



# Development process of mathematical representation ability and cultural love on RME learning using *Wayang Kulit*

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## Abstract

The development of science and technology in the current era of globalization can have a positive and negative impact on human life. Mathematical ability and cultural love need to be possessed by students. The methodology applied the qualitative method and collecting data using a written test and interview. This study used media *wayang kulit* with RME learning model applied to grade VII students SMP. The ability of mathematical representation in schools is less developed by subject teachers. Conventional learning results in students only being able to have the mathematical representation capabilities provided by the teacher. The process of developing a student's mathematical representation consists of the initial activity with sample observations and finding the concept of matter. Then students look at various examples and discover the concept of matter. When faced with problems, students can go through the stages of identifying problems, developing plans for the use of representation, and the use of representations to solve problems or communicate ideas they have. The cultural love that the students have during the learning process is described as finding the material concept. But when faced with a choice between the use of traditional media and technology, students prefer to use the media technology.

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## 1. Introduction

Mathematics learning is not only noted in dissemination of information as of theories, definition, formulas protected heavily, completion of procedures, modeling, make a chart, etc as well as for a measured tone by students, but the teacher involving student all at the active in the process. So that students can find our insights own against mathematical concepts. In the theory of constructivism learning, the learning process in humans is acquiring knowledge, human being have to understand, and to build it from his experiences own. According to Rifa'i & Anni (2012) constructivism is theory of psychology about knowledge who maintained that the human build and own the handling of knowledge from his experiences. Knowledge built students can be built individually and in groups. Each student has different way to construct in addition to information that. Is very possible students been implementing variety of representation in understand concept. Besides ability of representation was instrumental in solving mathematical. Goldin as quoted by Yudhanegara & Kurnia (2014), the representation is a configuration. In general, the representation is a new configuration that can be presenting an object in a way. Cai, Lane, and Jakabesin stated that the representation is the means used someone to offer an answer or a mathematical idea concerned (Mailiana, 2014).

The development of science and technology in era of globalization can really impact positive and negative for human life. One effect of the development science and technology is the entry foreign culture into the land. In the era globalization currently the need to develop the ability of mathematical and maintain culture needs to be done on the level of education. Abdullah (2012) said that at first NCTM 1989 said there

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had been four basic competence the solution of the problems, communication, connection, and reasoning. But in NCTM (2000) there are five competence base of ability mathematical namely problem solving, communication, connection, reasoning, and representation. The changes is the important that the representation needs to develop. Panjaitan. et al, (2014) stressed that many young people especially to the identity of Indonesian, for the style of his life to imitate western culture by the world considered, direction and the emergence of individualism that raises the non-compassion. Behavior among their fellow citizens the culture and education are closely related to each other and.

Social interaction for people within the rapid attention should be given to science and technology in the use of language to express ideas students independently. Math is a discipline of sciences academic who is employed to deliver of knowledge and meaning through language based on the mathematics , such as those concerning the concept, formula, principle, method, and problem solving (Zhe , 2012). The structure of a language in the activities of the mathematician who referred to is to use external communication such as using representation in communicate the building is just one. Ability of representation and love culture could contact one another to overcome the gap that might happen impact of current globalization. Symbols at cultures Indonesia with value of a character should be understood, applied in human life and transferred to other people do not understand. The ability get decode symbol. Representation can be applied. Because in math education an abstracting nature also has symbols should be understood to understand concepts is. In addition the delivery of a notion or idea by students and transferred to other people for the other can also understand the initiative, to understand or new experience for them and as a means of evaluation if there is blame on the initiative. So these are the was is and voice their opinions on symbols, mathematics and culture grow interactive students according to the values of social life.

The concept or idea that there is, invite researchers to conducted a study of the development process mathematical ability representation and culture love. Because the idea contained about the interaction of students, associated with real life, and to solve the problems there, good problem solving in math education and in life. Researchers used for that kind of classroom realistic mathematics education (RME) or also can be called *pendekatan matematik realistik* (PMR), using media *gunungan wayang kulit*. According to Zulkardi (2010) RME is learning model mathematics in schools that dotted turning in the life real students, stressed skill proces of doing mathematics, discuss and collaborated, argue with a classmate so that they can find your own (student inventing) as the opposite of teacher telling and eventually using math to the problems solving, either individually or in groups. *Gunungan wayang kulit* expected to give a stimulus or stimuli to address concept of students in the subject matter and a stimulus to understand the extent of they understand on culture local and national. *Gunungan wayang kulit* is one type of *wayang kulit* play an important role in wayang kulit, which have value of philosophy and character life.

*Wayang kulit* is a performance with media made from animal skins such as buffalo skin carved or grated. Then reflected by the light beam named *blancong*. At the opening and closing of *wayang kulit* stories, *kayon* or *gunungan wayang kulit* are used. In addition, wood is used as a substitute for scenes, background settings, fire symbols, water, earth, sky, forests and so on. When scene one ends and continues with the next scene, the puppeteer used *gunungan* to inform audience that the scene has changed by moving *kayon*.

Learning model RME by *gunungan wayang kulit* is expected to described or as a means to know the developmental process the ability representation mathematical and the love culture students. So researchers choose the title Process Development Ability of Mathematic Representation and Cultural Love on RME Learning Model using Media *Wayang Kulit*. As for the formulation problem on this research is how the process of the development of mathematical representation students class VII junior high school Bawen 1 in the model of learning RME using media *wayang kulit*? (2) How images of the love culture owned students class VII junior high school Bawen 1 on learning with a model of learning RME using media *wayang kulit* and in the school?

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## 2. Methods

The methodology applied the qualitative method because the data to be obtained is descriptive and collecting data using a written test and interview. Researchers position themselves as main instrument to obtain the results of research and data analysis, do the validity of the data, and conclude. A main means researchers as a planner, implementing, controler, gatherer, the analyzer, conclusioner, and then the report. As a planner, researchers prepared all anything associated with research is create education planning and

the necessary in data collection. The act of the researchers own teaching and implement actions. As control, researchers help controlling and monitoring learning that goes from start to finish the research.

A source of primary data in this research were students public junior high schools Bawen 1 class VII A. Data source was researchers get from the test results, such, and the interview on the subject of study and informants if the data obtained as yet lacks. Such students is the subject of charging representation ability and the love culture, and tests the ability of mathematical representation. While the data obtained from the interview the researcher would only take how many people. The subject interviews with purposive sampling techniques. According to Sugiyono was quoted as saying by Rofiqoh (2015) purposive sampling is data collection techniques with certain consideration. The subject of study were chosen from the results of the average ability representation consisting of three subject of study.

Data analysis techniques include (1) data analysis test results representation, mathematical ability (2) data analysis interview, (3) questionnaire analysis, (4) reduction data, (5) presentation of data (6) the taking of a conclusion or verification. Testing techniques which is used in determining the validity of the data in this research is to use triangulation. According to William (Sugiyono, 2009) triangulation in testing credibility are defined as checking data from various sources in many ways, and various times. Moleong (2010) defines the technique of triangulation of as a technique an examination of the data is not tampered with which is closely associated with something else outside the data was for the purpose of checking or as a standard for comparison data. From definini built with the sweat of triangulation of is a masonry technique for memeriksa data is not tampered with with take advantage of something on the outside for the purpose of checking or as standard for comparison. Triangulation is nothing more than a test your attitude and see the truth of the data and not for by collecting various different kinds of monetary data , trust in him but also an effort to look at with more sharply the relationship between the ranges from data to prevent mistake in of the data analysis. Triangulation can be found from the differences in the information that could thought provoking to it than that, this means that the researchers were able to identify source books, articles essentially and perfectly morally good from the media print and electronic media that could support the truth of the data regarding process development ability of the representation mathematically and their sense of loving culture out of school in droves mathematics. Other activities, researchers hold a with supervising lecturer .

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### 3. Results & Discussions

Researchers used the theory which was conveyed by Baltes (Rifa'i & Anni, 2012) about unknown principle or effect or used to assess development of human beings in described the developmental process in which the representation of students. On learning to promote disorder to before it was given treatment, students have become better informed in an unconventional manner the teacher who was responsible. Of learning which he had previously not uses the media. Data was being collected obtained group of researchers from at the time of the to do the interview with the subject of the interviews explained previously. In addition the impact of learning network of the bank conventional could result students only use representation had not experienced a similar math reasoning to be less what was spoken by the subject teachers.

At the time of RME learning use *wayang kulit* media, students can be more expressive in learning activities. Students actively participate in learning. The researcher would only stimulate the or impulse to students to find the nucleus of learning. Students can also invented the concept of justice and equality from reflection to the field of coordinates. The subject of selected when interview also said that lesson that is delivered by researchers easy to understand

#### 3.1. Learning conventional students using the ability representation taught by teachers

Learning conventionally also cited Muzakir (Yudhanegara & Kurnia, 2014) representation which is taught or learned only acting as supplement in the resolution of mathematics. In addition, most of the teachers only doing just a kind representation. Learning in an unconventional manner student will only chase the one way that is delivered by teachers. On learning mathematics, the resolution problems not only was glued to the one way. A lot problems which can be settled by various ways. For example on any material reflection itself, a settlement could be done with the methods a chart or equation. So the students need to know various ways to finish a matter of mathematics. When you know the various the means of conflict resolution student

can select the use of a representation to the thing fit to suit an idea or of its initiative. Students will have the ability multirepresentasi are also more confidence when solve the problems.

### 3.2. *Observation of Examples for Finding Material Concepts.*

The experimental work, students being invited to observe different examples. Examples of which are presented in the form an example the application in daily life and an example reflections on the field coordinates. At first required four samples reflections on the field of coordinates to locate the equation a shadow of a point that reflected toward the axis  $x$  and  $y$ . Reflection at point  $O (0,0)$ ,  $x = y$ , and  $y = -x$  students only need the two example to determine the equation. The developmental process can be seen from observation students against an example to define the shape an equation. At first students need four samples reflections on the field coordinates to locate single equation. Once students figure out how to determine the shape of the equation, they would only take two examples reflections on the field of coordinates. Of the case it can be said students have capable of developing his mind to find an equation reflections on the field coordinates. The development was in a differential manner. As Rifa & Anni (2012) “the developmental process in a differential manner referring to the idea that the development of show the progress of capability of being demonstrated differently when faced with an object”.

### 3.3. *Identification and Planning using Representations*

At the beginning ability representation tests, the majority students ask about what should be used to settle the matter about. Whether to use the or using the picture. Questions meant that students are having plan to settle about. Then when tests ability representation two students did not say that. Students only looking at about and then finish using the ability to representation.

Planning use representation aims to determine use mathematical representation by students. Students can use two representations mathematical do not feel confusion in working on tests the ability of representation. But when students who can only use one ability representation to solve the problems, students has can experience mistakes in planning the use of representation. The ability of identify problems and the use of a plan in the resolution of problems it is very peting shares will be held by student to using the ability representation. One of these phases would done by a student before apply the ability of a representation or communicating the results of its achievements. During the preparatory phase of planning students will be choose to travel either over the representation of that will be used. This trend has also was passed on by NCTM (2000) standard representation in learning to promote disorder to the use of a representation can be influenced by this utility of the identification of huge problem and the plans for using representation.

### 3.4. *Use of Representation*

The development of which begins with the understanding concept material, identification problem, and is planning to use a representation to continue in the use representation. The use a representation not only determine the representation of what should be used, but students was also have to understand the problems they have. Learning in an unconventional manner can result in students only stunned with one kind of the use of a representation. Besides obtained from the subject of interview, hearing was also raised by Muzakir (Yudhanegara & Kurnia, 2014) “representation which is taught or learned only acting as a supplement in the resolution of mathematics. In addition, most of the teachers only doing just a kind of representation”.

The discovery of the equation reflections on the field of coordinates to which done students, make students know how to that is varied in order to solve the problems. Students that can use multirepresentasi one of them were students DPMT and MY which is the subject of interview. When were interviewed before they are really only using settlement procedures of about taught by his teacher. After he received treatment by researchers they can use more than one way to resolve problems about reflection. The use of a representation to the thing done student all at mandiri is presented in table 1. Table 1 is the use of mathematical representation in doing the tests the ability of representation. The use of multirepresentation can be seen from the language test results second a representation to the thing, when are required to draw and write a step the project as much as 24 students use two representation. And also from the results of such students could make another way to complete about given. So the use of representation developing students it can be said, because the students only use a representation to thing given his teacher and then one student can find and use a representation own to settle about.

**Table 1.** Use Representations in Ability Tests

Test	No Question	Type Representation		
		Visual	Equation	Text
I	1	17	15	0
	2	0	0	32
	3	0	5	27
II	1	22	12	0
	2	28	6	0
	3	34	0	24

### 3.5. Description Culture Love Students

Learning activities use model RME learning by *gunungan wayang kulit* is one of learning activities mathematics based culture. Learning is also can be called learning etnomatematika. A culture used researchers are elements of the tools

and the technology. Is use *gunungan wayang kulit* media as a medium learning. More students learn to use traditional media rather than learning conventionally. This is evident when students observe a reflection on *gunungan wayang kulit*. Through the observation and enthusiastic, students have been able to find the concept of material with the discovery of their own reflection. But on the other student more interested in learning to use modern media. The reason they are more interested in using modern media is due to modern media more understandable and so that they can follow advances in technology. Even though students interested in learning to use modern media, still a student was revealed that the use of traditional media also needs to be implemented because the culture of which were inherited from ancestors that needs to be preserved. Students prefer learning culture without associated with learning. In other words, the form of learning operational cultural ties which have been done was to learn students learning culture directly through art and culture and activities at school that deals with culture. Student can know and provide an example the role of culture in their experiences after introduced function culture can be used as media.

Description love culture look of the activity students in those. Namely students participate in extracurricular activities relating to culture. These activities can make students learn about culture. Students follow learn culture one example of the efforts that local cultures. Not only as an extracurricular activity, but culture learned students also staged when the activities of the stage for the track art and culture. Students prefer local culture than foreign culture. The statement was obtained from the survey results. Students. A student more interested in learning traditional musical instruments than a musical instrument modern. Students also prefer to use a traditional game than the game use modern technology.

In the future currently the students still have a love the culture. The statement expressed students at the time they said about the survey. But it can be seen from the local culture than students who choose foreign culture. Still exist in surroundings culture will make students able to mention local culture. As a citizen, own cultural matters should know. So that culture in Indonesia was more awake and had no other countries claim Indonesian culture. Of students will be culture looks when students reveal culture needs to be preserved. Operational form of preserving culture applied students one of them is the use of local products and learning the local culture.

## 4. Conclusion

The process development ability of mathematical representation reasoning to be less in research it consists of the stage with the act of observing an example, invented the concept, identify problem, focus on making plans the resolution of problems, and that we apply the math reasoning to be less in which the representation. Of learning which he more variatif can develop the ability in which the representation of math reasoning to be less. An example of this can with model RME uses *wayang kulit* media. The development of the ability of the representation of math reasoning to be less be conducted by way of giving others a chance of students for how we think about and with the act of observing the concept of material which is to be advocating on behalf of people. By observing, students would indirectly develop the ability of the representation of math reasoning to be less to finish matter of or have been able to find way solve every problem during their play an independent.

Description of cultural love learning based on activities outside more. Students has been able to provide an example of culture gave them a dealing with matter at the time of learning which he carried out by researchers. Students has been able to connect with the materials given culture. The feeling of love culture owned students more noticeable when students follow extracurricular activities. Following of extracurricular activities more eager students learn about culture. The feeling of love culture look of interest in, loyalty, concern, and appreciation Indonesian culture. Love the operational culture in public junior high

school Bawen 1 students culture is studying locale through extracurricular activities, using domestic product, participate in culture grup, enjoy traditional art, and participate in the stage of art in school.

The need for learning that more variatif to be applied to learning mathematics. An example of this kind of classroom use RME with wayng kulit media. Besides student can know the application of mathematics in in students daily lives able to find out also or get to know local culture. In addition, explained that the students are given chance to more thought and develop the ability of mathematical representation at the time of learning. Role of teachers as facilitators when learning can for the provision of a stimulus to students to think. Of students who think, with the act of observing, to discover concept or the means of conflict resolution play an independent will better understanding of the materials that were given. So the use of the the ability of a representation is no longer being sourced on teachers are the subject of this, but from the results of ideas to the community a student to lose their own. Based learning for example in culture or uses the media for example in culture should be introduced that students may really come to know in depth from four to local culture. With the introduction of for example in culture students are expected to more have the feeling of love culture and he knows values contained at cultures.

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