

THE INFLUENCE OF PSYCHOLOGY OF MATHEMATICS EDUCATION ON STUDENT'S CHARACTER IN ELEMENTARY SCHOOL

Vita Nova Anwar, M. Pd
Bung Hatta University

Abstract

Psychology of mathematics education is the branch of psychology that focuses on how we learn mathematics. Mathematics education has changed over time due to a new understanding of learning processes. For example, in previous mathematics learning, drilling and repetition were key components of mathematics education. Recently, mathematics education has included hands-on activities due to psychologists' beliefs that children learn best through activity. Psychology today says that the current educational philosophy appears to be for student in elementary school who is not learning any subjects to even more hours of that subject in school and an ability in calculating numbers. But, psychology is related to building a student's character. Math teacher should encourage his/her students that they must not be afraid of math. Some of the characters are being developed in learning mathematics such as honesty, tolerance, hard work, creative, independent, curious, communicative and responsibilities. Mathematics is one of tools that can be used to develop character of students, due to the relationship of mathematic and daily life. Mathematics activities are used to explore ideas, arguments and students' different ways in determining solution from open questions and commands that can deliver students to the understanding of a concept.

Keywords: *Psychology in Mathematics education, Student's Character*

INTRODUCTION

The long term goal of learning is to improve the skills of students so that when they have graduated, they can develop themselves and are able to solve their problems. The learning process that occurs during the student in school will determine their success in the days to come. Teachers have responsibility to help students acquire information, ideas, skills, values and ways of thinking and expression. Another responsibility is to guide students on how to study and how to solve the problems.

Mathematics is known as a difficult subject for some of elementary school students. Most of students assume that he is not talented in mathematics. A student who has the assumption will think He/She doesn't have to learn math. He/She will think not good in math even already try the best. This supposition is very worrying. Several questions can be asked about those related to Psychology in mathematics learning in elementary school, why some students do not like math? What teachers can do to address it? Why students can complete the numbers but don't understand the meaning?

Mathematics is befitting the subject from the which to study the relationship between logic and psychology. There are, and for at least the last twenty five hundred years have been, profound and complex philosophical issues regarding the logical structure of mathematics in relation to the psychology of mathematical thinking. The ancient Pythagorean number posited as the fundamental constituent of all thing, be they objects of the sense or of the intellect. For Plato, mathematics afforded the natural course of passage into the realm of universal forms. He proposed mathematics as a centerpiece of his curriculum. The study of mathematics, he argued, provides a pedagogical bridge for

the learner to liberate Themselves from the transient world of the sense and to Regain entry to those transcendent realms.(Campbell , 2006)

Psychology of Mathematics Education consist of mathematical objects and the methods. Psychology is the science of the soul. By psychology, we try to uncover phenomena that occur around us . So many phenomena in the world that cannot be solved , as well as mathematics. A lot of phenomena that are not solved because of limitedness.

Psychology of Mathematics Education aims identifying the phenomenon, explains the phenomenon and operate the phenomenon. In this case, the phenomenon is the learning of mathematics. Identify the mathematical phenomenon will get feedback from students, namely the formation of student character.

Characters can be interpreted by different perspectives. According to Wynne & Walberg, "Characters is engaging in morally relevant conduct or words , or refraining from certain conduct words", (Idris , 2011) . Character education based on the basic character of human beings , which is sourced from the universal moral values (absolute) derived from religion, it also referred to as "the golden rule".

Math is related to math attitudes that include teacher and student relationship, the method used, the communication with the family, the state of the environment and character of the students. According to Jenkin (2006) "Mathematics possible connection between mathematics attitudes and such thing as a teacher student relationship, teaching method, educational values held by family and community, home environment, presence (or lack of) of the curriculum, a student innate character". The character of students can be developed by learning process in the classroom. The same thing is also supported by Groth (2007) "Effective learning environments Characterized as knowledge- centered, community-centered, assessment-centered and learner-centered". Learning environment strongly influences to development of student's character.

Therefore, it is vital to develop the psychology of mathematics instruction for elementary school students to build the character

The Purposes of the Study

1. To know Psychology of Mathematics Education
2. To know the character can be developed to Elementary School's Students
3. To know the linkages of Psychology of Mathematics Education and character of elementary school students.

THEORETICAL FRAMEWORKS

The Psychology of Mathematics Education

Psychology of mathematics education by Resnick and Ford (1984:3) is science that examines the structure or composition of the mathematics and also about how to assess a person's thought), reasoning reason, and how he/she uses the intellectual capability.

Psychology of mathematics education is the study of a variety of mental symptoms that appear on actors of learning, especially for students when learning mathematics. By analyzing the mental symptoms that appear when the students learn math, teachers can find out who get difficulty in mathematics learning and how student's character develops during the learning process continues. After that, teachers are able to explain the difficulties experienced by students in learning mathematics . Then the teachers

prepare alternative ways those can be used to help students to be free from learning difficulties.

The psychology of mathematics education plays an important role in developing students' mathematical character such as unyielding, conscientious, diligent, curious sense and communication. By studying the psychology of mathematics education which deals with one's soul will be related to human attitude displayed. Developing attitudes become the character of the elementary school students.

Character Education in Elementary School

Character education is very important as part of efforts to build the nation's character. Accordance regulation of character education in Law No. 20 year 2003, Article 3 on National Education System of Republic Indonesia states "The national education serves to develop skills and form the character and civilization of the nation's dignity in order to achieve the life of the nation, aimed to develop the potential of students to become a man of faith and fear of God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become citizens of a democratic and responsible.

According to Narvaez (2010), "the dilemma that faces teacher educator, then is whether it is acceptance to allow character education to remain part of a school's hidden curriculum or whether advocacy for the value commitments immanent to education and teaching should be transparent, intentional and public".

Character education is implemented with a comprehensive approach. Character development should include macro and micro context. National macro context includes the entire context of the planning and implementation of character development that involves all stakeholders at National Education Ministry.

Macro level character development can be divided into three stages, namely planning, implementation and evaluation. In the implementation phase developed learning experiences and learning processes that lead to the formation of character within the individual learner. This process is carried out by cultivation and empowerment as outlined as one of the principles of national education. This process occurred in the three pillars of education in educational units (school), families and communities.

Micro level character development occurred in school holistically (the whole school reform). School as a leading sector, seeks to utilize and empower all existing learning environments that initiate, improve, strengthen and enhance ongoing process of character education.

Micro-development values characters can be divided into four pillars, namely teaching and learning activities in the classroom, school culture, co-curricular activities and/ or extra-curricular, as well as daily activities at home and in the community.

As a part of the overall order of the national education system, character education must be developed and implemented on systemic and holistic in the three pillars of character education, the education unit (school, college, unit/non-formal education programs), family (immediate family, family wide), and society (community, local community, region, nation and state).

Character education is not meant to add a new lesson but rather integrated into subjects, personal development and cultural education unit. Therefore, teachers need to integrate education and unit values developed in character education into the curriculum (syllabus and lesson plans) that already exist. In mathematics learning, teacher have to link any topic related to everyday life.

According to Anis Matta in "Shaping Character Muslims", the roots of the character exist in the way of thinking and feeling person. It is a natural personality structure. Man consists of three building blocks, namely heart (how he feels), mind (what he thinks) and physical (how he behaved). Some rules of the establishment of the characters are following:

a. Gradualness

The process of formation and development of character must be done gradually. People cannot be prosecuted to be good suddenly and instantly.

b. Continuity

This is a continuous process that will form the flavor and color of a person those become a habit and so on will be distinctive personal character.

c. Momentum

Moment would serve as proper training and education.

d. Intrinsic Motivation

Strong character will be formed if the impulse that accompanies actually born from yourself.

e. Tutoring

The formation of this character cannot be done without a teacher/mentor. The position of a teacher/supervisor is to monitor and evaluate the development of a person.

Character development of each rule is seen that the teacher plays a major role in a touching student's character towards better. Classroom learning situation is possible at all for teachers to convey the characters well to students, and students can apply them in everyday life.

Definition of Character

Characters can be interpreted from different perspectives. One definition according to Wynne & Walberg "Character is engaging in morally relevant conduct or words, or refraining from certain conduct words" (Idris, 2011). Character education based on the basic character of human beings, which is sourced from the universal moral values (absolute) derived from religion, it also referred to as "the golden rule".

Principles of Character Education

Character education should be based on the following principles (MONE, 2010):

- a. Promote basic ethical values as the basis of character
- b. Identifying characters in a comprehensive manner that includes thoughts, feelings, and behaviors
- c. Using a sharp approach, proactive and effective way to build character
- d. Creating a care school community
- e. Provide opportunities for learners to demonstrate good behavior
- f. Have meaningful and challenging curriculum that respects all learners, build their character, and helps them to succeed

- g. Ensuring the growth of self-motivation on the learners
- h. Functioning of the entire staff of the school as a moral community that shares responsibility for character education and faithful to the same basic values
- i. The division of moral leadership and broad support in building character education initiative
- j. Enabling families and community members as partners in an effort to build character.
- k. Evaluating the character of the school, school staff function as teachers of character, and the manifestation of positive character in the lives of learners.

Relation of Psychology to Elementary School's Students Character

Bruner (1915) is a developmental psychologist and cognitive psychologists expert. His approach is eclectic psychology. His research covers a lot of human perception, motivation, learning, and thinking. In the human study, he considers humans as processors, thinker, and creator information (Dahar, 1988; 118).

On learning of mathematics in primary school, Bruner's theory to be a reference. By manipulating the props, the students learn through activity. As noted Bruner (Suwarsono, 2002:25), learning is an active process that would allow people to find things outside (exceeds) the information provided to him. For example, a student who is studying integer will be found important and interesting things about prime numbers, even at the beginning of learning process, the teacher just about providing a bit of information about integers. Bruner theory of human activities not related to the age and stage of development. There are three important parts of the theory of Bruner (in Suwarsono, 2002: 25), namely:

1. Enactive, which is a stage of learning of knowledge where knowledge is actively studied, using concrete objects or using real situations.
2. Iconic, learning of knowledge represented (embodied) in the form of a visual shadow (visual imagery), images, or diagrams, which describe the concrete activities contained in Enactive.
3. Symbolic, a stage of learning where knowledge is represented in the form of abstract symbols, both verbal symbols, letters, numbers, words, symbols of mathematics and other abstract symbols.

By knowing the stages of learning mathematics according to Bruner, the teacher can develop the character of students at each stage of the learning. For example, developing the curiosity of students, increase student confidence with praise, increase student persistence in solving math problems.

RESULT AND DISCUSSION

Development or character formation is believed to be necessary and important to be done by schools and stakeholders to be a foothold in the implementation of character education in schools. By the history of human culture, Thomas Lickona (1992) states that the purpose of moral education are : a) to help learners become smart; b) make learners become better. In other words, the goal of character education is basically encouraging the birth of good children. Growth and development of good character will encourage learners to grow with the capacity and commitment to do the best things and do everything right and have a purpose in life.

Character is developed through the stages of knowing, acting and habit. Characters are not only about knowledge. A person who has knowledge of goodness is not necessarily able to act according to his knowledge, if not trained (a habit) to do so. The character also reach the area of emotions and habits themselves. Three components of character (a component of good character) are moral knowing, moral feeling (emotions reinforcement), and moral action (MONE, 2010). So, Students or school community get involved in the education system can understand, feel, live, and practice (doing) good values (moral).

There are indicators of characters that can be developed in the learning of mathematics in primary schools include :

Table 1. Indicator of Mathematical Character for Elementary Students

Scope and Definition	Indicator
1. Honest A behavior is based on an attempt to make himself as one who can always be trusted in words, actions, and work	• Do not cheat in a test • Expressing the real feelings • Report items found • Report the data or information as it is • Acknowledge errors or omissions owned
2. Discipline It is an action that shows the orderly conduct and	• Be on time • Obey the rules • Working/collect tasks by specified time

Table 1. Indicator of Mathematical Character for Elementary Students

comply with various regulatory requirements	
3. Responsibility It is the attitude and behavior of a person to carry out the duties and obligations that should do for themselves, society, the environment (natural, social, and cultural)	• Carry out individual tasks well • Accept the risks of action taken • Do not accuse anyone without evidence of accurate • Return borrowed items • Ask for forgiveness for mistakes made
4. Tolerance It is the attitude and actions that respect the differences of religion, race, ethnicity, opinions, attitudes, and actions	• Do not disturb dissent friend • Respect to friends of different religion, race, ethnicity, and gender • Receiving a deal though different opinions • Accept the shortage of others • Forgive the mistakes of others

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| <p>5. Mutual Aid
It is working together with others to achieve common goals and helping each other various tasks sincerely</p> | <ul style="list-style-type: none"> • Getting involved in community service work, cleaning the classroom or school • Willingness perform a task according to agreement • Willing to help others without expecting anything in return • Active in the group work |
| <p>6. Polite
It is a good attitude in the association in terms of language and behavior. Politeness is relative meaning accepted varies norms at different places, the environment, or time.</p> | <ul style="list-style-type: none"> • Respect teachers and parents • Do not speak dirty, rude, and arrogant • Do not spit in any place • Do not interrupt • Say thank you after receiving help from others • Do greetings, smile, say hello • Ask for permission before enter room or use the property of others |
| <p>7. Confident
It is a mental or psychological condition of a person that gives a strong belief in himself to do or perform any act or conduct activities</p> | <ul style="list-style-type: none"> • Argues without hesitation • Ability to make decisions quickly • Not easily discouraged • Not awkward to act • Dare to presentation to the class • Dare to argue, ask or answer questions |
| <p>8. Never give up
It is the behavior that indicates earnest effort in overcoming barriers to learning and completing</p> | <ul style="list-style-type: none"> • The spirit of learning • Motivated to learn • Desire to learn • Complete the assignments • Do homework and practice properly |

Table 1. Indicator of Mathematical Character for Elementary Students

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| <p>assignments and tasks as well as possible.</p> | <ul style="list-style-type: none"> • Using a variety of sources to find solutions of problem given • Conduct experiments to find a solution to the problem given. |
| <p>9. Diligent
It is a best effort in whatever we do to achieve success</p> | <ul style="list-style-type: none"> • Do Exercise • Solve problems in a neat and orderly • Working step by step of a problem given • Pay attention in learning • Carry tools and materials in the learning |

CONCLUSION

Based on the above discussion, it can be concluded that psychology of mathematics education is a science that studies the structure or composition of the mathematics itself and also about how to assess a person's thought (think), reasoning, and how somebody use these intellectual abilities. It is closely related to the character development of

primary school students. By knowing the psychology of learning mathematics, teachers can develop some mathematical characters, for example, curiosity, persistence, confidence and communication.

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