

Computer Engineering Students' Metaphorical Images of Mathematics

[Necdet Güner]

Abstract— *This study examines and classifies the metaphors that computer engineering students formulated to describe “mathematics”. The sample of study consists of 45 Pamukkale University computer engineering freshmen. The following questions guided this study: What metaphors do students use to describe the concept of “mathematics”? What conceptual categories can be derived from these metaphorical images? The data were analyzed qualitatively and found 21 valid metaphors and 5 main conceptual categories were identified. These main conceptual categories are: puzzle, game, hardship, complex structure and a tool.*

Keywords—metaphor analysis, metaphorical images of mathematics, computer engineering students

I. Introduction

Today, almost every engineering jobs requires mathematical knowledge, and employees are expected to have mathematical reasoning ability. Because of this, it is important to teach engineering students mathematics effectively. Students, however, often experience difficulty with mathematics and have prejudice.

In their book Lakoff and Johnson [1] examined use of metaphors in daily language and English literature say “Metaphor is principally a way of conceiving of one of thing in terms of another, and its primary function is understanding.” As a concept, metaphor is considered an intellectual instrument that an individual can use in expressing and explaining an abstract and conceptual fact.

Previous metaphor analyses about mathematics, researchers examined the opinions of students, teachers, academicians and adults ([2][3][4][5][6][7][8]). For example, Lim [3] worked on metaphorical images of mathematics given by adults. He found three common categories of metaphors about mathematics; as a journey, a skill and as a game or puzzle. Wood's [8] research on 1200 university students from five countries show that, most students view mathematics as a tool to use in their professional lives.

In another study, researcher asked ninth and tenth grade students to write a metaphor for mathematics. Result of this study shows that most of the students emphasized the hardship of learning mathematics, its hierarchical structure and its use as an instrument [6].

This study examines and classifies the metaphors that computer engineering students formulated to describe “mathematics”. The following questions guided this study:

1. What metaphors do students use to describe the concept of “mathematics”?
2. What conceptual categories can be derived from these metaphorical images?

II. Method

The sample of study consists of 45 Pamukkale University first year computer engineering students. Data were collected during the fall semester of 2013, and participants were asked to complete the sentence “Mathematics is like; because.....” based on their experiences.

Completed questionnaires were read by the researcher prior to classification. During the first reading 9 questionnaires were excluded from coding. The remaining 45 forms which were answered appropriately were then coded, and valid metaphors were written in a computer file for classification.

III. Findings

The 45 forms were re-read and metaphors were analyzed via content analysis method. After that, by using predominant characteristics of metaphors we found 21 valid metaphors and five main conceptual categories. These main conceptual categories are: puzzle, game, hardship, complex structure and a tool. Some example metaphors were given for each conceptual categories below:

Mathematics as puzzle:

“Mathematics is like a jigsaw puzzle; because it has many different components/subjects.”

“Mathematics is like a puzzle you need to solve; because to be able to solve some math problems you need to find a clever ways.”

Mathematics as game:

“Mathematics is like a computer game; because computer games have levels, and you must work to pass to higher levels.”

“Mathematics is like a game; because you will win the game if you play well. Otherwise, you lose it. It is the same for mathematics. If you know mathematics well, you solve the problems, otherwise you cannot.”

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Mathematics as hardship:

“Mathematics is like a mountain summit to reach; because for me mathematics is very hard /impossible to learn.”

“Mathematics is like a Chinese; because mathematics is very complicated subject.”

Mathematics as complex structure:

“Mathematics is like a maze; because it is very complicated, and you can’t find your way without a map.”

Mathematics as tool:

“Mathematics is like a Swiss army knife; because you can use it anywhere you need it.”

“Mathematics is like a language; because engineers communicate with mathematics.”

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