 2009). These indicators are contained in the components of the observation sheet and interview guidelines.

Unstructured interviews are a type of interview where researchers do not compile systematic and complete interview guidelines. The interview guide used in this study is only in the form of a problem outline that will be asked. A researcher must have a presumption that becomes a reference when conducting interviews (Sugiyono, 2015). These assumptions include that the respondent is the person who knows best about himself, what the respondent stated is true and reliable, and the respondent's interpretation of the questions asked in the interview is the same as what was intended by the researcher. In this study, the interview technique was done face-to-face directly with the respondents to obtain more in-depth information about students' learning motivation in Mathematics Education at Mathematics of Economics class that uses multimedia based on Microsoft PPT with VBA.

Observation is a complex process that is composed of various biological and psychological processes (Sugiyono, 2015). These processes are in the form of observation and memorizing processes. Observation method is done by observing the behavior, events or activities carried out by the respondent then the results are recorded to find out what really happened. In this study, observations were carried out using an observation sheet that contained the components that must be observed to determine the learning motivation of students of Mathematics Education at the Mathematics of Economics class that uses multimedia based on Microsoft PPT with VBA in its learning process.

Data analysis in qualitative research is carried out when data collection is ongoing and after the process of data collection is completed in a certain period (Sugiyono, 2015). This data analysis was carried out in 4

steps; they are data collection, data reduction, data presentation, and conclusion making. The technique of checking the validity of the data in this study used the triangulation examination technique. The triangulation technique is the process of data examining by utilizing other data outside the data that is being excavated for the purpose of checking or comparing the data (Moloeng, 2015). This triangulation process becomes a process that strengthens evidence collected from interviews and observations.

Respondents of this study were fourth-semester students of class A in Mathematics Education study program of Teacher Training and Education Faculty at Universitas Islam Malang who were taking the Mathematics of Economics course. There are 34 students. This research was conducted for about four months during the Economics Mathematics lecture in the even semester of 2017/2018.

To be able to measure the increase in student motivation in the Mathematics of Economics class, the study was divided into two stages, namely the stage before the Middle Semester Examination or *Ujian Tengah Semester* (UTS) and the subsequent stages. In the stage before UTS, the class was still presented conventionally through the lecture method. For the second stage after UTS, Mathematics of Economics material is presented using multimedia based on Microsoft PPT with VBA. Observations carried out starting from the first stage begin until the end of the second stage. Then, interviews were conducted at the end of the lecture period by collecting data from respondents about the learning process both in the stages before UTS and after UTS. The research procedures in a sequence are as follows.

- 1) Determining the research subject.
- 2) Arranging the learning plan to be carried out in two stages in one class.
- 3) Developing interview guides and doing validation to the validators who have been chosen by the researcher.
- 4) Determining the components of observation to be arranged in the observation sheet and

doing validation to the validator who has been chosen by the researcher.

- 5) Carrying out learning in accordance with the draft that has been prepared.
- 6) Doing observations during the learning process.
- 7) Determining the sample as a respondent in the interview.
- 8) Carrying out interviews at the end of the period of Mathematics of Economics learning.
- 9) Conducting data analysis from observations and interviews.
- 10) Presenting the results of the research that has been done.

For samples taken as interview respondents, they were randomly selected based on UTS scores and Final Semester Examination or *Ujian Akhir Semester* (UAS) scores. There are three selection criteria; they are students who have UTS and UAS scores that remain good and are considered complete, students whose UAS score is higher than their UTS score, and students whose UTS and UAS scores remain low and are considered incomplete. There are three students for each criterion and the determination of the learning motivation level of the interview results were adjusted to the level of fulfillment of the indicators of learning motivation. In students with 3 different levels of achievement of UTS and UAS scores, interviews will be conducted to determine the increase in motivation that may be experienced before and after the use of multimedia based on Microsoft Ppt with VBA. Interviews were conducted to determine the improvement of these students who have different learning outcomes in fulfilling the indicators of learning motivation.

## RESULTS

Observations on Mathematics of Economics learning are held for one semester with a total of 16 meetings. Eight meetings were conducted before UTS and the other eight meetings were held after UTS. Observation sheet of main activities in Economic Mathematics learning using multimedia games

based on Microsoft Ppt with VBA contains 10 observed activities with 5 assessment criteria which are very lacking, lacking, good enough, good and very good, with successive observation scores of 1, 2, 3, 4, and 5. The maximum score of observations is obtained from the total score if each activity observed gets a very good value or the same as getting a score of 5. For the level of success follows the range of the average percentage of observations as follows.

Table 1. The Level of Success of Learning Main Activities

Mean of Observation Percentage on Students' Activities (SR)	Level of Success
$80\% < SR \leq 100\%$	Very Good
$60\% < SR \leq 80\%$	Good
$40\% < SR \leq 60\%$	Good Enough
$20\% < SR \leq 40\%$	Lacking
$0\% < SR \leq 20\%$	Very Lacking

The observation results of the implementation of learning before UTS and after UTS are presented in the following table.

Table 2. Observation Results on Main Activity in Mathematics of Economics Learning

	Meetings Before UTS	Meetings After UTS
<b>Maximum Observation Score of Main Activity</b>	50	50
<b>Minimum Observation Score of Main Activity</b>	34	47
<b>Mean of Observation Percentage on Students' Activities</b>	68%	94%
<b>Level of Success</b>	Good	Very Good

Table 2 shows that the overall implementation of learning when using the lecture method for along eight meetings can be said to have been done well, with an average observation-score of 34 compared with the maximum observation-score of 50. At eight meetings after UTS, where multimedia based on Microsoft Ppt with VBA was applied in learning, it appeared that there was an increase in the success of learning. Overall, the learning process reaches 94% and can be said to be done very well. At this stage, there is an increase with an average observation-score of 47 compared to a total observation-score of 50. This shows an increase in the success of learning implementation which reflects an increase in the learning motivation of Mathematics Education students in studying Mathematics of Economics course after using Microsoft Power based multimedia Point with VBA. Fulfillment of indicators of learning motivation appears after the use of new media in learning Mathematics of Economics.

All main activities in learning Mathematics of Economics after UTS use the game. Every meeting applies the game for the process of learning material. The material which should be studied is presented in the form of a game such as Monopoly. The operator of the game is some students assigned by the lecturer in the previous meeting in turns. Students who are assigned as game operators have the right to determine the rules of the game, so there will be different rules in each meeting and the game will not be monotonous. Four players were randomly appointed by the lecturers at each meeting so that every student who was not assigned as the game operator must be ready and should study the material which is determined and announced by the lecturer at the previous meeting. There will be at most 3 times of game rotations in a meeting so that there will be at most 12 students who have the opportunity to play in each meeting. The overall implementation of the game is almost the same as the game of Monopoly, except when the player tries to conquer the location, the player should be in struggle by

answering questions about Mathematics of Economics materials. Other students who are not in the role of operators and not being players may ask questions or show a disagreement for the player's answers. Awards in the form of scores are not only given to the players, but also to other students who are considered to be active in the class.

The researcher observed that when the material was presented in the form of games, the enthusiasm of the students increased. Students seemed more eager to attend the Economics Mathematics course. Students seemed impatient to get their turn to play and compete with each other in the game. The new form of learning tends to make the students more interested. The scenario for implementing Microsoft Ppt-based multimedia games with VBA also provides interesting challenges for students. The value of the competition that appears in the game encourages students to better prepare themselves before participating in the learning. As a player, students will be encouraged to win the game. Additional values given to students who can correct the answers of game players who are considered wrong can also motivate students to be more active in the class. The implementation of this game also triggers discussions that spurred students to be brave to express their opinions and thoughts. The overall implementation of the game remains under the supervision of the lecturer to keep the discussion to be not out of the context.

The interview results on a sample of students who have UTS and UAS scores which remain good and complete shows that the use of Microsoft Ppt-based multimedia games with VBA can improve learning motivation. The process of understanding the Mathematics material that has ever been studied before becomes more interesting and not boring. Students become more enthusiastic to describe the Mathematical theories given in this course by recalling the explanations that have been studied in the previous semester. Students also found it easier to understand the material of Economics as a new field that has never been

studied before. The competition raised in the game also stimulates students to be able to search for additional information outside the reference given by the lecturer. The use of multimedia games based on Microsoft PPT with VBA can spur students to be able to maintain their UAS scores to be still good and still meet the completeness criteria.

The interview results on the sample of students whose UAS scores are higher than UTS score indicated that the use of Microsoft PPT-based multimedia games with VBA can improve learning motivation. The lecture method held at the beginning of the Mathematics of Economics class made students bored to repeat the material that had been studied in the previous semester. After the learning process used multimedia games based on Microsoft PPT with VBA, students felt more eager to relearn mathematical material that had ever been studied before. The interest in new material in the Economics field has also increased. The value of competition that arises from learning media in the form of games makes students eager to learn economic material with all the economic theories and formulas. This competition also makes students try their best to get additional information outside of the references given by the lecturer. These factors make students more prepared to do UAS than to face the previous UTS. In the end, the students get a better UAS score than UTS score for Mathematics of Economics course.

The interview results on a sample of students who have low UTS and UAS scores and are considered incomplete shows that basically the use of Microsoft PPT-based multimedia game with VBA makes students more interested to participate in the Mathematics of Economics course. The use of multimedia still becomes a strong attraction. However, students in this third criterion still have difficulty in describing the mathematical formula and applying it to the economic formulas given in this course. For problems given in the form of theories that only require memorization, students in the third criterion

can still overcome them. Unfortunately, in the problem of describing the formula and applying mathematical formulas, they still had many difficulties. The use of multimedia games based on Microsoft PPT with VBA makes the class be student-centered (student-centered learning), so it requires students to be more independent in learning. These demands cannot be answered by students with this third criterion. All samples with the third criterion said that they did not try to find additional information to add to the learning material, unlike students on two other criteria. This third group of students basically likes to take part in games held in class but only on certain types of questions. This third group has also not been moved to play an active role in the discussion if there is a correction for the game players' answer.

A game as a learning media has several advantages. The game is something fun to do, something that is entertaining and interesting. The game enables the active participation of students to learn. The game can provide active feedback. The game enables students to solve real problems. The game provides real experiences and can be repeated as many times as desired, operational errors can be corrected. The game also helps students to improve their communicative abilities. It helps students who have difficulty in learning with traditional methods. It is flexible and can be used for various educational purposes. Games can be easily created and reproduced (Sadiman, 2006). With a game, all indicators of learning motivation can be fulfilled.

## CONCLUSIONS

Microsoft PPT-based multimedia with VBA is presented in the form of games. This multimedia is very easy to apply and to be arranged. The game scenario can also be easily adjusted to the learning objectives of each teacher. Microsoft PPT-based multimedia with VBA can be an attractive alternative for classroom learning and also be able to be an innovative work of the teacher as the main purpose of developing this multimedia.

Microsoft PPT-based multimedia with VBA is very suitable to be applied in Mathematics of Economics class. With the use of multimedia based on Microsoft PPT with VBA, the process of remembering the previous material as well as learning new material can be presented more interesting.

The results of observations and interviews show that students' learning motivation increases when the Mathematics of Economics lessons is presented using multimedia based on Microsoft PPT with VBA. Both show an increase in the fulfillment of learning motivation indicators when new learning multimedia is used instead of the old method.

Positive values that arise from the use of multimedia based on Microsoft PPT with VBA in learning Mathematics of Economics, which can result in an improvement of students' learning motivation are as follows.

- 1) Students become more enthusiastic in attending lectures because of the use of multimedia learning.
- 2) Students become more active in learning because the use of multimedia based on Microsoft PPT with VBA makes the learning become student-centered.
- 3) Students become active in conducting joint learning for the preparation of Mathematics of Economics lecture because of the competition value raised when the lesson is presented in the form of games.
- 4) Students become active in seeking additional information or references outside the references given by the lecturer because of the competition value when learning is presented in the form of games.

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