Erzincan Üniversitesi Eğitim Fakültesi Dergisi Cilt - Sayı: 18 - 2 Yıl: 2016

Ortaokul 6. ve 7. Sınıf Öğrencilerinin Kesirler Konusundaki Kavram Yanılgıları*

6th and 7th Grade Secondary School Students' Misconceptions about Fractions

DOI=10.17556/jef.30116

Muzaffer OKUR**,Zeynep ÇAKMAK GÜREL***

Extended Summary

Purpose

The purpose of this present research is to determine the common misconceptions of the secondary school 6th and 7th grade students related to fractions. In this context, the sub-problems as; What are the misconceptions of the 6th and 7th grade students related to the "Dividing a number by zero", "dividing zero by a number", "the relationship between the integers and rational numbers", "demonstrating the fractions on the number line", "ordering in fractions", "addition in fractions", "multiplication in fractions", "the relationship between the part and the whole" were tried to be answered.

Method

The case study method was applied within the scope of the research. The sample of the research includes 60 sixth and seventh grade secondary school students (26 of them were sixth graders and 34 of them were seventh graders) in a secondary school in Erzincan city Centre. . As data collection tool, eight misconceptions were determined existing in the literature related to the topic of fractions and an information test was developed including 16 questions, two of which were related to the each misconception regarding gains in the secondary school mathematics lesson curriculum. Data were analyzed developing the categories of correct, incorrect, empty and misconception related to the eight misconceptions as dividing the number by zero, dividing zero by a number, the

* Bu makale I. Uluslararası Erzincan Sempozyumu'nda sözlü olarak sunulan ve tam metin olarak yayınlanan bildirinin genişletilmiş halidir.

** Doç. Dr., Erzincan Üniversitesi Eğitim Fakültesi Matematik ve Fen Bilimleri Eğitimi Bölümü, Matematik Eğitimi ABD, e-posta: mokur@erzincan.edu.tr

*** Arş. Gör., Erzincan Üniversitesi Eğitim Fakültesi Matematik ve Fen Bilimleri Eğitimi Bölümü, Matematik Eğitimi ABD, e-posta: zcakmak@erzincan.edu.tr

relationship between integers and rational numbers, demonstrating the numbers on the number line, ordering fractions, addition in fractions, multiplication in fractions and the relationship between the part and the whole. Two methods were applied in determining the misconceptions. Therefore, each misconception was determined as a result of the evaluation of the two relevant questions prepared for them or constituted regarding the expressions of the students. Moreover, 8 basic misconceptions and sub-misconceptions related to each misconception were determined related to the aim of our research. For instance; the misconception 1 (M1) was divided into two categories as M1a and M1b sub-misconceptions determined related to "dividing a number by zero".

Results

Two sub-misconceptions were determined related to "Division a number by zero" (M1). One of them was as "in dividing a number by zero, 0 is ineffective element and the division should be equal to the number in numerator. The second one was as; in dividing a number by zero, "0 is absorbing element and the division should be 0" The rate of the M1 students who had misconceptions were determined as 38%.

Two sub-misconceptions were determined related to the misconceptions relevant to (M2) "Dividing zero by a number". The first one was as "the expression of dividing zero by a number was not rational but the numerator should be 0". The second one was the misconception constituted related to the indefinite answers by the students "that zero cannot be divided by any number". The average percent of students who had M2 was determined as 23%.

Two sub-misconceptions related to "The relationship between integers and rational numbers" (M3) were determined. The first one was that "the rational numbers do not include integers and natural numbers, therefore; integers are not rational numbers." The second was "in order that a number to be rational it should have a fraction line or numerator and denominator; therefore, integers are not rational numbers". The average percent of students who had M3 was determined as 5%.

Two sub-misconceptions were determined related to the misconceptions about "demonstrating the fractions on the number line" (M4). The first one was as "taking the number in the numerator making progress as the integers on the number line as the number placed in the denominator". The second one was as; "determining the place of a number on number line as a positive number ignoring the minus in negative rational numbers". The average percent of students who had M4 was determined as 27%.

Two sub-misconceptions were determined related to the misconceptions for "ordering in fractions" (M5). The first one was "the number has a large denominator is large". The second one was "that the students, who tried to equalize only the numerator or denominator, expanded only the numerator or denominator". The average percent of students who had M5 was determined as 10%.

Two sub-misconceptions were determined related to the misconceptions for "addition in fractions" (M6). The first was "that numerators are written in numerator place and denominators in denominator place by adding". The second one was as "if the numbers in numerator are equal, the numbers in denominator are added up and numerators are written as the same". The average percent of students who had M6 was determined as 4%.

Three sub-misconceptions were determined related to the misconceptions for "multiplication in fractions" (M7). The first was "that as in the addition in fractions, if the denominators are equal, numerators are multiplied and the denominator is written as the same. The second one was as; "the operation is done considering the multiplication line between the fractions as cross multiplication". The third one was "as in the addition in fractions, the multiplication is done by equalizing the denominators". The average percent of students who had M7 was determined as 25%.

Two sub-misconceptions were determined related to "the relationship between part and whole" (M8). The first one was as "symbolizing a whole which is not divided into equal parts with an expression with fractions". The second one was as "the expressions with fractions were equal ignoring the amount taken into consideration as reference". The average percent of students who had M8 was determined as 57%.

Conclusion and Discussion

The most common misconception was determined as "the relationship between part and whole" in the research. This misconception was followed in order by the misconceptions as "dividing a number by zero", "demonstrating the fractions on the number line", "multiplication in fractions", "dividing zero by a number". The least common misconception was determined as the misconceptions related to the "addition in fractions". Also, this misconception was followed by the misconceptions "the relationship between integers and rational numbers" and "ordering in fractions".

Even if many misconceptions were stated in several studies, it has not been encountered in the literature about which misconception was encountered more and which was less. Thus, even the most common misconceptions, which were the same or different from the literature, were determined in the present study. The most common misconception in this study was determined as the misconception "the relationship between the part and whole". Therefore, when it is considered that the students mostly have misconceptions about a significant expression related to the relationship between the part and the whole, it is recommended that it should be extremely considered by teachers.