

Categorizing Multiple Intelligences of Pre-Service Mathematic Teachers

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Keywords: Education, Multiple Intelligences, Mathematic.

Abstract: Someone will find it easier to learn something by using the most dominant intelligence within them, so it needs to be identified the prominent intelligence in a person towards an effective learning process. This study aims to determine the plural intelligence of teachers pre-service mathematically. The research method used is descriptive qualitative. The results of this study indicate that every student has a dominant intelligence, interpersonal intelligence is the dominant intelligence that most students have from the eight types of intelligence in multiple intelligences. The implications of this study are that students become aware of their dominant intelligence so that they are more confident.

1 INTRODUCTION

Gardner suggested that there are at least eight types of human intelligences. They are also known as multiple intelligences. The first intelligence is kinesthetic intelligence. It is the ability to use the whole body to express ideas and feelings and the competency in using the body to produce or change something (Gardner, 1983). Interpersonal intelligence is one's skill in understanding other people mood, purpose, motivation, and emotions (Gardner, 1983). Intrapersonal intelligence has self-concept and positive life direction. This refers to competence in knowing self-identity and acting self-development (Gardner, 1983). Logical-Mathematical intelligence is indicated by high skill in manipulating and understanding numbers and the ability to think effectively (Gardner, 1983). Musical Intelligence is the ability to appreciate, differentiate, write, and perform in different types of music (Gardner, 1983). Naturalist intelligence is the ability to appreciate, categorize, classify, explain, and connect things in nature (Gardner, 1999). Linguistic Intelligence is the ability to comprehend, use, and manipulate written or spoken words productively (Gardner, 1983). Visual / Spatial intelligence is characterized by the ability to understand pictures or situations and quickly (Gardner, 1983).

Therefore, it is important for prospective teachers to recognize their own intelligence domain to facilitate them to learn. In fact, math teacher candidates are generally unaware of their dominant intelligence and have not utilized that intelligence in the learning process. Based on the results of previous research it is suggested that the intelligence domain of prospective teachers should be determined starting from the first semester, and the environment must accommodate all intelligence domains (Yenice and Aktamis, 2010). It is important since every individual is unique (Kilic and Serf, 2015). Recognizing and understanding the classroom diversity have been proven significant (Katwibun, 2013). Significant progress has been achieved over the last decade to understand and define diversity in mathematics classes, and how this diversification is concerned with teaching and learning mathematics. According to recent research, in order to have an effective educational process, it is important to identify areas of intelligence and know the exact parameters in identifying them. (Aydemir and Karali, 2014).

Consequently, at the level of mathematics education at the University, prospective teachers need to know what are their most dominant intelligence are so they can learn better and are confident in utilizing the intelligence. Multiple Intelligences theory for beginning teachers is also useful for improving

confidence in the transition from student to teacher (Roxana, 2014) Therefore, the mathematics teacher prospective needs to be facilitated to be able to learn effectively in the classroom. The lecturer also needs to know the dominant intelligence in the students so that the lecturer can plan the learning which is relevant to the students' intelligence. Knowing the students' intelligence profiles will allow lecturers to familiarize themselves with their students and understand their similarities and differences better. This is consistent with the theory of Multiple Intelligences implying that educators should recognize and teach students to develop their broader talents and skills (McClellan and Conti, 2008) In addition, with the categorization of students' multiple intelligences, students can know that they are smart and special. Every student is smart and excels in their respective fields and deserves an award for it. The appreciation of different intelligences in the mathematics class will make the students of mathematics teachers have confidence, so they are more motivated to do their best in learning. Variation is the most common metaphor for recognizing and accepting differences among people in society (Siegel, 2003).

The dominant intelligence fields of mathematics teacher candidates must be taken into account when planning education, they will be encouraged to participate in educational status proactively. Giving them assignment according to their preferred field will contribute to their personal development. It is in line with Ahmed and Gasm (2013) claiming that by knowing the dominant intelligence, students will have the opportunity to get a better education that suits their individual characteristics. As a result, they will be so motivated that failure to achieve educational goals can be minimized.

This study aims to categorize the multiple intelligence of prospective teachers. Efforts to categorize the intelligence of prospective mathematics teacher students was adapted from a multiple intelligence assessment in the form of multiple intelligences checklist. This is done so that the future lecturers can develop the lecture plan by considering the characteristics of the dominant intelligence of each student, also to give appreciation for all the intelligence that students have in the math class that is not currently done. The appreciation is only given to students who have logical mathematical intelligence, students who are dominant in other intelligences are less appreciated so they are less confident.

2 METHODS

This study used descriptive qualitative study. The subject was junior students of mathematic teachers. The sample was 24 students chosen randomly.

The instrument in this study was MI test using Multiple Intelligences Indicator based on Howard Gardner (Chapman and Chislett, 2005) the questionnaires consists of 24 statements measuring eight types of intelligences. It used Likert scale answer with the following options: highly disagree, disagree, agree, and highly agree.

3 RESULTS AND DISCUSSION

Based on the data, it was revealed that most students has more than one dominant intelligence.

Table 1: Multiple intelligence categorization.

Type of Intelligence	Number of Students
Linguistic	8
Logical Mathematics	8
Visual Spatial	5
Interpersonal	14
Intrapersonal	8
Kinesthetic	4
Musical	5
Naturalist	2

Table 1 shows that students with dominant interpersonal intelligence are 58.3%, linguistic intelligence, logic mathematic and interpersonal are 33% respectively, musical and visual intelligences are both 20.84%, kinesthetic is 16.6% and naturalist is 0.083%. In addition the students with more than one dominant intelligences are 58.3%.

The most developed intelligence is interpersonal intelligence because many courses require the students to be able to learn and complete group tasks. Furthermore, intelligences that have the same percentage are linguistic, intrapersonal and logical mathematic intelligence. These intelligences develop because mathematics students are required to be able to solve mathematical problems, communicate the problems and minimize error in solving the problems.

Ideally, mathematical logical intelligence can be further developed in learning, since it is the dominant domain in mathematics, the effort to improve mathematical logical intelligence can be done by providing many opportunities involving mathematical logical intelligence such as identifying patterns for certain patterns to come up with generalization. Activities that require students to

modify, use props or measuring tools should be given special attention so that student's kinesthetic intelligence can develop and the activities will then develop student skills in using mathematical tools. Visual intelligence may be facilitated by designing instructions containing more pictures, maps and object designs. The visual and non-visual methods used in solving problems by students of mathematics teacher candidates are very important for their students (Yasemin, 2014) Therefore, the instructions involving more types of intelligences are suggested to improve all types of intelligence potential. It is in accordance with the purpose of multiple intelligences that increase the ability that is not dominant in a person (Gardner, 1999) Contextual and daily life-based mathematical learning should also be able to give the space of naturalist intelligence to be better developed. Then to develop musical intelligence mathematics class, learning design needs to connect mathematics with music. Ideally, learning method is supposed to facilitate all types of intelligences to develop. Various learning method utilizing different types of intelligences will enable people with different types of intelligence to understand what they are learning as for example by using words, pictures, gestures, rhythmic expressions and individual and group experiences (Nasrin, 2012) Mathematic skill is not merely influenced by logical intelligence, and logic mathematic intelligence is not dominant and superior to other types of intelligences. It is in line with Gardner stating that logic mathematic intelligence is not better than any other intelligences. In traditional method, to learn mathematics, students have to use their logic mathematic. This is no longer relevant to today's condition (Mousavi and Ahmadi, 2013). Other research suggest that teachers need to equip themselves with more flexible approaches (Galton and Eggjeston, 1979) in teaching science and mathematics. This alternative method attempts to fulfill various students' needs (Sulaiman, et al., 2010).

4 CONCLUSIONS

The categorization of intelligence into eight types of intelligence help mathematics teacher candidates to recognize their own strengths and weaknesses. Recognizing their own intelligence helps them to be more confident. Intelligence identification has enabled the students to use their dominant intelligence in achieving a more effective learning process. The students' intelligence classification is also beneficial for the lecturers in designing

instructions and assignments in accordance with the type of intelligence the students have.

ACKNOWLEDGEMENTS

We express our sincere gratitude to UIN Sunan Gunung Djati Bandung research institutes and community service for their support.

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