

IMAGES OF MATHEMATICS HELD BY MANAGEMENT STUDENTS

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ABSTRACT

We need to know how student learn mathematics. Their perspective about mathematics through images must be explored and analysed to contribute answers how they learn mathematics. Knowledge is shaped by students through various activities and different experiences in life. Mathematics education in Malaysia involves preschool level until university level. One of the levels in mathematics educations that some students must undergo is the foundation level implemented by majority higher learning institutions all over the country. The program objective is to produce 'feeder' to the Bachelor program and students should understand the basic concept of mathematics and how it relates to various issues in management. Hence, this paper discusses the general views of images of mathematics held by students of the Foundation of Management program at a higher learning institution in Selangor. Forty two students out of ninety from the second semester batch were involved in this study. Data were collected through an open-ended questionnaire which asked them to draw image which represent their perspectives on mathematics and mathematics learning. Many matters related to the students' images of mathematics and mathematics teachers are discussed and how they relate to the values in mathematics education.

Keywords: *images of mathematics, mathematics learning, values in mathematics education.*

1. Introduction

Mathematics is a very important subject and must be learnt by every student in Malaysia since preschool until university level. A review of related literature (Lim 2012; Nik Azis 2010; Rokiah et.al 2010; Wan Zah et.al 2009; Bishop 2012; Clarkson et.al 2010; Dede 2013) shows that inculcating values and moulding character has been a great concern in the school mathematics curriculum of many countries. It is possible to inculcate positive values with careful and mindful integration into teaching and learning of mathematics and thus produce positive characters of our future generation.

Prime Minister of Malaysia, Dato' Seri Mohd Najib bin Tun Abdul Razak had firmed about values (Kementerian Pendidikan Malaysia 2012) which must be integrated and inculcated through teaching and learning. Mathematics which has a negative perception as a 'dry' subject (Wan Zah et.al 2005) must be tuned back to be a beautiful and meaning subject so that everybody will be full heartedly enjoy learning it.

There are many studies in the West and a few in Malaysia on the mental images(Sharida Hashim & Nik Azis Nik Pa, 2010) or representations of mathematics. Nik Azis (2009) defined images of mathematics as a mental perspective which represent his/her belief, attitude and

perception on mathematics based on his/her true knowledge and experience. It can be expressed through verbal, graphics, figurative and linguistic (metaphors). It is actually the personal perception on mathematics. It contains implicit element unconsciousness. Picker and Berry (2000) found that Western community expressed images of mathematics as dry, difficult, abstract, theoretically yet important (Picker & Berry, 2000). These negative perspectives on mathematics were also supported by several researches in Malaysia such as Wan Zah et. al (2009) and Lim (2012).

We need to know about students' perspectives on mathematics and how they learn mathematics. Management Foundation is the Pre University level that some student must undergo with the objective to produce 'feeder' (Elisha & Reevany 2007) to the Bachelor program with management background. The basic concept of mathematics which relates to various issues in management should be explored and well understood by each of student. Hence, students from this program were selected to be involved in this research to give information about their perspectives on mathematics and the role of their teacher when teaching mathematics in the classroom.

Lately, wide attention has been garnered by researchers in mathematics education to study on images of mathematics. Previous studies (Sharida & Nik Azis 2010; Roselah e.al 2010) have found that teacher was the main factor that influences students by shaping students' attitude and beliefs towards mathematics and mathematics learning (Seah 2011) . Besides that, the differences in images of mathematics held by students were found to be related to approaches to mathematics learning, students' experiences while learning mathematics, and evaluation of their achievement (Bills & Husbands 2005).

2. Methodology

Forty two students out of ninety from the second semester of Foundation of Management program were involved in this research. Open-ended questionnaire provided data such as personal information like gender and Mathematics' result for Sijil Pelajaran Malaysia, metaphors related to mathematics and images of learning mathematics was designed and adapted from several previous (Nik Azis Nik Pa 2009; Rokiah Embong et.al 2010; Roselah Osman et.al 2010).

For the metaphors and images of mathematics learning, participants were asked to draw a picture about their experience while learning mathematics. The picture or figurative representation should depict their perspectives on mathematics and the role of their teacher in the mathematics classroom. Finally, the questionnaire data were analysed quantitatively.

3. Findings

From the research, 74% of participants were female students and the remaining of 26% were males. As a whole, the grades for Mathematics subject in the Sijil Pelajaran Malaysia (Malaysian Certificate of Education) of the participants were between D to A with 43% of them achieving A.

3.1 Images of Mathematics

Data for images related to mathematics in the questionnaires provided information on the views of participants regarding what represents mathematics. The findings found 40% of participants chose symbols to represent mathematics while 19% chose symbols plus numbers and abstract respectively. Meanwhile, 17% of drawings showed numbers in relation to mathematics. The findings differed from that of other studies such as Lim (2012), Seah (2007) and Wu et.al (2011). Although the differences may be attributed to contextual factors (e.g., participants differ in terms of demographics, field of study, learning experience, and type of educational institution), they raise several questions requiring further investigation.

Table 1: Images of Mathematics

Gender & Number	Symbol	Number	Symbol	Abstract	Abstract	Total (%)
Female	11	5	8	6	1	31(74%)
Male	6	2		2	1	11(26%)
Total	17(40%)	7(17%)	8(19%)	8(19%)	2(5%)	42(100%)

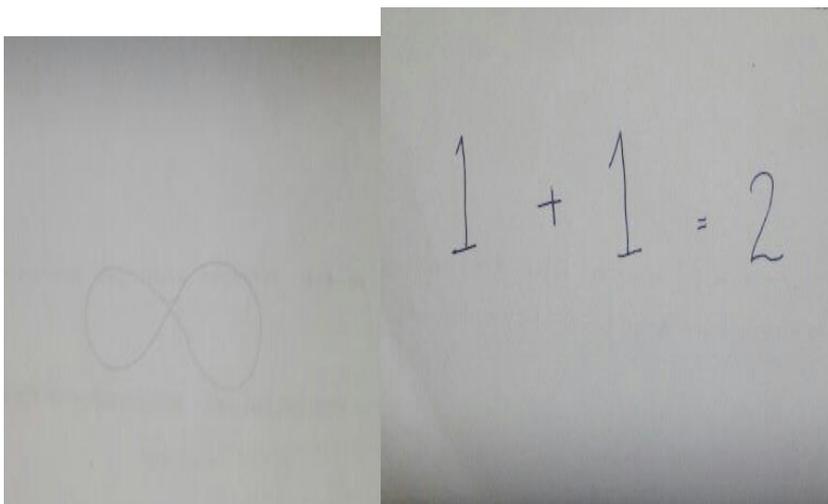


Figure 1: Drawing by a female

Figure 2: Drawing by a female student with B result student with B result

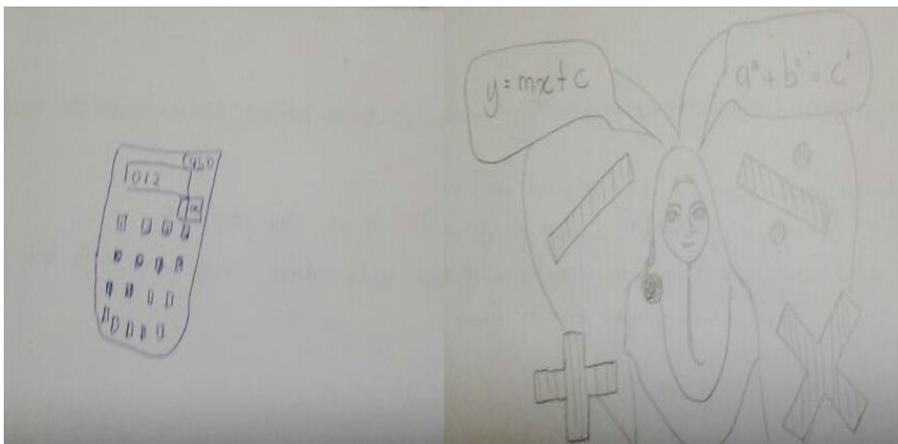


Figure 3: Drawing by a male
Student with C result

Figure 4: Drawing by a female student
with A result

3.2 Images of Mathematics Teachers

Data on images of mathematics learning were analysed in the context of images of the role of teacher in the mathematics classroom. Data on the images of mathematics teacher were categories into two main areas namely orientation and appearances (Table 2). Figure 5 to 8 show examples of

drawings of the participants on images of mathematics teaching. In the aspect of orientation (see Table 2), 64.5% of the drawings showed teacher-centred approach, 16.5% drawings show teacher and student-centred approach, 8% of drawings show a picture of teacher or teacher teaching without students and 14% of the drawings show an abstract picture meaning that neither teacher nor student in the picture.

Next in terms of appearance, four drawings for the case of teacher-centred and teacher and student-centred approach respectively showed the student-friendly teacher, while 26 drawings showed the teacher where the student-friendly aspects were not highlighted. Finally, in the case of teachers teaching with no student displayed in a picture, both two drawings expressed a student-friendly teacher. Overall, in the 42 drawings that displayed images of teachers, 23.8% drew teacher-friendly pictures of students, in which warmth was marked by a smile.

Table 2: Images of Mathematics Teachers in the Classroom

Gender	Orientation								
	Teachers Centered		No Student		No Teacher No Student		Teacher and Student Centered		Total %
	SF	NS	SF	NS	SF	NS	SF	NS	
Male		7	1			2		2	12 29%
Female	4	16	1			4		4	30 71%
Total	4	23	2	0	6	4	3	42	100%
%	9.5%	55%	8%		14%	9.50%	7%		100%

SF: Student Friendly

NS: Not Shown



Figure 5: Drawing by a female student with A SPM Math result

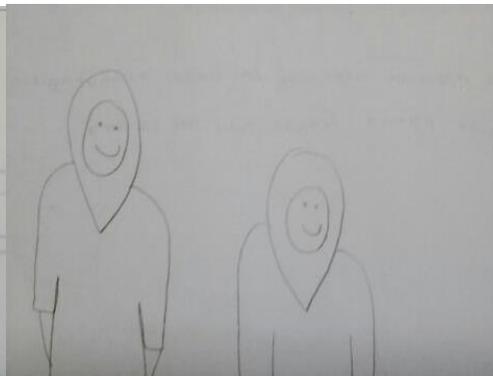


Figure 6: Drawing by a female student with A SPM Math result

Figure 7: Drawing by a female student with B SPM Math result

Figure 8: Drawing by a male student with A SPM Math result

4. Discussion and Conclusion

Research on the images by drawings made by the Foundation of Management students allows us to develop ideas about their self-perception on mathematics and the role of a teacher during the teaching of mathematics. Finally, in terms of images related to mathematics and mathematics learning, the details of the study are as follows:

1. Majority (76%) of the students select number and symbol as an element or item related to mathematics.
2. More than half (64.5%) of the drawings on mathematics teachers shows teacher-centred approach.
3. Only 23.8% of drawings on mathematics teachers display student-friendly teacher.

In this study, an overall conclusion can be drawn from the findings is that students had different perspectives on mathematics. Numbers and symbols are very common views which represent mathematics. When students hear about or look at the word of mathematics, majority of them will imagine numbers and symbols. Anybody who hates numbers, symbols or other abstract views will hate mathematics too. This scenario supposed not to be happened in the classroom. Positive expectation and perspectives on mathematics should be inculcated among students so that they will enjoy learning mathematics.

The very dominant model of teaching and learning namely behaviourism promotes a teacher-centred teaching approach in which the relationship between teachers and students is in the authoritarian form. Refer to Roselah et.al (2010), teacher-centred approach expect student as an empty glass to be filled with knowledge and specific skills, while the teacher has a responsibility to organize a collection of empty glasses and filled in them with knowledge about mathematics. This is a common scenario which we can see in teaching and learning especially in mathematics classroom in majority of institutions of higher learning in Malaysia. The information obtained from this study will hopefully help teachers, curriculum developers, module writers and administrators of institute of higher education to produce module or think the right action to improve the teaching and learning mathematics as a whole.

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