Problem solving is about making connections

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Abstract. One of the aims of mathematics education in Indonesia is that students have good problem solving abilities. Therefore it is not surprising that many educational studies focus on students' problem solving abilities. Various studies mentioned there are several effective learning methods to improve students' problem solving abilities. This article abstracts and synthesizes these methods to get the same or the core of each method so as to improve problem solving abilities. The results of the discussion obtained that the core of the method that can improve problem-solving ability is in the planning section that must be able to make students connect their knowledge with other concepts, other disciplines, and with real world.

1. Introduction
Indonesian students are required to have good problem solving skills in learning mathematics. Problem solving skills is the leading of basic skills that somebody must have and use in many fields of everyday life [1]. In problem solving, the students not only require routine or basic skills, but also have a variety of other skills to manage all the thinking process in order to solve their problems. It means the students have control and sort ability all their knowledge, finally they can find the best way to solve it [2].

Other than that problem solving is the ability that students must be managed until they are 12th[3]. Problem solving will be very important for student success at this time because it makes students learn to find solutions of problems in life. Just knowing the facts and formulas are not enough to solve problems and situations that arise in life, students must also know the information needed and the relationship of each information. It proves that problem solving is important to learn and has become the goal of learning mathematics in Indonesia and even in the world.

The importance of problem solving makes a lot of studies in the education field focus studies on mathematical problem solving. The results of these studies state that there are learning methods are claimed to be effective for improving students' problem solving abilities. These learning methods are Problem Based Learning (PBL), Guided Discovery (GD), Contextual Teaching Learning (CTL), Realistic Mathematics Education (RME), and other constructivist learning methods. Good problem solving skills can be improved using several learning methods. However, in what steps does the method make students have the ability. These methods certainly have similarities that make students able to improve students' problem solving abilities. A person's mathematical connection is one of the competencies in solving mathematical problems [4]. Therefore a Systematic Literative Review needs to be done to find out the essence of these methods so as to improve students' problem solving abilities.
2. Research Method
The research method that used is Systematic Literature Reviews (SLR). SLR can be done with 8 steps as follows[5] (1) review planning: Plan the review effort and training activities, (2) question formulation: Define the research questions, (3) search strategy: Define the review scope and search strings, (4) selection process: Define inclusion and exclusion criteria, (5) strength of the evidence: Define what makes a high quality paper, (6) analysis: Extract the evidence from the selected papers, (7) synthesis: Structure the evidence in order to draw conclusions, and (8) process monitoring: Ensure the process is repeatable and complete.

2.1. Review planning
The articles analyzed are the results of quantitative research with variable problem-solving abilities. The article is searched from trusted online sources. The research that was reviewed was mostly done in Indonesia with the hope that the results of this review could be useful for the development of education in Indonesia.

2.2. Question formulation
This study aims to find out the answer the question about what is the core of mathematics learning that can improve problem solving skills.

2.3. Search strategy
The search for research articles was conducted on online databases like JRPM (Jurnal Riset Pendidikan Matematika), Pythagoras, and Cakrawala Pendidikan as a data-base with a reputation focus on the field of mathematics education. The search was conducted using keywords “problem solving abilities” and “problem solving”.

2.4. Selection process
The search results article that will be selected for further review must fulfill the following criteria: (1) research article that contains empirical evidence of the influence of a method on students' problem solving abilities, (2) articles published in the range 2008-2018, and (3) research subjects are secondary school students in formal education.

2.5. Strength of evidence
This article contains discussions of articles published in trusted indexed journals. The article certainly had reviewed before being published. Therefore the conclusions in this article will certainly be more acceptable. In addition, the article to be reviewed is only the result of quantitative research, so that subjectivity in results can be minimized.

2.6. Analysis
There are 14 articles that fulfill the criteria. The article was extracted and classified based on author, year of publication, research subject, type of research, and what treatment was carried out in the study.

2.7. Synthesis
The synthesis of the results are carried out qualitatively by looking at the results of analysis process after that, the reasons will be searched why the treatment in the research will improve students’ problem solving abilities.

2.8. Process monitoring
The last step is ensure the process is repeatable and complete. So the good SLR will be got.
3. Result and Discussion

Search results related to predefined keywords are presented in Table 1. There are 14 articles that fulfill these criteria.

Table 1. Learning methods that improve problem solving ability

| Author                                             | Year | Publication | Subject              | Treatment |
|----------------------------------------------------|------|-------------|----------------------|-----------|
| Joko Sulianto                                      | 2009 | Jurnal      | Junior High School   | Eksperimen|
| Ahmad Afandi                                      | 2013 | Jurnal      | Junior High School   | Eksperimen|
| Kusnaeni, Heri Retnawati                           | 2013 | Jurnal      | Junior High School   | Eksperimen|
| Mohammad Saeful Amri, Agus Maman Abadi             | 2013 | Jurnal      | Junior High School   | Eksperimen|
| Palupi Sri Wijayanti                               | 2013 | Jurnal      | Junior High School   | Eksperimen|
| Raden Heri Setiawan, Idris Harta                   | 2014 | Jurnal      | Junior High School   | Eksperimen|
| Wahidin, Sugiman                                   | 2014 | Jurnal      | Junior High School   | Eksperimen|
| Hanna Filen Sopia, Dhoriva Urwutul Wutsqa          | 2015 | Jurnal      | Junior High School   | Eksperimen|
| Inggrid Marlissa, Djamilah Bondan Widjajanti       | 2015 | Jurnal      | Senior High School   | Eksperimen|
| Nuning Melianingsih, Sugiman                       | 2015 | Jurnal      | Junior High School   | Eksperimen|
| Siti Kawiyah                                       | 2015 | Jurnal      | Senior High School   | R&D       |
| Siwi Khomsiatun, Heri Retnawati                    | 2015 | Jurnal      | Junior High School   | R&D       |
| Sari Wirdaningsih, I Made Arnawa, Azwir Anhar      | 2017 | Jurnal      | Senior High School   | R&D       |
| Umy Hasanatul Latifah, Djamilah Bondan Widjajanti  | 2017 | Jurnal      | Senior High School   | R&D       |

The articles that match the criteria are extracted. The data from extraction process are processed and analyzed for further synthesis to get what is the main step of the learning so that it can improve students' problem solving abilities. Any learning methods used to improve problem solving skills are presented in Table 2.
The last table shows that problem solving abilities can be improved by various learning methods. From Table 2, it can be seen in general that most of these methods try to link the mathematical concepts with the conditions in the real world or with previous concepts that support what is being learned at this time. However, out of five of the six studies mentioned that conventional learning methods are also effective for improving problem solving skills.

3.1. The effect of RME, CTL, REACT, MEAs in improving problem solving skills
Some learning that can improve students' problem solving abilities is learning that connects mathematical concepts with real life incidents. This is because in the realistic mathematics learning process that can make students motivated, have a good attitude, and have the ability to make mathematical models and associate concepts that exist in mathematics[9]. The statement intends that MEAs are learning approaches that confront problems based on authentic (real-word) situations in students' lives[10].

3.2. The effect of GDI, GI, and Scientific in improving problem solving abilities
Guided discovery is a learning methods that meet two important criteria for active learning, activating or constructing appropriate knowledge to be used for making sense of new incoming information and integrating new incoming information with an appropriate knowledge base [20]. Guided discovery is also a process where learning is aided by hints, direction, feedback and other helpful information [21]. While learning with the process of finding, students will be required to be able to link the concepts learned with the supporting concepts. therefore students can solve the mathematical problems presented. While learning with the process of finding, students will be required to be able to link the concepts learned with the supporting concepts. Therefore students can solve the mathematical problems presented. As a learning method that is almost the same, GI and Scientific can have the same impact as guided discovery of student’s problem solving abilities

3.3. The effect of open ended in improving problem solving abilities
From the research that has been reviewed, open ended is proven to improve problem solving ability because it is a constructivism approach [10]. In addition, the problem used in an open-ended approach has many solutions and answers so that students' problem solving abilities are increasingly trained. While the problem solving approach only presents routine and non-routine questions so that the problem solving ability is less than optimal compared to the open ended approach [15].

Table 2. The synthesis of learning methods that improve problem solving ability

| Variabel                               | Number of Articles |
|----------------------------------------|--------------------|
| Realistic Mathematics Education (RME)  | 2                  |
| Contextual Teaching Learning (CTL)     | 4                  |
| REACT                                  | 1                  |
| Guided Discovery (GDI)                 | 1                  |
| Guided Inquiry (GI)                    | 1                  |
| Saintifik                              | 1                  |
| Open Ended                             | 3                  |
| Multiple Intelegence (MI)              | 1                  |
| Problem Posing                         | 1                  |
| Problem Solving                        | 1                  |
| Modelling Elicity (MEAs)               | 1                  |
| Conventional                           | 6                  |

The effect of RME, CTL, REACT, MEAs in improving problem solving skills

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3.4. The effect of open ended in improving problem solving skills

The effectiveness of teaching materials based on multiple intelligences is because in learning strives for student involvement in every learning activity. In learning there are various activities that can empower multiple intelligences of students so that they will arouse their curiosity in learning. Furthermore, this curiosity will have a positive impact on the development of students' problem solving abilities and student learning achievement [19].

3.5. The effect of problem posing and problem solving in improving problem solving skills

During mathematics learning with a problem posing approach, students learn to make questions independently, so that students have the freedom and opportunity to issue ideas or ideas based on the knowledge they have to find concepts, about the material being studied. So that through the problem posing approach students can strengthen and enrich basic mathematical concepts. With various types of questions being worked on, train students to think about the situation and problems faced, so as to train their mathematical problem solving skills [8].

3.6. The effect of conventional learning in improving problem solving skills

Conventional approach can also be categorized as a learning approach to the way students receive. However, what students receive can be meaningful if the concept being explained is always associated with the concepts that have been learned that support the concept being explained. For example, when students are studying pre-calculus, they will think about how some material such as limits and other material related to calculus. This means that studying problem solving will be easier to do if we can relate the material known to the material that has been studied, in other words meaningful learning will make it easier for students to solve mathematical problems. Therefore, it is not surprising that six of the seven studies revealed that expository can improve students' problem solving abilities.

From the discussion in this article, it can be seen several learning methods that can improve problem solving skills. These methods are Realistic Mathematics Education (RME), Contextual Teaching Learning (CTL), REACT, Guided Discovery (GDI), Guided Inquiry (GI), Scientific, Open Ended, Multiple Intelligence Based Learning, Problem Posing, Problem Solving, Modeling Elicity Activities, and Conventional Methods. All methods have have similarities, there are (1) trying to introduce and utilize the relationships between ideas in mathematics (2) making students understand how ideas in mathematics are interconnected and underlying one another to produce a coherent whole (3) introducing and applying mathematics in contexts outside mathematics. This makes students have good mathematical connection skills [3]. Mathematical connection ability is the ability to associate one mathematiccal concept with another concept, with concepts in other disciplines, and also related to everyday life [22]. Connection mathematics ability will be greatly needed by students, especially to solve the problems that need the relation between mathematical concepts with other concepts in mathematics and other disciplines or in everyday life [23].

4. Conclusion

Problem solving abilities can be improved by various learning methods. It can be seen in general that most of these methods try to connect the mathematical concepts with the conditions in the real world or with previous concepts that support what is being learned at this time. So, there is no doubt that problem solving is about making connections.

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