THE DEVELOPMENT OF ALGEBRA MODULE BY USING EXE LEARNING TO IMPROVE MATHEMATICS COMPREHENSION OF THE SEVENTH GRADE STUDENTS OF JUNIOR HIGH SCHOOL

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The purpose of the research is to determine the quality of the development of realistic mathematics module based on exe-learning materials in the form of algebra to enhance mathematics comprehension of the seventh-grade students of Junior High School from the aspect of validity, practicality, and effectiveness.

This research belongs to research and development. Research and development are conducted in accordance with the procedures of R & D from Borg & Gall through some modification consists of the following steps: (1) a preliminary study and data collection, (2) the preparation of the module, (3) the validation of the module continued by revision, (4) focus group discussion followed by the revision of the results, (5) the initial field trials, (6) the improvement of the initial field trial results, (7) the implementation of the test field, (8) the revision of the implementation of the test field.

Algebra generated module has been valid because it has fulfiled two types of validity, namely: content validity and construct validity. Content validity is used because the process

of development has been adjusted by the procedures of R & D from Borg & Gall. While observing construct validity where assessment is based on the correlation among the various components which arrange the product has been validated by two experts each on matter and media. The developed module in this research has met the practical criteria based on the students' responses and obtained good score. This module is also effective because it is based on the value of the t (4.834) > t table (2.042) which means that the result of mathematics comprehension for the experimental class is different from those in the control group. From three criteria above, the use of exe-learning for the module has fulfiled the criteria of validity, practicality, and effectiveness.
Keywords: Module, Exe-Learning, Comprehension

INTRODUCTION

One of the materials studied in Junior High School in national education curriculum is algebra. Learning algebra in national education curriculum aims to "equip the students in order to be able to think logical, analytical, systematic, critical and creative". The ability is required by the students to be able to face the challenges of their life.

In Junior High School Mathematics learning, the explanation of the concept of algebra until now is merely as the expalantion of the information without involving the students to stimulate their own understanding. This is consistent with what

is expressed by De Lange (1987, in Turmudi, 2010) that learning mathematics is often defined as the activities carried out by "the teachers introduce the subject, give one or two examples, then ask some questions and ended by doing test practice taken from the book". The following meetings will repeat the same activities from the beginning.

In learning process of algebra, the students usually only see what the teacher explained and copy the teacher's writing on the board, this is in accordance with the statement of Silver (1989, in Turmudi, 2010) which stated that "in learning mathematics generally, the students simply see how the teacher demonstrates how to solve math problems on the board and the students just copy what has been written by the teacher".

The fact founded in Junior High School 1 Sukosari, most of the students do not like mathematics. As the result, they often ignore and even answer the questions carelessly. According to more than 75% of the seventh-grade students in Junior High School 1 Sukosari, the abstract mathematical objects make the students feel difficult to understand in a limited time.

To overcome these problems, the selection of lesson which is used to optimize the result of the students' learning is crucial. In learning mathematics, the teachers should use teaching methods and various media, adjusted to the students' condition so that the students get better comprehension of the presented material and the students are more enthusiastic to learn what

has been taught, therefore it will be easier for the students to memorize and not to forget what they have learned.

One of the learning methods is realistic mathematics that uses contextual problems. Teaching media which can be used to help the learning process is the module. “The module is written for the students to learn independently with or without the guidance of the teacher, so that the module contains at least about the basic components of teaching materials” (Majid, 2006: 176). According to Russell (1974, in Wena 2009: 230), “module learning system will make learning process more efficient, effective, and relevant. Compared to the conventional learning which tends to be classical and and must be conducted face to face”. To help the students understand the module, the researcher develops the learning by using web applications with *exe-learning*.

Exe has some advantages, such as: easy to use, easy in designing, free, *e-learning* standard; and can be used on Windows and Linux operating systems (Priyambodo, 2010). These reasons interest the researcher to develop the teaching materials in the form of module by using the exe-learning application.

At Junior High School level, mathematics still needs learning media, it is described in Sobel and Maletsky (2001: 121) that concrete models and media are not only suitable for the early learning of mathematics at primary school level, but also equally important for the students of junior high school or senior

high school. The abstract of algebra makes some manipulative experiment and a visualization activity becomes more valuable. Teaching media that will be used in the research is colored paper.

The problem of the research is: how does the quality of the development of algebra module using the exe learning application to improve mathematics comprehension of the seventh-grade students in Junior High School being viewed from the aspect of validity, practicality, and effectiveness?

RESEARCH METHOD

This research on algebra module using the *exe-learning* application was held in Junior High School 1 Sukosari. The research belongs to research and development. Research and development was conducted in accordance with the procedures of R & D from Borg and Gall (1989, in Sukmadinata, 2012) with some modification consists of the following steps: (1) a preliminary study and data collection; (2) the preparation of the module by using *exe-learning* application; (3) the validation of the module by using *exe-learning* application continued by the revision; (4) focus group discussion continued by the revision; (5) The initial field trials; (6) the improvement of the initial field trial results; (7) the test field implementation; and (8) the revision of the test field implementation.

The subject of the research for the development of the mathematics module for learning based on the problems is

divided into the following steps: (1) the subject of the module validation, consisting of four experts: two experts each for matter and media; (2) the subject of Focus Group Discussion (FGD), which is taken from three teachers who teach mathematics in Junior High School; (3) the subject of field trials, taken from the seventh grade students of class VIIC; the questionnaires were given to five students; (4) the subject of field trials, the experimental class and control class derived from normal distributed population, and homogeneous, and has the same initial capability. To test the average difference with the independent t-test was taken from the data of pretest and posttest of the experimental class and control class. On the subject of field trials students were also given questionnaires for the modules used in the classroom. The analysis of the calculation and technical guideline also refers to the *Likert* scale with four criteria.

RESULTS AND DISCUSSION

1. The Result of Preliminary Study

Here are some cases that become the focus and findings of the researcher after holding preliminary study.

a. At school, the teachers still use unrealistic teaching materials. In their explanation, teachers do not use teaching media and rarely take the advantage of utilizing information and communication technology (ICT).

b. The seventh grade students are around the age of 13 years old. It also becomes a consideration or the researcher in formulating the module by using the exe-learning application for realistic learning in order to match with the characteristics of the students.

2. The Result of the Module Preparation

The preparation of the module was started by composing RME components applied in the module using exe-learning application. RME learning components include: comprehending the contextual problem, resolving the contextual problems, comparing and discussing the answers, classroom discussion and conclusion.

The module composed by the researcher consists of three chapters, namely; Chapter I about the definition of algebra, chapter II about the operations of addition and subtraction, and Chapter III about multiplication, power, and division. The outline of the arrangement of the module for realistic learning is as follows: (1) the first part, contains: the cover (the first part), preface, instructions how to use the module, concept maps, table of contents (menu); (2) the core part, contains: introduction, mian activities and post activities; (3) The last part, contains, the test of competence, a bibliography and a glossary.

3. The Result of Module Validation

a. The Validation Result from the Matter Experts

The validation from the matter expert is done by asking help to a competent expert. The researcher submits the module which has been arranged to the matter experts by enclosing grilles and assessment sheets for the module. Based on the overall assessment derived from the matter experts that includes the assessment of the content feasibility, the presentation feasibility and RME components, all are included in good categories.

Some inputs from both matter experts after the validation are

1) Revising mistyping or writing mistake,
2) The examples of the problems shown should be real and understandable by junior high school students,
3) The improvements of the concept, because there are some concepts need to be improved,
4) Questions or problems given should be made clearer and more detailed,
5) The provision of contextual problems at the beginning of the chapter should not be too complex for junior high school students in order to facilitate the students to link the issue with the material to be studied.

b. The Validation Result from the Media Experts

The validation of the media experts is done by handing in the module which has been compiled by the researcher to the

media experts by enclosing grilles and assessment sheet. The assessment from both media experts showed that the components of graph and module language are included in good categories.

Here are some suggestions and input from media experts: (1) the improvement of notation or mathematics symbols; (2) the correction of the images and tables which are numbered; (3) the correction of mistyping and (4) the chart that shows the concept of the material should be in one page so that the students are easy to understand the order of the material in the module.

c. The Revision Result I

The revision of the module on First Phase was conducted based on the advice of the validators. The result of the revision is continuously consulted with the matter and media experts to obtain a decent draft and declared it ready to be tested. Based on the assessment of media experts and matter experts, the module made by the researcher can be developed and fit to be used but it should always be open for reevaluation. Both matter experts and linguist gave feedback for the improvements of the module as they found mistyping, the name of the table and image, the concept which still needs to be revised, the pictures that are unclear and can confuse students, as well as the real problems applied in module.

d. The Result of Focus Group Discussion (FGD)

FGD in this research was carried out by discussing with mathematics teachers of Junior High School 1 Sukosari. This FGD is a group discussion focused on discussing the module that has previously been revised based on the validation of the matter and media expert. In FGD, the researcher presented the revised module to be used in the field trials, hereinafter FGD participants responded by giving suggestions, criticisms, and opinions for the improvement of the module. The discussion with teachers in FGD is conducted by including the questionnaire to the module so that later it can be used by teachers and students widely, especially for the seventh grade students of Junior High School.

The assessed components are as follows: presentation techniques, the appropriateness of language, the appropriateness of content, the accuracy of the matter, the practicality and simplicity, RME components, and the development of totally thinking skills. The value of all components was 76.5% and included in good categories for four scales to all aspects of the teacher in FGD agreed that the module is included in good categories to be used at the following phase.

Some cases become the focus of the researcher at this phase; the module which uses *exe-learning* for RME learning can be applied to the seventh-grade students of junior high school, in general, the module is approved with some improvements, the module can help the students and able to facilitate them in

connecting the things that exist in real life with mathematical concept that is often considered too abstract and difficult by the students.

e. The Revision Result II

The Revision on second phase was done after getting feedback and suggestions from the teachers in FGD. Some improvements were made by adding the bibliography and simplifying the modules.

f. Initial Field Trial

The module that has been improved and revised, both the validation process and FGD, was then tested in the initial field trials. In this research, the initial field trial was conducted by the researcher by providing module with *exe learning* along with a set of questionnaires to five students of Junior High School 1 Sukosari. The initial field trial was aimed to analyze the test results, to learn and know the reading level of students, their understanding, and their interest to the module before the module is considered ready to be practiced in the classroom on the implementation of the field trials.

1) The Student's Responses Towards Learning by Using Module

The instrument of the research is in the form of a questionnaire completed by five students. In this initial field trial, the researcher describes the module and the contents of the instrument so that the five students understand well about the contents of the questionnaire. The aspects assessed at the initial

field trial consist of three criteria: the appearance, the presentation of the matter, and the benefits of using the module for the students which gained good categories in a scale of four.

2) The Result of the Student's Learning Process

The analysis of the achievement test which will be used to test the effectiveness includes the validity test of the instrument, the reliability test, the test of the difficulty level items, and the test of the distinguishing matter. Once the instrument is validated by the validator, the instrument was then revised and improved in accordance with the input from the validator. The next step is implementing the instrument in the experimental class. The trial of the instruments which was carried on class VIIC in the first semester was given the material taken form algebra to 30 students. THB exercises consist of seven essays developed by some gratings. THB trials were implemented on class VIIC consist of 30 students which obtained only 5 valid items.

3) The Third Revision

The third revision was made after the implementation of the initial field trials. Overall, during the conduct of the test, the students gave positive response to the module arranged by the researcher. However, the researcher still rechecks the module, especially for typing or printing error. So, in the third revision the improvements focus on writing or mistyping. On the other hand, the test of learning result, after conducting field trial testing on the revision of THB exercises consists of 7 essays obtained only 5 valid items.

4) The Results of the Implementation of the Field Trials

Test implementation of field trials is the phase where the efectiveness of the modul is tested by using the module in the classroom. The researcher compared between the students who use module and those who did not in learning process. This phase is also accompanied by giving questionnaire to the students who use module in the class, so the analysis during this phase consists of the analysis towards the result of the students' learning and the students' questionnaire.

a. Student Learning Outcomes

The implementation of field trials was done by comparing the test scores of learning outcomes between the class with module in learning (experimental class) and the class without module (control group). The achievement test in this research consisted of pretest and posttest. Pretest is given to both classes, experimental class (VII A) and control class (VII B) before the treatment is applied. The objective of the pretest is to know whether the ability of students' initial understanding in algebra in each class is relatively equal, the extent of students' ability to receive the material which will be studied, as well as the homogeneity test and the normality test.

The result of normality test on students' learning outcomes with the kolmogorov-smirnova obtained the value of 0.200, the value is greater than α= 0.05 (sig> 0.05) thus it concluded that the learning outcomes of both classes were normally distributed.

The homogeneity of class VII A and VII B was tested by using the equality test for two variants. The data of the homogeneity test on daily test results is used with *Levene's test,* with the significance obtained for 0.717 is more than α= 0.05 (sig> 0.05). This result was concluded that the hypothesis H_0 is accepted, which means that the data come from the populations with the same variance (homogeneous).

The data of students' comprehension on mathematics pretest showed that the experimental group obtained the average score 42.93 with the standard deviation of 7.714, the lowest value was 32 and the highest was 60. Meanwhile, the control group gained the average result 43.47 with the standard deviation of 8.320, the lowest value was 32 and the highest was 60. After being treated with a set of developed device, the data of the posttest in comprehending mathematics showed that the students in experimental group obtained the average result 84.00 with standard deviation of 8.662, the lowest value was 66 and the highest was 100. While the control group gained the average result 72.11 with standard deviation of 9.923, the lowest value was 54 and the highest was 88.

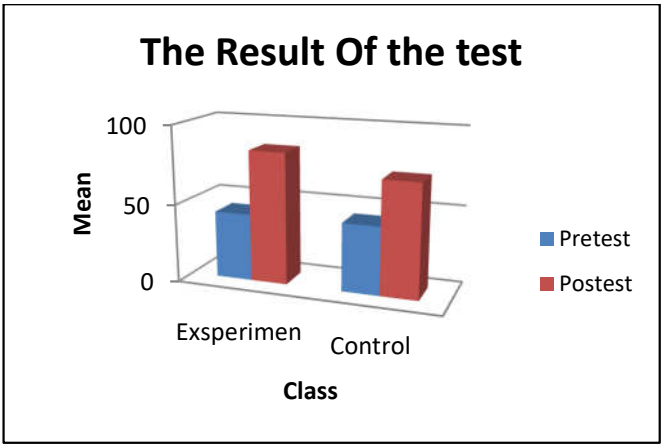

Figure 1. the Diagram of Learning Outcomes

It can be concluded that the average of learning outcomes for the seventh-grade students who learn mathematics by using the algebra module with *exe-learning* is better than the average score of learning outcomes of those who learn mathematics without module.

The analysis of T test to see the similarities between the experimental group and the control group with *Independent t-test* can be seen in the following table:

Table 1. Description of Students' Posttest Result Data in Understanding Math

Those who were tested	Type of the Test	Result	Conclusion	Decision
The Result of Experimental and Control Group	*Independent t-test*	Sig. = 0,00 t_{value} = 4.834	H_0 is rejected	The result is not the same (has difference)

According to table 4.10 known t sig = 0.00 <0.05 or t value (4.834) > t table (2.042) then H0 is rejected or H_1 is accepted. So, the average of learning outcomes on mathematics between the students in experimental class is different from the students in the control group.

It can be said that there are significant differences between the learning outcomes on mathematics for the students in experimental group and control groups with the use of the algebra module equipped by *exe-learning*. So, the algebra module using the *exe-learning* can improve students' comprehension on mathematics especially algebra.

b. Students' Response Results Towards the Module

Students' response towards the module is a stage that was retrieved after the students use the application of ***exe learning*** in the implementation. This stage is conducted to find out about the students' response in using the module of the ***exe learning*** application in their learning. The students feel happy and more relaxed, because the learning process can be done out of school hours, it is easy to understand the abstract and we can use the environment as props. This makes the students like math teacher and they love math more.

c. Results of the Fourth Revision

Based on the results of students' responses on the questionnaire, the researcher reviewed the modules which have been used in learning. Overall, after reviewing process, the module was revised only on its display.

B. The Analysis of Results

The development of algebra module using the ***exe learning*** application in grade VII junior high school began with a preliminary study using interview, observation, and literature studies which were conducted to find out about the need for module, student characteristics, the material and the indicators of the material shown in the module. This fits well with Puslitjaknov (2008), that preliminary research aims to gather information, identify problems encountered in learning, and summarizes the problems.

Based on the results of the literature study, it is concluded that algebra is one of the materials that is still considered difficult by the students. So, the teachers need to develop the learning activities that enable students to discover their own knowledge and to involve the students in solving problems related to their real life so that learning mathematics could be more meaningful in the development of teaching methods, devices, and learning materials. This is consistent with the theory of Jerome S. Bruner (in Suyono, et al., 2012) that "The teachers should give breadth to the students to be problem solvers, while the main role of the teacher is to ensure that learning activities generate curiosity, minimize the risk of learning failure, and try to be relevant to the needs of students." The theory also contains encouragement for the teachers to guide their students so that they can build their own knowledge and not only taught by memorizing method.

During the literature study and observation, the researcher analyzed competency standards and basic competencies as well as the learning materials for grade VII so that the modules compiled by the researcher can help students master the competencies that have been determined. Besides analyzing competency standards and basic competencies, the researcher also analyzed the characteristics of students from grade VII junior high school. The Learning theory of Piaget saw cognitive development as a process of children construct systems of meaning actively and understanding the reality through experiences and social interaction. It was also explained that the age of grade VII students is over 12 years old with the category of formal operational and able to solve the problem. Prastowo (2012, in Widyaningrum et al., 2013) states that "a picture or illustration shown on the module can support and clarify the content of the material, rising to the appeal and reduce the boredom of readers (students)". The same thing also delivered by Lestari, et al. (2014) that "the use of modules in mathematics learning is one way that can be used to make students active and motivated because the module is a self-teaching material that contains a series of learning experiences arranged systematically and it can help students achieve the learning objectives".

The module compilation was conducted after obtaining a preliminary description from a preliminary study that reinforces the need to develop learning modules. The module was

compiled based on the modules of manual preparation guidebook from Ministry of Education (2008), including the planning phase with: "(1) determine the competency based on standards and basic competencies, (2) identify and determine the scope of competence units or materials, (3) compilation of learning syntax that will be used in the module, (3) identify and define the knowledge to be learned, (4) determine the title of the module".

Based on these guidelines, the researcher developed a module with the following steps; (1) established the title of module, which is Development of Algebra Module by using *Exe Learning* to Improve the Mathematics Comprehension of the Seventh Grade Students of Junior high school; (2) provides the ability to be owned by the students after using the module, and the initial ability was written on each indicator in each chapter of the module; (3) define the outlines of which are illustrated in the outline map of competence module which is an elaboration of each chapter into several sub-chapter material that students need to learn; (4) develop materials in accordance with the standards of competencies and basic competencies; (5) develop learning activities that correspond to the learning syntax RME; (6) re-checks the modules which have been completed.

The initial modules that have been developed include these components: cover, preface, the contents of the module maps, tables of contents, introduction, standards of competencies or basic competencies, learning objectives,

learning materials, learning evaluation and assessment rubrics, alternative answers, glossary, and bibliography. This is in accordance with Triyanto (2013, in Kurniawan, et al., 2013) which stated that "module is a guide in learning activities that includes learning materials, investigation activities based on the concepts, information, and examples of the application of materials in daily life". The modules that have been completed was then submitted to subject matter experts and media experts to get the validation. Based on the assessment derived from the subject matter experts that includes assessment of the feasibility of the components of content, presentation feasibility and RME components, all of which are counted in the good category. The graphic media and language experts also said that the module is good.

The validation results by all validator indicate that the module is suitable to be used with the revision. The researcher considers revising the module based on the validator's advice. In accordance with these results, the module developed by Widyaningrum, et al. (2013) showed that "in terms of material, legibility, and presentation modules validated by the experts are included in good categories". If associated with the results of previous studies in the validation phase, the module developed by this researcher has met the eligibility standard modules, even for the assessment of media experts, the module that is developed by the researcher is categorized as good. The first Revision module was conducted based on suggestions, feedback

and comments from the validator. Revisions were made to improve by replacing the writings that are considered less appropriate as well as by improving typing errors. The revision results continuously consulted with subject matter experts and media to obtain the proper modules and declared ready to be used in FGD.

Focus group discussions (FGDs) were conducted after researcher completed the first revision. FGD was conducted with math teacher of junior high school. Through FGD with teachers, researcher obtained the results of teachers' responses through questionnaire as well as various input and suggestions for consideration in fixing the module. The feedbacks and suggestions from the FGD participants who had experienced in teaching grade VII are very important because the teachers have become accustomed in the field/in the classroom and have more experiences, especially in terms of learning like choosing the materials, the use of methods, tools, sources of student learning, as well as the ability and characteristics of each student.

This is in accordance with Uno (2009, in Kurniawan, et al., 2013) which stated that the knowledge and logical thinking of teachers to the course content should be very good, because without good logical thinking, the teacher will get difficulties to pick and choose the subject matter, defined it in succinct formulation, as well as the sort of material in a logical sequence structure and easy to understand. Based on the results of the teacher questionnaire responses, presentation techniques,

appropriateness of language, appropriateness of content, accuracy of the material, the practicality and convenience, RME components, and the development of thinking skills total value of all of the components was 76.5% and included in good category.

Based on the score obtained, the module is included in good category. The positive responses from teachers were also demonstrated in studies of Widyoningrum, et al. (2013), where the results of teacher assessment to the developed modules included in the excellent category. The Research of Somayasa, et al. (2013) also showed that teachers welcomed the developed modules as indicated by the acquisition of a percentage of 86.28% with a good qualification. The results from these studies indicate that the majority of teachers welcome the development of the module. It is expected to be a motivation for other teachers to develop modules that correspond to the characteristics of each student.

Overall, during the FGD, the teachers responded positively to the formulation of the module which is expected to help teachers to develop RME in a module using props. This is important because teachers feel that there are a lot of students who are not interested in math. One of them is because the students do not know about the benefits of science that he learned, students are more accustomed to memorize the formulas to be able to work on math problems without being driven to find out the knowledge. The Teachers of FGD

participants also claimed that there are still many students often ask the teacher to explain the whole material, without interest in understanding and learning from math book by themselves, it is because the interest of students in reading tends to decline even though the teachers try to encourage students to read a lot of book.

This became one of the suggestions from teachers to simplify the material on the module, so the module does not seem too thick and the depth of the material keep students interested in reading and using modules. In the second revision, the researcher reorder the contents of the module in order to be more simple and interesting to read without reducing the range of material to be conveyed through the module. The Revisions were made by replacing some of the illustrations or images that are too complicated to be seen by students as they require much explanation. It is also motivated by the low interest of students in reading, especially if the material is too long and difficult to read.

This fits well with the Ministry of Education (2008: 11), that "the success of learning to use the module depends on learning tutorials with the students learning criteria which includes persistence, time for learning, learning content, quality of teaching learning, and the ability to understand the instructions in the module". Based on discussions with the teachers at the time of this FGD, the researcher choose the material and module presentation that is more simple and easier to understand for

the students, so that when the next module is tested, students will be interested in using this developed module.

The first field trial was tested to the seventh-grade students who have not got the material form of algebra but have taken or completed material integers, which is a requirement in the material form of algebra. This trial aims to determine the readability and interest of students to use RME math module before being tested on learning. The trial was also used to gather information that can be used to fix the module in the next revision. According to the five students, they are interested in the presentation of the colors used in the module, the use of *exe learning* application can reduce their boredom in reading and learning. In addition, according to the five students, the representation of real problem contained in the *exe learning* application module can inspire them that there are a lot of real life problems which are closely related to the mathematical sciences. The instrument used in this trial is student questionnaire responses with aspects of the display module, module presentation, and the benefits of modules counted in good category.

The third revision performed on parts containing typos, images or illustrations that are less obvious, and also re-check the entire content and module components. This is in accordance with Prastowo (2012, in Widyaningrum, et al., 2013) who conveyed that the images can clarify the contents of the

materials as well as generate interest and reduce the boredom of students so that students respond to the module positively.

In the class which uses the module exe learning application in learning, all students were given the module file which is used in groups or individually. Teacher acts as the facilitator who directed that learning to work effectively so the students can follow all the learning activities in the module.

At the beginning of learning, the teacher asks the students to study the manual/guide and to do the problems on the prerequisites material. The teacher then introduces the concept map of algebra module on material forms in order to let the students know the outline of the material range that will be studied. When doing the core activities, the teacher's task is to accompany and guide whenever the students need help and when students are required to discuss with their friends about work or to present the results of the discussion.

Student orientation activities was done by asking the students to read the module where the module has presented an illustration that can bridge the real problem to the material so that students can understand the use of the material to be studied. In addition to the illustrations, the students' orientation was also done by asking them to do rubric problems that can guide students on the material to be studied. Organizing students to learn was conducted by asking them to read materials module individually. Guiding inquiry activities carried out by guiding students to complete individual tasks and group

task in form of rubric of problems or rubric of concept finding. Activities to develop and present the work was conducted by having students work on assignments in a portfolio sheet to familiarize students with report that contains a collection of answers. If the task is in the form of group assignments, the teacher asked that representatives of the groups to present the results of the group answers to their friends from other groups. This is expected to lead students in giving answers and opinions and in criticizing one another. Analyzing Activity and evaluate the problem-solving process were done by having students work on an evaluation rubric (retraining) to determine the ability of individual students.

The results of students in the field test was obtained by comparing the test results of learning between classes that use the module in learning (experimental class) with classes that do not use module in learning (control class). The tests conducted in this study consisted of pretest and posttest. Pretest is given to both classes; experimentation class (VII A) and the control class (VII B) before the treatment was applied. The Results of data normality test student learning outcomes with the Kolmogorov-Smirnova obtained a value of 0.200, the value is greater than α = 0.05 (sig α = 0.05) thus concluded that the learning outcomes of both classes are normally distributed. To test the homogeneity of class VII A and VII B the researcher used the equality test of two variants. Data homogeneity test results of daily test is used to test Levene's test, with significance obtained

for 0.717 is more than the value of α = 0.05 (sig > 0,05). These results concluded that the hypothesis H_0 is accepted, means that the data come from populations with the same variance (homogeneous).

Based on the value of the gain, there is a high improvement of comprehension of mathematics students in the experimental class than the control class before giving the algebra module using the ***exe learning*** application, from the (pre-test) than after (post test). From the t value (4.834)> t table (2.042) then H_0 is rejected or accept H_1. So the average outcomes of mathematical comprehension in experimental class is different with students' mathematical comprehension of the control group.

Somayasa, et al. (2013) said that "the development of the module can answer and solve problems or difficulty in learning". That is simply because some learning materials are often difficult to understand by the students or difficult to explain by the teacher. The difficulties may occur because the material is abstract, complicated, and strange. If the learning material is abstract, then the module is able to help students to describe something abstract through the use of images, charts, and schematics. The complicated material can be explained by the module with a simple way and flow in accordance with the level of thinking of students so that it becomes easier to understand. Modules can assist schools in achieving qualified learning. The application of modules can provide more well-planned learning

activities, independent, thorough, and with obvious results. Module can facilitate students to be more interested in learning and to improve learning outcomes.

There are barriers to use algebra module using ***exe learning*** application, among other: lack of computer, laptop or android owned by the students. So the researcher asked them to learn in groups. The use of ***exe learning*** application needs these facilities. The benefit of using ***exe learning*** application is that the students can study even when they are not in class by using the computer lab or at home. Therefore, the schools' management should pay more attention in providing facilities and infrastructure that support the creativity of teachers and students so as to develop student competencies.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Realistic Mathematics modules produced are valid because it has met two types of validity, namely: content validity and construct validity. Content validity is obtained because the process of development has been adjusted to the procedures of R & D from Borg & Gall. While looking at the construct validity, the assessment based on the linkages between the various components have been validated by two media experts and two materials experts. The modules developed in this study have met the practical criteria based on students' responses which obtained good score. And this module has been effective

because it is based on the value of the t (4.834)> t table (2.042) means that the results of experimental class students in mathematical understanding is different with the control group students. From the three criteria above, the use of *exe learning* application modules has fulfilled validity criteria, practical and effective.

SUGGESTION

1. In using *exe learning* application algebra module, the teachers should be able to develop their own teaching materials for students and it suppose to be one of the teaching materials to assist other teachers and students in learning, especially in realistic learning.
2. In using *exe learning* application algebra module, teachers should have more understanding about the characteristics of the subject matter in order to teach students more meaningfully, since the media used in learning must suitable with the characteristics of the subject matter. So the algebra module which use *exe learning* application can improve students' understanding of mathematics.
3. In using the *exe learning* application, students need laptop or computer facilities in school or at home. The benefit of using *exe learning* application is that the students can learn even outside the class by using the computer lab or their personal computer at home. So the schools' management should pay more attention in providing facilities and infrastructure that

support the creativity of teachers and students so as to develop student competencies.

FOLLOW-UP

This study can be followed up by expanding the scope, reproduce more animation applications, music, videos and images into the *exe learning* application, so students could foster independent learning. This module can be developed into another material. *Exe learning* application has many advantages that will benefit teachers who use it for learning.

REFERENCES

Depdiknas. (2008). *Panduan Pengembangan Bahan Ajar*. Depdiknas. Jakarta.

Kurniawan, HE, Sarwanto, dan Cari. (2013). *Pengembangan Modul IPA SMP Menggunakan aplikasi Problem Based Learning Terintegrasi Pendidikan Karakter pada Materi Getaran dan Gelombang*. Seminar Nasional Fisika dan pendidikan Fisika dengan tema "Pembelajaran Sains Menggunakan aplikasi Kearifan Lokal. Prodi Pendidikan Sains. PPs Universitas Sebelas Maret Surakarta. (Online). Http://fisika.fkip.uns.ac.id. Diakses 11 September 2016.

Lestari, E dan Abdur R. As'ari. (2014). *Pengembangan Modul Pembelajaran Soal Cerita Matematika Kontekstual Berbahasa Inggris untuk Siswa Kelas X*. Artikel. Universitas Negeri Malang. Journal-online.um.ac.id.

Majid, A. (2006). *Perencanaan Pembelajaran*. Bandung: PT Remaja Rosdakarya.

Priyambodo, E. (2010). *Pemanfaatan Program Aplikasi eXe (Elearning XHTML Editor) dalam Penyusunan Media Pembelajaran di Sekolah*. Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA, Fakultas MIPA, Universitas Negeri Yogyakarta, 15 Mei 2010 K-91. (Online). http://staff.uny.ac.id/sites/default/files/132309686/eXe.pdf. Diakses 5 September 2016.

Puslitjaknov. (2008). *Metode Penelitian Pengembangan*. Depdiknas

Sobel, M.A. dan Maletsky, E.M. (2001). *Mengajar Matematika*. Terjemahan oleh Suyono. 2003. Jakarta: Erlangga.

Somayasa, W dkk. (2013). *Pengembangan Modul Matematika Realistik Disertai Asesmen Otentik untuk Meningkatkan Hasil Belajar Matematika Siswa Kelas X di SMK Negeri 3 Singaraja.* e-Journal Program Pascasarjana Universitas Pendidikan Ganesha Program Studi Penelitian dan Evaluasi Pendidikan (Volume 3 Tahun 2013).

Sukmadinata, N.S. (2012). *Metode Penelitian Pendidikan*. Bandung : Rosdakarya.

Suyono dan Hariyanto. (2011). *Belajar dan Pembelajaran*. Bandung: Rosdakarya.

Turmudi. (2010). "*Pembelajaran Matematika: Kini dan Kecenderungan Masa Mendatang", dalam Teori, Paradigma, Prinsip, dan Pendekatan Pembbelajaran MIPA dalam Konteks Indonesia*. Bandung: FPMIPA UPI.

Widyaningrum, R., Sarwanto, Puguh Karyanto. (2013). *Pengembangan Modul Berorientasi POE (Predict, Observe, Explain) Berwawasan Lingkungan pada Materi Pencemaran untuk Meningkatkan Hasil Belajar Siswa*. Jurnal No 1 Vol 6. ISSN: 1693-2654.

Wena, Wena. (2009). *Strategi Pembelajaran Inovatif Kontemporer*. Jakarta: Bumi Aksara.