

## **Algorithm Perception in the Programming Education: A Metaphor Analysis**

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### **Summary**

#### **INTRODUCTION**

Programming skill is an essential competence for guiding computer-based systems' solving problems and working for a particular purpose. Nowadays, developments occurring in the technology and increasing requirements for access to the information make the programming skill have to be a basic competence in the field of research, science, and teaching-learning process. In the programming process, codes may vary according to the programming language, but programming logic does not change. For this reason, it is important that to be settled the programming logic before teaching any programming language. The fundamental of the programming logic is constituted with algorithms. In the programming education process, it is primarily focused on learning the structure of the algorithm due to programs can be performed more easily by using algorithms. Considering the algorithm's functionality in human life as well as importance in computer programming, trainings are given to the computer science students for many years in the teaching-learning process. Therefore, it is crucial that how the algorithm perceived by students studying for the algorithm in terms of teaching of programming courses as well as for the students to be trained as programmers of the future, can efficient design and analysis to the software developed by them.

#### **PURPOSE**

The overall objective of this research is to examine the students', studying in the Department of Computer Programming, perceptions of the algorithm via metaphor and to compare the emerging results in terms of grade level and gender.

#### **METHODOLOGY**

This research is a qualitative study conducted in descriptive pattern. The research sample consists of 372 associate degree students, studying in 5 different Computer Programming Department depending on the Kastamonu University in the 2015-2016 academic year, and have taken the Programming Fundamentals Course that the concept of the algorithm is taught. Data was collected with the forms prepared by the researchers and containing the phrase "Algorithms are like ....., because ....." . Before writing the metaphors for the algorithm, the students were given some explanations about the metaphor and were requested them liken the algorithm to an entity, living, dead, real, or imaginary, and write these analogies on the forms together with the reasons. In the analysis process, the steps recommended by Saban (2004) were followed. As a result of the analysis, 107 available metaphors related to the algorithm are produced by the students. There are 63 unique metaphors. Percentage (%) and frequency (*f*) values were estimated for the metaphors and they are divided into specific conceptual categories in terms of metaphors' common traits. Students' perceptions related to the algorithm were examined by Pearson's chi-square analysis according to the gender and the class level. For the reliability of the research, expert opinion has been consulted to determine the representation level of the emerging categories to the related metaphors. Expert

feedbacks were analyzed using the reliability formula proposed by Miles & Huberman (1994) and the reliability of the research was found .92.

## FINDINGS

Results indicate that stairs (5.6%,  $f=6$ ), parents (4.7%,  $f=5$ ), labyrinth (4.7%,  $f=5$ ), and teacher (4.7%,  $f=5$ ) are the more produced metaphors according to the algorithm by the students. Metaphors are grouped under the categories in terms of common characteristics: 1) directory, guidance, 2) a systematic structure, 3) command operator, 4) complex, tedious, and 5) basic consistent. Metaphors were more collected under the conceptual category which are director, guidance (37.4%,  $f=40$ ) and a systematic structure (34.6%,  $f=37$ ) in terms of common characteristics. The chi-square results shows that there isn't a significant difference between the students' perceptions about metaphor according to gender and the grade level ( $\chi^2(\text{gender})=4.13, p>.05$ ;  $\chi^2(\text{grade})=6.68, p>.05$ ).

Consequently, students who are studying at the Departments of Computer Programming, which are performing intensive programming instruction, regard the algorithm as directory and guidance and perceive it as a stair that leads them to their goal. This result indicates that the students are aware of the importance of the algorithm for the programming.