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The use of problem-solving as a method in the teaching of mathematics and its influence on students' creativity

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Abstract

This study aimed to describe the use of problem-solving in the teaching and learning of mathematics for the development of students affective creativity in Indonesia. The samples to the study were taken from selected Banjarmasin junior high schools. The research focused on the inability of mathematics learning in developing student's creativeness. To establish how affective creativity is developed based on mathematics learning, the present paper thought to answer four research questions: how is the creativity of students in Indonesia, especially in Banjarmasin?; how does the affective creativity model work using problem-solving as a method to teaching and learning mathematics? is there any significant difference between problem-solving method and conventional methods in terms of student's creativity?; lastly, what factors contribute to student's creativeness development? To answer these questions, mixed research methods entailing both qualitative and quantative methods has been used. In the effort to discover how students' values or personalities are developed through mathematics learning and factors which might be contributing to the development of students' creativity a qualitative method was applied. Whereas, in the process of examining how problem-solving learning method during mathematics lessons impact on students' creativity a quantative method was used. In this regard, data collection was conducted through observation, testing, and interview. The findings revealed that: most students have a higher level of creativity on the cognition aspect with little affective aspect; problem-solving method consists of six phases namely: deliver the objective of the lesson, direct students to the problem through problem-solving method, manage students to learn, guide the students to solve the problem individually or together, present the result and ensure student's understanding. It has therefore been concluded that the implementation of problem-solving method can advance student's creativity on cognitive and affective level with low grade students adapting to learning faster.

Keywords: affective creativity, creativity, cognition, learning and teaching, mathematical learning and problem-solving.

1. INTRODUCTION

Education is a requirement and a necessity for each citizen, however the question that arises is what kind of education? Is it that which stimulates creativity of the learners or that which stimulates a spirit of living together or that which promotes awareness and understanding of the surrounding and one's dealing with the environment and probably many such questions. From whatever perspectives experts tend to look at such questions they are right of use to national growth and development. Due to a nation's interest in developing responsible citizens, in Indonesia for example, it is clearly stuplated in the constitution that national education functions to develop character and enchance students' capacities, such they become democratic and responsible citizens. To attain this dream, education should be motivating, stimulating and able to triger a creative mind. Since today the world is rapidly changing. Everything has gone digital as technology covers many aspects of life. This tells us one thing, which that every aspect of life more so regarding modern tools rely on creativeness of people.

It is human creativity which has led to the growth and development of once poor nations into powerful and highly productive countries. For instance, Japan and South Korea have achieved and successfully grown depending on their creative human resources inspite of limited and or almost with non-existent natural recources in these regions of the world.

Whereas, Indonesia happens to be on the losing end with its abundant natural resources, something which mighe be happening due to limited or poorly prepared or equipped human resources. Understanding the dangers of having a poorly equipped human resource, the Government through policies is ensuring that Indonesia's education produces excellent human resources. This is strengthened by the enacting of article 3 of Act 20 of 2003 which supports the development of quality human resource which is creative. Human creativity is shown through different behaviors and one of such behaviors is creative thinking which can be developed through the learning of mathematic. Van de Walle (2002) argues that those who can solve and understand mathematics problems are likely to have more options when it comes to deciding for their future.

Teaching mathematics at lower levels and middle classes such as in junior high school helps to guide students thinking more so when it comes to handling concrete to abstract ideas through the practice of solving daily math problems or others subject related to daily life. Since mathematics is such a tasking subject, Anderson and Krathwohl (2001) point out that hardworking students seem to possess three stages of creative thinking which include understanding, planning and executing the plan which are the requirement for students problem-solving moreso during mathematics learning.

Mathematics learning leads to the improvement of students' ability to think creatively, critically and logical. Bishara (2016) in his findings reveals that challenging tasks in mathematics for students may contribute to improving the level of motivation for learning, something that results into improved creativity and affective development of learners. Creative thinking during mathematic lesson is showed through student's confidence in completing their task without help. For creativity development, in in Indonesia their competence standard principles which must be followed in preparing junior high school students, they are: search and implement the information obtained

from the surrounding and other sources logically, critically and creatively; demonstrate logical, critical, creative, and innovative thinking ability; and demonstrate the ability to analyze and solve problems in everyday life. However, in a preliminary study it was revealed that students tend to wait for teachers to solve and explain tasks or rely on another student work. For instance, students keep asking teachers instead of thinking and trying to solve problems individually.

In a preliminary study, it was revealed that in Banjarmasin, majority of the elementary and junior high school students are still weak in solving problem assigned to them as reflected in the national science olympiad selection results at the provincial level in South Kalimantan which comprise of 13 districts, where Banjarmasin students are always below students from other districts/cities in terms of exploration ability. The reason being the prevailing lack of creativity in solving mathematical problems. The data from the last three years indicate that out of 39 participants, Banjarmasin students only managed to achieve 5^{th} , 8^{th} , and 24^{th} rank in 2010, 4^{th} , 8^{th} , and 9^{th} in 2015, and 12^{th} , 14^{th} and 15^{th} in 2016. Meanwhile, in junior high school level, Banjarmasin representatives are elected to the last national level in 2008. Yet, for the last three years stuents from Banjarmasin did not come out as math representation anymore. Therefore, it is considered as a serious matter for Banjarmasin city. Walidi (2012) explains that the focus of mathematics learning is to advance student's understanding. Through the learning of mathematics students are expected to be excellent learners through additional and remedial learning activities. Teachers must assign students with motivational and stimulating mathematics problems and they (students) should be encouraged to work on their assignement without waiting for the teachers to do the assigned tasks.

A situation whereby students wait for teachers is caused by two things: first, the learning method limits student participation to maximize their potentials during the learning process. Thus, in finding the answer, the students do not follow systematic procedures that can accustom better behavior and grow their creativity. Second, the current assestment system which is oriented towards final examination and national examination results. Both factors influence the lower level of student's motivation in learning regarding the capacity to identify problems, experience the appropriate ways for problem solving and adapting to execute the problem based on Lickona (1991,2012, 2004) theory on character development (knowing, feeling, and action)

Mathematics learning approach which encourages students to find solutions is known as problem-solving method. The process covers identifying stage upto solving the problem which is rich of educational values including creativity. The creativity values throughout the process are too unfortunate to be left behind. Thus, teacher plays an important role to remind and guide the students so that they are owned structural managements. Moreover, the application of this type of Iearning in class can create a creative behavior among students. In today's rapidly changing world, it is important to analyze the creativity of students, along with the development of creativity model through problem-solving method and examine whether there is significance as such innovations. The interview result with three math teachers from 3 different schools (SMPN 6, SMPN 9, SMPN 24) followed by class observation and student interview point out two different approaches of mathematic teaching in Banjarmasin. The first approach uses conventional model by sticking to the syllabus. This model was conducted through four stages namely explaining, giving examples, class assignment, and task.

On the other hand, the second model use different method in delivering the materials through encouraging students to actively participated during the process even though it is not optimally conducted due to time consuming. Regarding this, many people think that the maximal effect will be achieved if it employed in schools with better quality and better input for the students. Yet, in general, it can be said that the effort in developing national characteristics including creativity is far from exist. This conidition is inflenced by teacher's lack of knowledge regarding how to execute the idea of developing creativity. On the contrary, the idea of providing students with task with different level of difficulties is considered to be shared by all of mathematics teachers including those who have done simmilar things. Since not every difficult problem contains problem-solving aspect.

Teacher's awareness regarding student's creativity development is considered little. Yet, some teachers have pushed their students to work their task clearly despite teacher's lack of knowledge regarding the matter. Moreover, the teacher's unavailable experience in preparing learning scenarios also interfere the effort in developing student's creativity. Besides, during the assessment process, students are likely to be evaluated cognitively through multiple choice questions which can kill their creativity. The example is how memorizing method is used to answer the trivial problem given by the teacher (Davis, 1984 as cited by Siswono, 2008). Siswono (2008) further mentions six reasons which show how creative thinking is needed in mathematic lesson: mathematics subject is complex and too broad to be taught through memorizing method, creative thinking allows students to find original solution during the problem-solving process, teachers are required to respond to student's real and surprised participation, memorizing method discourage student's in learning mathematics, it is important to educate students considering originality, and mathematics is needed in everyday life, while creative thinking is needed in order to solve daily issues.

Thus, creativity development has important role in school life, since it can be used to do something positive. Additionally, creativity requires supportive actions in order to develop better. Guilford as cited by Munandar (2009) argues that formal education ignores the existence of creative learning process. Many people possess basis quality, but their surroundings fail to give proper reaction. To put is simply, teachers can encourage student's creativity and help them to develop the character, but teachers can also kill student's curiousity, damage their motivation, pride, and creativity. Getszel and Jackson as cited by Munandar (2009) mention that teachers prefer smart students compared to creative students. Simmilarly, Torrance (1980) says that creative students are likely to be labeled as foolish, naughty, and out of control. Due to such as a perception, the teaching method puts a teacher as the core aspect in the teaching and learning process, hence, limiting students' creative participation. This makes it importance to develop a learning model which openly allows students' participation to advance their cognitive and affective aspects.

Based on the explanation, this study focuses on an idea of teaching and learning mathematics as way required to develop students' creativity. Creativity has two different dimensions, cognitive and affective. Yet, in general, creativity illustrates one's cognitive ability such as mathematics creativity. As this study emphasizes the affective aspect rather than cognitive aspect, the term of creativity values is used in the analysis. The result of the study is expected to be significant theoretically and practically. Theoritically, the result of this study points out several new principles in teaching mathematics lesson which is not only develop cognitive aspect, but also affective aspect

namely creativity values. Creativity values are considered important for each student to form their creative characteristic which can be beneficial in the future considering life will turn to be more difficult following the globalization. Besides, creative human resources will always be essential in maintaining Indonesia continuity in the future following the decreasing of Indonesia natural source.

Practically, the findings of the present study will be used to develop student's creativity values. In otherwords, this learning model will be beneficial for math teachers if implemented during mathematics class. The examples of learning plans and scenarios as the result of the analysis can be used as a reference in maximizing learning plans with creative values.

2. LITERATURE REVIEW

The Nature of Mathematics

Mathematics, according to the great dictionary of the Indonesian Language online edition by Language Center of the Indonesian Ministry of Education and culture is the science of numbers and their operations, interrelations, and combination used in solving numberic questions. To put it simply, mathematics relates to numbers and numberic operations, while, Hudoyo (2005) describes mathematics as a tool to advance human's thinking ability. Therefore, mathematics is considered important not only in daily lives, but also in science and technology development. Furthermore, mathematics is also required in continuing study and learning about natural phenomenon which supported other brach of knowledge.

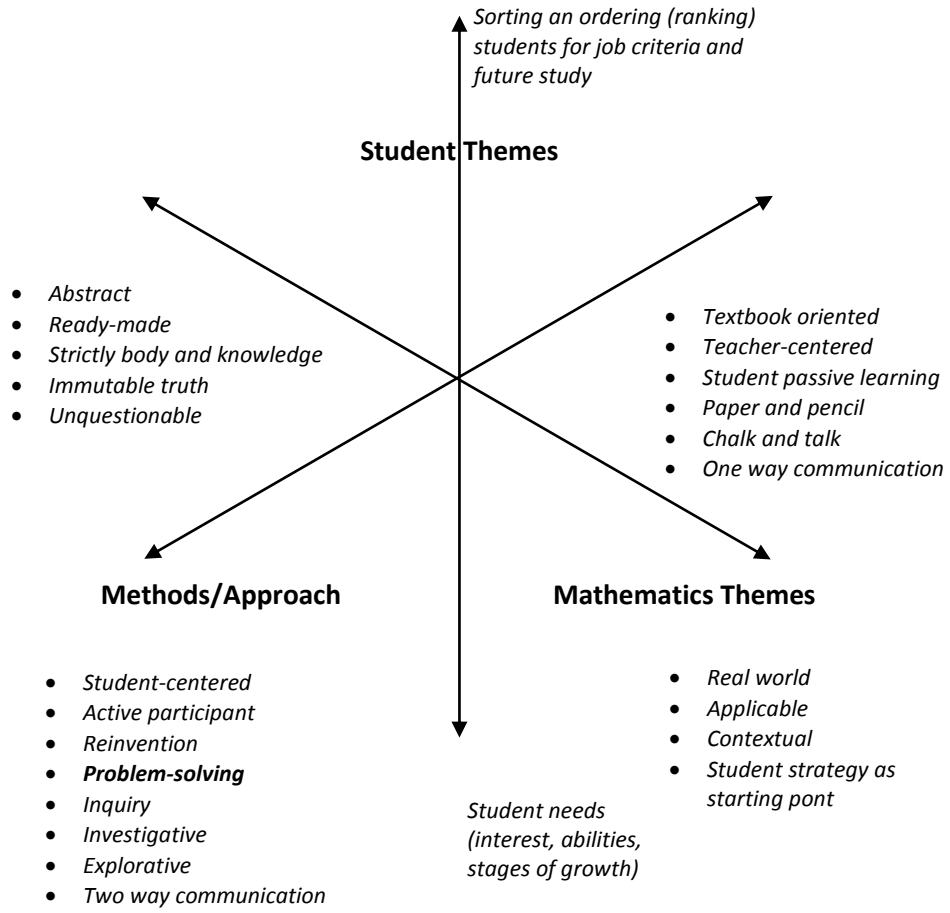
However, mathematics covers more than numbers and its operations, such as space elements and its object. Moreover, mathematics also relates to patterns, forms, and structures (Tinggih as cited in Hudoyo, 2005). In another words, according to Begle as cited in Hudoyo (2005) mathematics can be summarized into four ideas, namely facts, concepts, operations, and principles. Simmilarly, Anderson and Krathwohl (2001) mention basic dimensions of science and knowledge namely facts, concepts, procedures, and metacognitive. As it is already known the empthy symbol used as mathematics object allows it to enter other studies. Hudoyo (2005) further concludes that the nature of mathematics relates to ideas, structures, and relations which are logically organized. That is to say, mathematics is about abstract concepts where the truth is obtained through logical reasoning. Additionally, mathematics covers observation, guess and senses, hypothesis testing, analogical analysis, and theoretical formulation from the assumptions and undescribes elements. Yet, mathematics involves deductive analysis, there is also creative thinking which commonly used in inductive analysis, instuition, and trial and error. Regardless there is inductive analysis in the process, the finding of creative process should be organized through deductive verification. Therefore, it is about mental activity.

NCTM provides five content standards namely: numbers and its operations, algebra, geometry, measurement, data analysis and probability (Van de Walle, 2002). Furthemore, Van de Walle (2002) explains the depth of each category is different according to educational level. However, NCTM also provides five process standards in mathematics learning namely: problem-solving, reasoning and proof, communiation, connections, and representations.

Mathematics Approaches

Cockroft as cited in Turmudi (2009a) proposes three-dimension model to observe

mathematics situation and profile during mathematics lesson along with teachers in general and mathematics teachers. Three main issues by Cockroft are math as learning material, method as the ways and strategic in delivering the material, and students as mathematics subject. Therefore, mathematics is placed it the continuum line from concrete, semi-concrete, semi-abstract, and abstract. Meanwhile mathematics methods are positioned at continuum line from inquiry, investigation, exploration, and text-orientation. Following this, student perception is placed in continuum line as the object that is ready to be filled, to be forced by drill to compete, continue their study, or work in one side. Moreover, the perception of students as the subject that have necessity, interest, and development level is on the other side.



Adapted from Cockroft, 1982; Collins., 1988 as cited in Turmudi (2009a)

Figure 1. A 3 Dimension Model of Mathematics Learning

The latest condition of mathematics learning in Indonesia schools, according to Turmudi (2009b) can be observe through the three-dimension diagram above. The left corner above points out that the current mathematics lesson tends to be abstract, textbook oriented, and considers students as the ranked object aimed for continuing

study or work. Moreover, students are considered as the object that ready to be filled with various knowledge and mathematics is seen as a subject which is proper to be given to the students cognitively.

Turmudi (2009b) further explains Ernest (2004) concerning conventional classes. Class assignment teach students how to do symbolic procedure, work without thinking, and put them away from critical and independent students. Globally, it has happened in the 90s, however there is paradigm changing lately. In the United States of America, it is occurred through contextual learning movement, while in Europe, there is realistic mathematics. The movement then brings changing for the students since it makes mathematics learning more fun due to conjecturing process, problem-solving, student's involvement in finding previous concept, procedure, and the law (Turmudi, 2009b).

Problem-Solving Method in Mathematics Learning

In order to encourage the use of creative thinking in mathematics, the concept of assignment problem is used. The teacher asks the students to connect their knowledge with the information regarding the task, so it comes as a new idea for the students (Pehkonen as cited in Siswono, 2008). If the student immediately recognizes how to complete the task, then the task is considered as a routine task. If it is not, then the assignment is considered as a problem depends on the individual. As previously mentioned, a problem is personal. Problems refers to a situation that where an individual or group do not have any rules, algorithms/procedures or laws to answer the question immediately. Thus, the characteristics of a problem may include: the awareness concerning the question, known as prerequisite knowledge; the awareness to do some actions, known as challenge; and the awareness of various problem-solving method which is not always clear to others.

Problem-solving method refers to a process or individual effort in overcoming the obstacles or constraints when the answer or the method is not yet apparent. According to Siswono (2008) there are several factors that affect the ability to solve the problems. While Piaget as cited by Bruner (2006) notes that knowledge of the world is made, not found. That is to say, the students are the one who create their knowledge. Their mental development moves from a simple form to complex logic operating systems. This process is influenced by the transformation and the internalization of their actions. Meanwhile, according to Vygotsky (as cited by Bruner, 2006), mental development is seen though human interaction. On the other hand, Van de Walle (2002) suggests taking problem-solving approaches during mathematics lesson. He further argues that the most essential concepts of mathematics can be best taught through problem-solving method due to its beneficial aspects such as: problem-solving methods focus on the ideas and understanding, problem-solving develops students confidence in doing math, problem-solving provides continuous assessment that can be used during teaching period, helps students discuss ideas, and informs parents regarding their children's achievement, problem-solving allows many variations that can be used by students, problem-solving provides less questions so that students will not get bored, problem-solving develops mathematical strength, such as reasoning, communicating, connecting, and presenting,

and problem-solving is full of fun since students can give their own reasons (Van de Walle, 2002).

Thus, it can be concluded that problem-solving has an important role in mathematics teaching to develop students' cognitive and affective ability.

Creative and Creativity Definition

In the Indonesian National Dictionary online version, creative belongs to adverb category which means to have the power of inventiveness, the ability to create, or contain creativity that requires intelligence and imagination. While creativity refers to the ability to create and relates to creativeness. Gardner (2003) defines creativity as a feature of a new product that suits society wish. Regarding this, there is a conflict between creative group and expert. It is said that a person can be an expert without creativity and there is someone who happened to be creative though not an expert yet. Additionally, Munandar (2009) proposes the idea of creativity known as four P's of Creativity (4P): person, press, process, and product with following schemes.

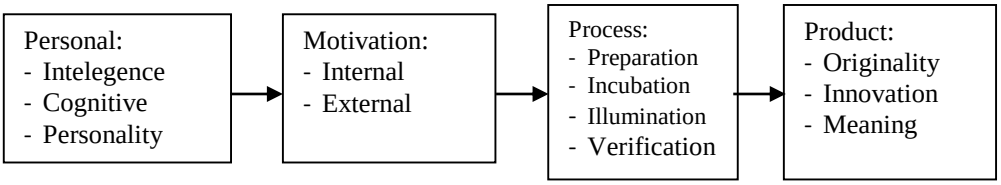


Figure 2. Creativity Scheme

Figure 2 above informs that creativity only occurred from one side only, such as individual or product. In fact, many scholars do not let the interrelationships between the four approaches disappear, although not all the approaches are filled. Yet, for the study, many experts only emphasize on one definition. Furthermore, Hurlock (2010) suggests eight concepts of creativity. Four of them are creativity which emphasizes the process of making something new and different, creativity is the invention of new things by chance, creativity covers almost everything relates to new creation which is different from others, and creativity is a unique mental process to produce something new, different, and original. It can be said that all of them focus on the product, but at the same time only the first and the fourth sense which focus on the process beside the product (Hurlock, 2010). According to Guilford (2009) creativity refers to the ability which becomes the characteristic of creative people. This ability determines whether a person has the capability in demonstrating his creative behavior appropriately including his thinking ability. Guilford as cited in Hurlock (2010) also mentions creativity required divergent thinking. He further argues this idea deviates from the common perspective and try to find another choice. Therefore, this kind of thought goes beyond what is clear and real, considering some possible answers to a problem rather than one absolute solution. Yet, this is contrast to convergent thinking.

Like Drevdahl, Hurlock (2010) mentions that creativity is a person's ability to produce any compositions, products, or ideas that are essentially new and previously unknown to the creator. It can be an imaginative activity or a synthesis of thought which may include the formation of the new patterns and a combination of information from previous experiences and old relationships, and the formation of new correlations. However, it should have a clear purpose and not a mere fantasy, in spite of its perfect and complete result. In addition, the result can be in the form of art products, literature, scientific products, or procedural and methodological products.

In line with Drevdahl, Gallgher as cited in Rachmawati and Kurniati (2011) describes creativity as a mental process by which an individual creates new ideas or products, or recombines existing ideas and products, in fashion that is novel to him or her.

Munandar (2009) mentions creativity is the ability to produce something new, creativity is the ability to create new combinations that have social meaning. On the other hand, Pehkonen as cited in Siswono (2008) refers to the definition by Bergstom (neurophysiology expert) which defines creativity as performance where the individual is producing something new and unpredictable). Evans as cited in Siswono (2008) explains creativity as the ability to discover new relationships, to see a subject from a new perspective, and to form new combinations of two or more concepts that already exist in mind. Based on aforementioned definitions, creativity can be recognized from its result. The product of creativity is something new and a combination of the syntheses of thought, concepts, information or experiences that already exist.

On the other hand, the notion of creativity that emphasizes its personal aspect is explained by Sternberg as cited cited Munandar (2009) known as three facet models of creativity. It covers creativity is the meeting point of three psychological attributes namely intelligence, cognitive style, and personality or motivation. Intelligence includes verbal skills, smooth thinking, planning knowledge, problem formulation, strategy formulation, mental representation, decision-making and balance skills, and general intellectual. Cognitive or intellectual styles show constraints and attachment to the conventions, personal rules creations, personal behavior, the preference of less structured issues, write, design and interest in filling the positions that demand creativity. Personal or motivational dimensions include flexibility, tolerance, motivation to achieve and gain recognition, resilience in facing the obstacles and risk-taking.

Simpson as cited in Munandar (2009) emphasizes internal factor explains that creative ability is a personal initiative that is manifested in the form of human ability to break common sense. Creativity does not exist in a culture that overemphasizes conformity and tradition, and a little bit close to new changes or developments. Amabile as cited by Munandar (2009) mentions that creativity depends on skills on particular field and internal motivation for working in a supportive social environment. On the contrary, Welsch in Isaksen and Geuens (2003) and Siswono (2008) emphasize the process regarding creativity as the process of generating products by transformation the existing ones. This process focuses on creative products, and left the description of mental processes that occurred alongside other processes. In addition, lsaksen and Treffinger

in lsaksen and Parnes (2011) define creativity as a means of making and communicating meaningful new relationships to help (a) thinking of possibilities, (b) thinking and experiencing in various ways and using new insights, (c) thinking of new and unusual possibilities, (d) guiding someone in taking the alternatives. This definition emphasizes the process of producing creative human being. Lumsdaine and Lumsdaine (1995) mentions creativity involves the whole brain. It is a dynamic activity that involves conscious and subconscious mental processing. Creativity involves the whole brain. Based on several definitions above, along with the interest of mathematics learning, the notion of creativity in this study focuses on the product thinking to produce something new and useful. Therefore, creativity means a product of creative thinking ability to produce a new way or solution.

Creative Thinking

Thinking, according to Indonesian National Dictionary, is the process of using logic before deciding something. Suryabrata (2008) argues that thinking is a dynamic process that can be explained through its process. The thinking process is consisted of three steps, namely understanding process, opinions, and decision-making. In facing some situations, a person will be creating connections among information to get the idea. Then, opinions are formed based on his knowledge. Following his opinion, the next step will be drew the conclusions that can be used in solving the problem.

Ruggiero in Siswono (2008) defines thinking process as a mental activity to help formulate or solve a problem, decide, or fulfill curiosity. In another word, when a person formulates a problem, solves the problem, or wants to understand something, he is already done thinking process. Thinking as a mental ability can be divided into several types which are logical, analytical, systematic, critical, and creative thinking. Logical thinking can be interpreted as students' ability to draw conclusions based on their logic and the ability to prove the conclusion in accordance with previous theory. Analytical thinking is the ability to describe, itemize, and analyze the information used to understand the knowledge based on logic. Systematic thinking is the ability to complete a task following the sequence, stages, steps, or perform a proper, effective, and efficient planning. All the types are often related since to think systematically, then somebody needs to do analytical thinking in order to understand the information. Then, in order to understand the information, logical thinking is required in the process. Thus, critical and creative thinking is the embodiment of higher order thinking since both of them belong to cognitive competence that should be mastered in the classroom. Following this, critical thinking can be viewed as the ability to compare two or more information, such as comparing outside information with existed information. If a difference or similarity is found, the person will question the issue in order to get the explanation. Furthermore, critical thinking is often associated with creative thinking.

According to Anderson and Karthwohl (2001) create is put elements together to form a coherent or functional whole; reorganize elements into a new pattern. Supriadi (1994) as cited by Rachmawati and Kurniati (2011) arranges the characteristics of creativity into two categories, namely cognitive and non-cognitive. Cognitive features include

originality, flexibility, fluency, and elaboration, while non-cognitive category covers attitude motivation and creative personality. Torrance (1980), Guilford (2009, 2010) and Munandar (2009) identify four components of creative thinking (creative cognitive) as follows: Fluency, Flexibility, Originality, and Elaboration. These four components are also used by Siswono (2010) to determine students' creative level based on their math results. It is appropriate to say that one's creative thinking ability can be seen from flexibility, fluency, originality, and elaboration. While, the affective creative component according to Torrance (1980) and Munandar (2009) is indicated by curiosity (ask the teachers and observe the situation), imaginative (try new things through trial and error), challenge (accept the task and find the solution), and courage (respond to a question), and appreciation (express personal idea/ compare the idea with others)

Three Stages of Moral Development

According to Lickona (1991; 2012) moral development consists of three different stages, namely: Moral knowing; Moral feeling; and Moral action that is further explained in the following paragraph.

- Moral Knowledge. Moral Knowledge is inseparable from values. It is important for the children to differentiate good moral values from poor moral values. Lickona (1991, 2012 and 2004) mentions many changing in terms of moral knowledge following the changes of life.
- Moral Feelings. The emotional side of human character has been neglected in moral education, in spite of its important role. The knowledge in differentiating something good from bad cannot guarantee good deeds. The students can be very clever in knowing the right and wrong , but still choose the wrong ones. How much we care about being honest, fair, and proper to others have obviously affected the moral knowledge which eventually lead to moral behavior. Similarly, the emotional side is open to be developed by family and teachers.
- Moral action. Moral action is the result of the previous processes. If the students possess new moral qualities of intelligence and emotion, they may do something based on their feelings and logics. However, there are times when they aware of the idea, but fail during the execution. Regarding this, to fully understand moral action and prevent someone from doing it- the teacher needs to pay attention to three other aspects namely competence, desire, and habits. (1) Competence.

Moral competence has the ability to transform moral judgments and feelings into effective actions. (2) Desire. The correct choice often to be the difficult choice. Being a good person , for example requires us to act good, and do what we think we should do. (3) Habits. In a meaningful situation, the execution of moral action is the result of habit (Lickona, 2012).

In mathematics learning, the development of creative values can be performed in three stages, namely discussing good values, facilitating creative, and implementing creative values when assessing and giving the assignment. All of the three stages are integrated

in the preliminary, core, and closing activities of each mathematics lesson.

Creative Values in Public Education

Public education according to McConnell in Sumaatmadja (2002) serves to prepare young people to realize the problems faced by all members of society in various dimensions of life. In general, public education aims to create a complete human being who know themselves along with people around them, aware of the life problems, and become a responsible member of family, society, citizen and a faithful human being. Similarly, Phenix (1964) argues that every human being needs to understand the essential meaning to become a unified and comprehensive human being. Before 2010, educational character in Indonesia became an integral part of moral education and one of the characters in religious education or Pancasila and citizenship moral education. According to Suparno as cited in Budiningsih (2004) there are four models of moral value learning models that can be applied in school: (1) model as the subject itself (2) integrated model in all subjects (3) outside teaching modeland (4)) combined model. Each model has its own advantages and disadvantages. Model (1) has proven to fail in shaping the character of a good nation. Meanwhile, in model (2), the internalization of the character has been discussed extensively in the trainings organized by Ministry of Education and Culture. There are 18 main characters who want to be developed and one of them is a creative character.

As a citizen, everyone should have the awareness in improving the quality of the nation in a midst of globalization and economical uncertainty. To be able to improve national qualities, creative attitude and creative works are required in the process. Similarly, a creative effort is important in exploring the limited economic resources. In the preamble, Alwasilah (2012) mentions that information is something that enables one nation to rule the world. However, in the next global competition, the authority of information alone is not enough. It is important to have creativity. Therefore, the next century is the age of creativity. Thus, there is should be a strategy to build a creative society. Alwasilah (2012) further explains a good education is some types that encourages students to be imaginative and creative, not only focuses on the knowledge. Creativity requires high quality education, critical and creative educators, appropriate learning curriculum, and teaching materials that can stimulate students to think freely. In general education, learners are viewed as human beings, therefore it is important to have the curriculum that suitable for the requirements, common interests, or individual activities that lead to global life.

In national education, the importance of general education is undoubtedly important. The current situation is strongly influenced by the globalization that has the potential to erase national identity. Life values of life that have been preserved started to falter and even fade away (Mulyana, 2004). The influence of other cultures which can harm national culture requires a great national education which can guarantee a creative and sturdy generation. So, creative society is needed to be able to continue the life of a nation and take an international role. Moreover, creativity becomes an essential part in today's life and future life.

3. METHOD

Research Approach

This study used a mixed methods with quantitative becoming a dominant approach. A qualitative approach was used to reveal how students' creative value is developed through the learning of mathematics. For the case of this research, the qualitative approach has been used to establish factors which affect the development of creative values over the years and the obstacles of the development. This approach has been also used to observe the potential of the current teaching model.

While quantitative approach is used to test and finally develop learning models which allow creative values through research and development methods. This method was employed to obtain a problem-solving model that is efficient and effective in the development of students' creative values.

Research Steps

In conducting the analysis, the researcher followed several steps which involved research Problem and Potential- in this step, the researcher gathers all of the information regarding the potential of learning models that have been implemented by teachers in Banjarmasin junior high school, including the tools. In addition, the problems that are related to the development of creativity values in math learning process are included in the analysis. The data collected is taken from analysis reports from individuals or the Education Institution.

Data Collection- data collection was conducted based on creative cognitive ability and affective creative of students. The creative cognition is obtained through mathematics test, while affective creative is obtained through class observation. Both results come from creativity achievement of the current learning method. Besides, the researcher also collects the data regarding the obstacles that are faced by the teachers. This process is taken along with literature study of mathematical learning models that allow the development of creativity.

Research Design- in this step, the first draft of instructional model design is prepared based on the analysis of the model and the related theories (learning models and values education). The design includes syntax model and all supported aspects such as learning plan, student worksheet, and evaluation tools. Furthermore, this model is called problem-solving model of creative value learning.

Design Validation- design validation is performed by presenting the draft of the learning model in the seminar. The validation then is performed based on rational thinking from the theory.

- Model Revision I

  There was need to revise the model as a requirement. The revision at this stage is designed to minimize the weaknesses of the method.

- Limited Model Trial

The mathematics learning model based on problem-solving method was tested at a limited scale in a government junior high school, that is SMPN 6 Banjarmasin win a mathematics class. In this case, a one group pretest-postest design was used.

Description:
X : The treatment (learning model implementation)
O : Cognitive test after the treatment

Figure 3. One group pretest-postest design Model

Prior to the implementation of the model, a training and discussion regarding the model and its supported tools was conducted. The data obtained from the limited trials consisted of two components creativity which are cognitive creativity from each student and affective components taken from class observations. To get data accuracy, classroom observation was conducted in two groups only. Both groups were tested by t-test to see whether there was any significance on students' cognitive and affective score during the last three lessons.

- Model Revision 2

  The results at this step either in the form of direct observation and others have been analyzed for use as a revised model. The model improvements at this stage consider the applicability and practicality aspects of the implementation.

- Larger Model Testing

  The broader test was conducted in two parallel classes still at SMPN 6 government junior high school in Banjarmasin. This time with different classes and also the teachers were from different previous tests. For this test, the researcher used one group pretest-postest design with similar design drawing in Figure 3.

  Furthermore, the revised model was applied in both classes by the teachers after following the training and discussion of models and the learning tools. The analysis observes (1) validity, (2) practicality, and (3) affectivity. Meanwhile, the weaknesses of the new model were further improved based on the findings of the experiment. Additionally, paired sample t test was employed in the study.

- Final Revision

  This revision was conducted due to the weakness found in the wider model. In the step 8 above, validation model includes the impact of the application of

problem-solving method to the task given by teacher, learning implementation, learning evaluation, along with its impact student's achievement and creativity development. Furthermore, the revision produced PSBNK hypothetical model.

- Hypotetic Model Validation

  Hypothetic model is a model that has been obtained after completing all the stages of Research and Development. Problem-solving model is the basic of hypothetical design. This model is further implemented in three junior high schools, namely SMPN 6, SMPN 19, and SMPN 24 Banjarmasin. Two sample classes were taken from each school with one class for the treatment and one class as the control. The effect was analyzed through quasi experimental model with nonequivalent control group as shown below.

O	X	O
O		O

Description:
O : Pretest and Postest
X : Treatment

Figure 4. Experimental Quasi

In the control class, conventional learning model is applied. Conventional learning is conducted through a four stages (convey information, give examples, give classroom exercises, and end with assignment) with the current lesson planning. Hypothetical learning model is applied in the experimental class with lesson planning prepared by the researcher. Yet, the teachers who taught in both classes (control and experiment) are the same. Before teaching in the experimental class, the researcher and teachers discuss a detailed learning scenario.

Population and Sample

The population of this study consisted of 34 students of SMPN in Banjarmasin. Through stratified random sampling technique, SMPN 6, SMPN 19, and SMPN 24 were chosen as the location for the research. The three junior high schools were chosen since they are considered as the appropriate representation of three categories namely high, medium, and low category. The categories were based on student input quality, school infrastructure, human resource (teacher) background, school location, and school popularity. With these criteria subsequently SMPN 6 represents the high category, SMPN 24 represents the medium category, and SMPN 19 represents the low category.

Based on the teachers and principals' interviews result, it was discovered that the distribution of students in each class follows a heterogeneous pattern. At the beginning of the school year, the new students are ranked and then randomly assigned for their class placement. Then in the following year, the students are once again redistributed equally. Based on this condition, both experimental and control class in each school has the same quality. Hence, a simple random sample selection was aimed at taking two parallel classes of mathematics teachers. Each school had 18 classes, with six classes at each level.

Furthermore, the subject of this study was the VIII grade students in three selected junior high schools, since they were already used to the school atmosphere compared to VII grade students.

Therefore, data collecting was conducted in accordance to the data types. Data collection techniques comprised of interviews, questionnaires, observations, and tests. This present study also used observation sheet to find out affective creative level, reference sheet for the cognitive measurement, questionnaire for teacher background information, and student questionnaire to collect students' socio-economic information and the result of the analysis. The observation instrument used five affective creativity components of Munandar (2009), namely curiosity, imaginative, challenge, risk-taking, and respectful.

For the objectivity, the researchers with the other two teachers have discussed how to fill the observation sheet. Since the learning process always occur in group discussion, the by observer only watch two groups from the first meeting until the last meeting continuously (three times). Furthermore, it has been agreed to avoid class changing during the observation. The observations are conducted based on each behavior found in the creative affective indicator of each student in the observed groups. Then, the researcher will gives a tally on the observation sheet according to the student's name.

Cognitive Assessment Reference Sheet

The students' cognitive creative assessment was performed by assessing the product / work result of the students. To determine its value, the students' work is compared to the reference sheet based on the four cognitive creative components by Munandar (2009) and Torrance (1980). The four components are fluency, flexibility, originality, and elaboration. Fluency is the ability to create many ideas. According to Munandar (2009), smooth thinking is the ability to produce a lot of ideas, answers, problem-solving method or questions, provide many suggestions to do things, and always think other possibilities. Torrance (1980) describes fluency as several responses toward a stimulus. Thus, it emphasze the quantity more than quality; from this explanation, the indicators are: *A number of solutions*. Flexibility the ability to propose many approaches or problem-solving methods. According to Torrance (1980) flexibility thinking is characterized by the ability to respond in different ways. Meanwhile, Munandar (2009) explains that the flexibility of thinking is the ability to generate ideas, and provides different answer. In addition, people who own flexibility will be able to see a problem from different perspectives and try to find the alternatives, and capable

in changing their way of thinking. Thus, a creative person refers to a flexible person who can leave the old way of thinking and replace it with a fresh one. Originality is the ability to produce authentic ideas. According to Torrance (1980) orinality is the ability to provide statistical, relevance, and appropriate response, while Munandar (2009) describes originality as the capability in creating new ideas or combine different elements. Thus, the third indicator is uncommon answer.

Elaboration is the ability to enrich and develop an idea or product along with give the details of particular objects, ideas, or situation so that it becomes more interesting (Munandar, 2009). On the Other hand, Torrace (1980) explains elaboration as the additional information or details which makes the response become more relevant. Based on aforementioned explanations, the next indicator is; *Detailed/interesting answers*. Hence, cognitive creative assessment consists of four indicators.

Data Analysis

The data of this research result was divided into three categories: creative cognitive, affective creative, and the combination of the two.

Creative Cognitive. As it has been explained in the previous section, creative cognitive consists of four components. Assessment of the results of students followed these indicators. If an indicator appears, it is given one score, if does not it is given zero score. Thus, the maximum grade that can be obtained is four. To determine the creative cognitive level, the following rules were used:

Table 1. Creative Cognitive Level

Score	Creative Cognitive Level	Criteria
4	Very Creative	If there are four component indicators
3	Creative	If there are three component indicators
2	Creative Enough	If there are two component indicators
1	Less Creative	If there is one component indicator
0	Not Creative	If there is no indicator

Then, to convert the value in a scale of 0-100, the following formula was used.

$$\text{Creative Cognitive Score} = \frac{\boldsymbol{Score} \times \mathbf{100}}{\mathbf{4}}.$$

Affective creative. Each students' affective creativity was obtained from direct observation on class in their learning activity. The observed students of each class came

from the same two groups during the research, which consisted of eight or nine people. Each students' affective creativity achievement was measured by observing their attitude/behavior according to the indicator of each affective creative component. Because there were ten indicators, the maximum scores were also ten. Then, the score was converted into a scale of 0-100 by using the following formula.

$$\text{Affective creative Score} = \frac{\boldsymbol{Score} \times \mathbf{100}}{\mathbf{10}}.$$

The obtained score was classified according to the following table.

Table 2. Affective creative Classification

Score	Classification
81-100	Become a Habit
61-80	Already Growing
41-60	Start Developing
21-40	Visible
0-20	Not yet visible

Explanation:

Become a Habit	If the students keep on showing behavior as stated in indicator and is consistent
Already Growing	If the students keep on showing behavior as stated in indicator and starting to be consistent
Start Developing	If the students have shown various sign of behavior that is stated in indicator but not yet consistent
Visible	If the students have start to show the first sign of behavior that is stated in indicator
Not yet visible	If the students have not show the first sign of behavior that is stated in indicator

Students' Creative Score. Students' creative score which include cognitive and affective creative is a combination of two sides of assessement. This score is the sum of cognitive score with affective score which has been converted to a scale of 0-100. Thus, the maximum score is 200.

The overall statistic analysis was done using SPSS software version 16.0. The test was done by following normality test data homogenity stages. If it is normal and homogen, then *t*-test is applied. If it is not normal, then nonparametric statistic is applied.

4. FINDINGS AND DISCUSSION

Creativity of Banjarmasin's Junior high school (SMP) Students.

Based on the observations and interviews with teachers in the three schools, the findings of the research are shown below:

Cognitive Creativinty- based on the four creative cognitive indicator, which are fluency, flexibility, originality, and elaboration, fluency is the highest indicator which often appears, while ethe lowest one is elaboration. Fluency is a little bit higher and often appears since the students were taught to solve mathemathic problems ever since they were in elementary school. Thus, it is already a part of their habit to look for the correct answers in doing mathematic problems. Yet, the students cannot explain how they can arrive to that correct answers (elaboration).

The four cognitive creative indicators from Torrance (1980) and Munandar (2009) above can be made into cognitive creative level. Based on the result of creative cognitive test, which is reflected in table 3 below:

Table 3. Cognitive Creative Observation Result

Creative Cognitive Level	SMP 6		SMP 19		SMP 24		Total	
	f	%	f	%	f	%	f	%
Very Creative	5	12.20	0	0.00	0	0.00	5	3.18
Creative	11	26.83	16	23.19	11	23.40	38	24.20
Creative Enoguh	8	19.51	35	50.72	27	57.45	70	44.59
Less Creative	17	41.46	14	20.29	9	19.15	40	25.48
Not Creative	0	0.00	4	5.80	0	0.00	4	2.55
Total	41	100.00	69	100.00	47	100.00	157	100.00

Source: processed from the results

The data in the above table was taken from six classes, each two classes from SMP 6, SMP 19, and SMP 24. Overall, students' cognitive creative mode is at the level of being creative enough.
It shows that studying mathematics in the three middle schools in two years have formed cognitive creative in the students and overall distributed normally. Yet, if it is based on each middle school, there is respectable difference in SMP 6.

Affective creativity- according to Munandar (2009), the indicator of affective creative are (1) curiosity, (2) imaginative, (3) feeling challenged by plurality, (4) capable of taking risks, and (5) can respect each other. The fourth indicator, capable of taking risks, is the most dominant among them and it was found when doing the first observation. It is some kind of mentality that enocurage people to not be afraid of giving answers, even though it is possible to be wrong. For example, giving a temporary answer immediately,

test it, and provide another answer. This indicator often appears, especially, in SMP 19. This kind of characteristic is related with speculative temporary answer. The students give random wrong answer while also giving another answer. In certain conditions, this characteristic show in students who can give answer without pressure. Meanwhile, there are only few students with the similiar characteristic in SMP 6. It is because the students in SMP 6 feel that they give answers with pride and embarassed to give the wrong answers.

The second component of affective creative which often appear is feeling challenged by plurality. This characteristic is a kind of mentality which encourage to solve difficult problems, feeling challenged by problematic situations, and attracted to difficult tasks. For example, they do not refuse doing tasks, quick thinking and aiming for completion, and shows enthusiasm to tasks that are given by teachers. Some students are observed to have positive attitude to assignments which are given by mathematic teachers. They open their notebook rightaway and read textbooks enthusiastically. However, there are still some students who complain by saying "Why do you give those kind of questions, sir?!"..

The other three components appear once in a while and balanced. Such as the first and second components which split into two indicators: trying new ways and trial and error. Trying new ways appear less compared to trial and error. It shows that students do not have the habit of doing both of them. It is because of the effect of mechanic learning that has been done long since elementary school. Every students think that there is formula for eaceh mathematic questions and if they do not know the formula means that they have yet to study the material. From 157 students, there were 49 affective creative students with the following results:

Table 4. Affective Creative Observation Result

Affective creative Level	SMPN 6	SMPN 19	SMPN 24	Total	
	f	f	f	f	%
MK	4	0	0	4	8.16
SB	1	1	2	4	8.16
MB	4	3	5	12	24.49
MT	5	9	6	20	40.82
BT	3	3	3	9	18.37
Total	17	16	16	49	100

Source: processed from the research result.

From the table above, we can see that the values of affective creative which appear dominantly and start to grow is the capability to take risks and trying to seek answers from questions given by mathematic teachers. The students often try to answer without

thinking it would be correct or wrong. When they try to do so, they use empty book to count and think of an answer.

The Creative Values for Problem-solving Learning Model. The developing research has result in mathematic learning model design that has been tested which is called the Creative Values for Problem-solving Learning Model. This model has six phases with the following framework.

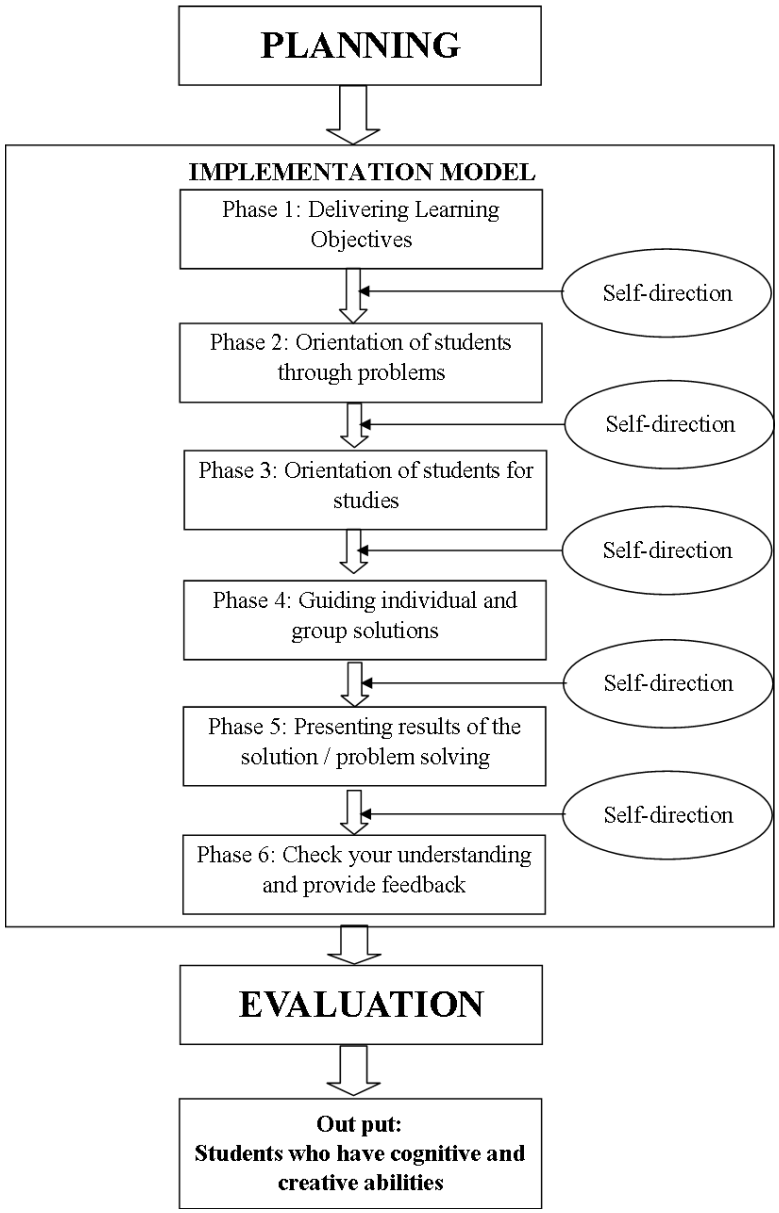


Figure 5. The Creative Values for Problem-solving Learning Model Learning Model

The explanation of the above diagram is as below:

Phase 1. Explaining the aim of learning. In this phase, the teachers explain the aim, discuse the prerequired material, motivate students, relating lessons with daily life problems.

Phase 2. Orientate students to problems through problem-solving. In this phase, the teachers provide some problems which correspon with the growth of middle school students to lead them into understanding the concept and students' creative thinking. Ask the students to try solving the problems based on the information/first problem and work individually first.

Phase 3. Organize the students to study. In this phase, the teachers discuss the problem with students/in group and lead them to help and share with the other or group members.

Phase 4. Guide them into completion individually or in group. In this phase, the teachers guide and teach effectively and efficiently. Encourage the students to gather the whole required information, try/test every way, and try to come up with another way.

Phase 5. Provide result/problems' solution. In this phase, the teachers help students in planning and choose one student or a group to prepare and provide solutions.

Phase 6. Check their understanding and provide feedback. In this phase, the teachers lead students to have some reflection and provide feedback to apply the problems to the advanced material and daily life problems.

Self-direction. In every phase change there is a between phase which is called self-direction. According to Knowles as cited n Mok (2010) self-directed learning is human's basic competence which means the ability to learn from themselves. Self-directed learning is defined as a process where an individual take an inititative with or without help from the others in diagnosing their learning needs, formulate the objective, identify the source, choose and apply the suitable learning strategy, and evaluate the expected result. Furthermore, Mok (2010) states the reasons as to why self-directed learning is important. It is because (1) new knowledge is created quickly and the knowledge in schools quickly left behind and (2) self-directed learning is also one of the high achievements. Thus, throuh self-directed learning, teachers get the chance to include characteristic teaching and encourage students to use a good/positive attitude. Accordingly, teachers' encouragement consist of advice which correspond with creative cognitive (4 components) and affective creative (5 components) and adjusted with the discussed materials.

Self-direction in each phase change need some helps from teachers as the facilitator, such as the teachers become their role model, be kind when asking or answering questions and when giving them chances. Bandura's social learning theory as cited in Maftuh (2009) states that children obtain valuable behavior or moral through modelling and reinforcement. The supporter of this theory believes that children start to behave in consistent way by having adults as the standard, since every parents and teachers respond "good behaviors" with positive reinforcement in the form of agreement, love, and another present. They believe that children behave in a wide moral through

examples, observing and copying adults which has similiar behavior. However, in class learning, teachers do not only become their role model, but also become the facilitator which lead every activity to create a comfortable learning environment for the students. In this phase, the teachers must always ready to emphasize behavior/attitude which support affective creative values.

Students' Creative Cognitive. For data collection of students creative cognitive, two written tests, beginning test and final test, have been done. A result recapitulation which consist of a distribution of students based on their creative cognitive level is explained per middle school below.

Table 5. Final Test Result of SMP Banjarmasin's Students' Creative Cognitive

Creative Cognitive Level	SMPN 6		SMPN 19		SMPN 24		Total	
	T	K	T	K	T	K	T	K
Very Creative	7	2	0	0	4	1	11	3
Creative	7	6	27	4	11	4	45	14
Creative Enough	6	12	5	8	9	8	20	28
Less Creative	0	1	0	23	4	6	4	30
Not Creative	0	0	0	0	0	0	0	0
Does not attend the test	-	-	2	-	-	-	2	0
Total	20	21	34	35	28	19	82	75

Explanation: T: Treatment/Trial Class; K: Control Class;
Data is processed from the research result.

The result shows an improvement of creative cognitive level in each treatment class when compared with the beginning creative cognitive. The data description for the creative cognitive result is shown in the following table.

Table 6. Students' Creative Cognitive Statistic

SMP	N	Mean	Std. Deviation
SMPN 6 –T	20	76.32	21.203
SMPN 6 – K	21	59.21	17.100
SMPN 19 –T	32	71.05	9.366
SMPN 19 – K	35	46.05	19.118
SMPN 24 –T	28	65.79	25.291
SMPN 24 – K	19	50.00	22.048
Combining– T	80	69.69	18.527
Combining - K	75	46.67	21.487

Explanation: T: Trial/Treatment Class; K: Control Class

However, to be more precise, a statistic test has also been done. The result of normality test shows that every group actually do not distributed normally. Therefore, to see whether there is an average difference in the above table, Mann-Whitney's statistic nonparametric test is applied and can be concluded that creative cognitive median which is produced by treatment group class is significantly different from creative cognitive median which is produced by control group class in the three middle schools, whether it is per school or the combination of them. In other words, the implementation of PSBNK learning model is effective in developing middle school students' creative cognitive.

Students' Affective creative. The condition of real affective creative is very different if compared with creative cognitive. It is caused by creative products that can dissapear quickly if not recorded properly. The use of handy camera is helpful in reexamining the appearance of behavior/attitude that becomes indicator of affective creative components. Another weakness in revealing a side of affective creative is the observer can only observe half students in a class. The following is the result from observing the half students which are related with creative values that appear through their attitude and behaviour.

Table 7. The Result of Final Observation of SMP Banajarmasin's Students' Affective creative

Affective creative Level	SMPN 6		SMPN 19		SMPN 24		Total	
	T	K	T	K	T	K	T	K
Become a Habit	4	3	2	0	2	0	8	3
Already Growing	1	2	1	2	2	2	4	6
Just Developing	4	3	5	0	4	3	13	6
Visible	0	0	0	6	0	3	0	9
Not yet Visible	0	0	0	0	0	0	0	0
Total	9	8	8	8	8	8	25	24

Explanation: T: Treatment Class; K: Control Class

At a glance, the above table seems to show that treatment group distribution tends to achieve higher affective level compared to control group. The statistic description of processing result from Attachment 20 can be seen in the following table.

Table 8. Students' Affective creative Statistic

SMP	N	Mean	Std. Deviation
SMPN 6 –T	9	76.25	19.955
SMPN 6 – K	8	76.25	20.659
SMPN 19 –T	8	68.75	16.421
SMPN 19 – K	8	52.50	18.323
SMPN 24 –T	8	67.50	18.323
SMPN 24 – K	8	45.00	16.036
Gabungan – T	25	72.00	18.484
Gabungan - K	24	57.92	22.259

Explanation: T: Treatment Class; K: Control Class

The result shows that students' affective creative mean in SMPN 19, SMPN 24, and their combination is quite different in between treatment group and control group, except in SMPN 6. For deeper insight, normality and homogenity test has been done repeatedly to the above data. Next, in SMPN 24 group, the applied homogentiy test result in showing two group of treatmend data and control is homogen, so to test whether the affective creative data mean is significantly different, *t* test is applied. Meanwhile, student groups in SMPN 6, SMPN 19, and their combination, Mann-Whitney's statistic nonparametric test is applied and shows that applying PSBNK learning model in mathematic learning in three middle schools proven to be effective in developing students' affective creative.

Intact Students' Creativity. The two explanations above have provided data based on cognitive and affective components from creative separately. The following is students' creativity data which is a combination of two components. The data are only obtained from 25 treatment class students and 24 control class students, since the observation is only on two groups of each class.

Table 9. Students' Creativity Distribution

Creativity Score	Class		Total
	Treatment	Contro	
161-200	8	3	11
121-160	15	7	22
81-120	2	8	10
41-80	0	6	6
0-40	0	0	0
Total	25	24	49

Each average creativity score is 149 for treatment class and 110 for control class. We can see that control class is spread according normal distribution and different from treatment class. It is proven from the normality test. To see whetеher applying PSBNK learning model in mathematic learning shows effective result, Mann-Whitney's test is also applied to the above data. The result of this test gives *z score* = -3,845 with *p-value* = 0,000 < α = 0.05. Therefore, it can be concluded that by convincing experiment group with the appliance of PSBNK learning model can achieve higher creativity score compared with control group that is given a treatment of conventional learning model.

Factors which Affects Middle School Students' Creativity Values Development

Internalization characteristic values process is not only happening in school through learning in class or school's culture forming, but also at home and students' environment where they interact with others. Home environment of students' family background become the first place of characteristic values internalization, since students see, learn, feel, and do many things at home first. Therefore, family background can affect the establishment of students' characteristic. Based on this research's data, students' background consists of gender, date of birth, number of siblings, whether or not they have attend kindergarten, parents' education, parents' occupation, and parents' income can result in various level of creativity. Male students are more creative compared to female students. It is because boys tend to have more courage in doing something new. Students that have never attend kindergarten is less creative compared with those who have attend kindergarten. It is not because attending kindergarten is bad, but it is because those who do not attend kindergarten have faced bigger challenges in elementary school. Even so, overall, students' background does not have significance influence in their creativity level. Based on the statistic analysis, it is known that father's educational background, the child's order in the family, and experiencing kindergarten tend to have positive impact in creativity level. This shows that parents with better education have better realization on children's education. It can potentially affect the child's creativity.

CONCLUSION

Currently, most middle school students are in the level of creative enough for cognitive component and in the level of starting to be seen in affective component. Therefore, it can be seen that cognitive component is more developed thatn affective component. The application of PSBNK mathematic learning model can improve students' creative level cognitively or affectively. The impact of development of creativity values can fastly seen in students with low input level and slowly seen in students with high level input. Students with high affective creative will also have high cognitive creative but not vise versa. Students' economic social status establishes different students' creative level achievement but does not have any significance relation with students' creative level achievement. If the teachers can plan their teaching materials properly by involving affective objective (value/character education), then, the results of students' character development can be seen more quickly.

The result of this research shows that PSBNK model is capable of developing students' creativity, whether it is their cognitive or affective component. This learning model emphasize on giving students chance to explore, experiment, discuss, asking questions, and working together while also respecting each other. Teachers play a role in encouraging students to keep on thinking creatively and behave according to the affective creative components. In the learning process, students are given enough chance to know which the right behavior is, feel how to behave properly, and do the right thing. Therefore, to imrpove and nurture students' creativity, the research recommends: Every mathematic teacher should apply learning model which allows the development of both students' cognitive and affective sides at the same time aside from psychomotor in learning. Prepare properly the mathematic subject, including problem-solving which contains creative values. Give students chance in every learning process to direct themselves into affective behaviors so the developed character values can be internalized properly.

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