International Journal of Educational Studies in Mathematics

ISSN: 2148-5984

www.ijesim.com

The Effect of Conceptual Change Texts on Understanding of Height Concept of Secondary School 5th Class Students

Nejla Gürefe[1], Saliha Hilal Yarar[1], Büsra Nur Pazarbasi[1], Hasan Es[1]

[1]*Gazi University, Gazi Educational Faculty, Department of Mathematical Education, Turkey*

ABSTRACT

It is important to be provided meaningful and permanent learning in the Secondary School Mathematics Curriculum based constructivist approach. In order to achieve it, firstly, existing information of students about a subject should be determined and lastly, if they have misconceptions related this subject, these misconceptions are determined and removed. One of the effective methods using to determine is Conceptual Change Texts (CCT). The purpose of this study was to provide being learnt "Height" concept by the secondary school fifth class students and to remove misconceptions of these students with CCT. The study was made of the spring semester of the 2012-2013 academic years. Participants were 80 students from two different schools of Ankara. One of these schools was public schools and the other school was private school. A quasi-experimental design was used as the research method. There were two groups being experimental and control in each of schools. CCT was used in the experimental group and traditional instruction was used in the control group. "Height Achievement Test" developed by researchers was applied as pre-test and post-test for the experimental and control group. Difference between scores of experimental group and control groups was analyzed with independent samples t-test. The findings in this study indicated that there was a significant difference between the control and experimental groups in favour of experimental group ($p<.05$) for the both schools. Findings indicated that lessons being studied with conceptual change texts are more effective than traditional instruction.

Keywords:
Conceptual change text, *height* concept, geometry.

© 2014 IJESIM. All rights reserved

Article History:
Received 27.02.2014 Received in revised form 11.04.2014 Accepted 16.05.2014 Available online 01.06.2014

Extended Summary

Purpose

It is important that students have previously acquired knowledge during learning process new concept. If previous knowledge is missing or incorrect, new knowledge which students gain is incorrect. Incorrect prior knowledge can make learning difficult. Because of this, knowledge which students have previously must be reviewed and according to this case, training must be organized (Hewson, 1984).

Misunderstanding of the concepts and the creation of erroneous concepts are known as misconception. Misconception is an important problem which students have in mathematics lessons, especially in geometry. Because geometry is abstract, students have difficulty during learning concepts of geometry. Unfortunately, in our country, level of students' understanding geometry is lower than the level of understanding algebra (Yenilmez and Yaşa, 2008). "Height" concept is one of geometric concepts which students learn difficulty. Because "height" concept is used in a lot of area in geometry such as area and volume calculations, it is important which students learn correctly this (Van De Walle, 1998). Because of this, students'

[1] Corresponding author's address: Gazi University, Gazi Educational Faculty, Department of Mathematical Education, Turkey
Telephone: +90 312 202 36 97
Fax:
e-mail: ncalik@gazi.edu.tr

© 2014 International Journal of Educational Studies in Mathematics (IJESIM) is a supported by Educational Researches and Publications Association (ERPA)

misconceptions must be detected and these misconceptions must be removed. Conceptual Change Texts (CCT) are a one of the methods which provide this (Alvermannan & Hague, 1989).

In this study, following problems is researched;

1) For public school students,
   a) Is there a significant difference between pre-tests scores of control group students and experimental group students?
   b) Is there a significant difference between pre-test scores of experimental group students and post-test scores of experimental group students?
   c) Is there a significant difference between pre-test scores of control group students and post- test scores of control group students?
   d) Is there a significant difference between post-tests scores of control group students and experimental group students?

2) For private school students,
   a) Is there a significant difference between pre-tests scores of control group students and experimental group students?
   b) Is there a significant difference between pre-test scores of experimental group students and post-test scores of experimental group students?
   c) Is there a significant difference between pre-test scores of control group students and post-test scores of control group students?
   d) Is there a significant difference between post-tests scores of control group students and experimental group students?

Method

In this study, the quasi-experimental design was used. The research sample consisted of 80 students enrolled in 5th Class from public and private secondary schools in Ankara, during the 2012-2013 spring semester of academic year. 46 students were selected from public schools and34 students were selected from private school. One control group and one experimental group classes were identified in both public and private schools. The traditional method was used in the control groups and a teaching based on the CCT was used in the experimental groups. The data was collected through "Height Achievement Test" and CCT formed by the researcher. Height Achievement Test consists of six sections and has 100 points. The test is developed to detect misconceptions of students and to learn what they know about "height" concept. The questions in this test were detected by scanning literature. It was wanted from students to answer an open-ended question in the first section, to explain true or false statements with the reasons in the second section, to answer as correct a multiple-choice question in the third section, to identify heights of the triangles and quadrilaterals located in a variety of ways in the fourth section, to detect segments given on polygons which height is in the fifth sections, to draw heights belong to edge which marked on polygons in the sixth sections of texts.

CCT was prepared by considering four process. These process are inability, intelligibility, rationality and efficiency. These texts was prepared to change wrong perceptions of students, to provide permanent learning, to provide better understanding of "height" concept by the students.

Independent samples t-test and paired samples t- test were used for analyzing the data. Independent samples t- test was used whether experimental groups' and control groups' scores differ significantly in terms of success. Paired samples t-test was used whether experimental groups' scores differ significantly in terms of success and control groups' scores differ significantly in terms of success.

Results

In this study, CCT was used to detect having students' misconceptions about concept of *height* and to provide better understanding of *height* concept by the students.

As a result of this study, pre-test scores of the experimental and control groups students in both public and private schools did not differ significantly *(p> .05).* However, post-test scores of experimental and control groups for the both schools differ significantly in favor of the experimental group *(p < .05).* In addition, there is no statistically significant differences between pre-test scores and post-test scores of students in control groups of both schools *(p > .05).*

Looking at the results, the students of experimental groups was seen more successful than the students of control groups for both schools. This situation shows that teaching with CCT is an useful method for teaching a subject in mathematics.

Discussion

Learning is a comprehensive process that has several methods and techniques. In this process, the usage of methods and techniques in the right place at the right time are so important. Many similar studies show that traditional methods do not raise student achievement on desired levels. A learning environment which students discover concepts and construct knowledge themselves must be prepared for the students. However, the role of teachers must guide instead of leadership. CCT can be considered as a method that can support this process.

Mathematics and geometry have a lot of concepts and knowledge. These concepts and knowledge must be required to grasp the students well as in relation to each other for the creation of meaningful learning in individuals. This study shows that CCT contributes creation of knowledge as meaningful. Guzzetti et all (1992) support our study.

Ortaokul 5. Sınıf öğrencilerinin yükseklik kavramını anlamalarında kavramsal değişim metinlerinin etkisi

Nejla Gürefe[1], Saliha Hilal Yarar[1], Büşra Nur Pazarbaşı[1] ve Hasan Es[1]

[1]Gazi Üniversitesi, Gazi Eğitim Fakültesi, Matematik Eğitimi Anabilim Dalı, Türkiye

ÖZ

İlköğretim Matematik Öğretim Programının temel aldığı yapılandırmacı öğrenme yaklaşımı, anlamlı öğrenmenin gerçekleşmesi için mevcut bilgilerin önemli olduğunu savunmaktadır. Bu nedenle öğretim sürecine başlamadan önce öğrencilerin kavram yanılgılarının belirlenmesi ve giderilmesi gerekmektedir. Bu çalışmanın amacı, Kavramsal Değişim Metinlerinin (KDM) ortaokulda öğrenim gören öğrencilerin geometride yer alan Yükseklik kavramını öğrenmeleri ve bu kavrama yönelik kavram yanılgılarının giderilmesi üzerindeki etkisini incelemektir. Bu çalışmanın örneklemini, Ankara'nın bir devlet ve bir de özel okulu olmak üzere iki ortaokulunun 5. sınıfında öğrenim gören 80 öğrenci oluşturmaktadır. Bu çalışma için her iki okuldan da derslerde kavramsal değişim metinlerinin uygulandığı deney grubu ve Milli Eğitim müfredatı tarafından önerilen yöntemin uygulandığı kontrol grubu olarak ikişer sınıf belirlenmiştir. Çalışma, 2012–2013 eğitim-öğretim yılının bahar döneminde yapılmış ve çalışmada yarı-yapılandırılmış deneysel desen kullanılmıştır. Araştırmacılar tarafından geliştirilen Yükseklik Kavramı Başarı Testi (YKBT) deney ve kontrol grubuna ön test-son test olarak uygulanmıştır. Bu araştırmanın bulgularına göre kavramın öğrenilmesinde başarı açısından deney grubu lehine anlamlı bir farklılık bulunmuştur.

Anahtar Kelimeler:
Kavramsal değişim metni, yükseklik kavramı, geometri

© 2014 IJESIM. Tüm hakları saklıdır.

Makale Tarihçesi:
Alındı 27.02.2014 Düzeltilmiş hali alındı 11.04.2014 Kabul edildi 16.05.2014 Çevrimiçi yayınlandı 01.06.2014

Sorumlu yazarın adresi: Gazi Üniversitesi, Gazi Eğitim Fakültesi, Matematik Eğitimi Anabilim Dalı, Türkiye
Telefon: +90 312 202 36 97
Faks:
e-posta: ncalik@gazi.edu.tr