Electronic Conceptual Change Texts Prepared About Fractions

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ABSTRACT
Fraction is one of the important mathematics topics, and it has been determined that students at every grade have misconceptions about fractions. Regarding the fact that technology has been developing rapidly, it is actively used in educational institutions. It has a great number of benefits. It has become inevitable to associate conceptual change texts (CCT) with technology. In this study, electronic conceptual change texts (ECCT), were designed in order to eliminate misconceptions on fractions and to strengthen the effective teaching by creating a different point of view. These texts were presented to 12 teachers, who work at different secondary schools and interviews were carried out with them. As a result of these interviews, teachers expressed positive opinions about these texts and said that it would be effective to develop them.
Keywords: Conceptual change texts, Electronic conceptual change texts, Fractions, Teachers' opinions

INTRODUCTION

Conception is the name of information representing the common features of different objects and phenomenon which makes sense in human's mind (Ülgen, 2001). The fact that the learnt concepts can't be shaped in mind or can't be associated with the existing schemas and they are used apart from their scientific meaning causes misconceptions in the individual (Bahçeci & Kaya, 2010). The misconception is the perception or understanding that is far from the opinion on which experts agree (Zembat, 2010). Cornu (1991) who was inspired by Bachelard's (1938) study, emphasized that mathematical difficulties and misconceptions that students have might be derived from three main reasons (Bingölbali & Özmantar, 2010). These are epistemological reasons (They are the reasons derived from the nature and the structure of information. These are related to the historical development of the conception), pedagogical reasons (The reasons such as teaching models, the applications of these models, metaphor and analogies that teachers use, course books, the array of the subjects are pedagogical reasons of misconceptions), psychological reasons (They are the reasons related with the self-development including biological, cognitive and affective aspects. Students' comprehension ability, stages of individual's development, their background information and readiness level are the psychological reasons of misconceptions).

There are many types of misconceptions. The misconceptions under four categories which are overgeneralization, overspecialization, mistranslation and limited conception (Zembat, 2015). Studies on misconceptions generally use two categories (overgeneralization and overspecialization) (Bingölbali & Özmantar, 2010).

Fraction defined as one or more parts of a whole divided into equal parts (Argün, Arıkan, Bulut & Hacıoğlu, 2014). According to Lamon (1999), fractions have 5 different meanings. These are part-whole, division, processor, rate and measurement (Alacacı, 2010).

Some studies show that students cannot make sense of fraction concept completely and they have misconceptions (Chinnappan, 2005; Brown and Quinn, 2006; Pesen, 2007; Fisher, 2009; Küçük & Demir, 2009; Alacacı, 2010; Siegler et al., 2010; Biber, Tuna & Aktaş, 2013; Şengül, 2015; Gagatsis, Deliyianni, Elia, Panaoura & Michael-Chrysanthou, 2016; Maelasari & Jupri, 2017). In these studies, we observe that most of the misconceptions of students stem from reading of the fractions, the relation of the amount that the fraction represents with the whole which is taken as a reference, dividing into equal parts in fractions, comparisons of fractions, and determining the unity in compound fractions, incorrect sums of fraction, the difficulties related to the effect of doing multiplication

and division with fractions to numbers. In addition, these studies indicated that students who have misconception produced their own rules. It is difficult to correct this misconception of the student who adopts his own rule. Topics in mathematics are interrelated. If the student has misconceptions about a topic, it will be more difficult to learn a new topic. Therefore, eliminating misconceptions is as important as teaching a new concept.

One of the alternative ways used in eliminating the misconceptions is the use of CCT. The CCT are defined as the texts which clearly present the contradictions between scientific truths and misconceptions (Çobanoğlu & Bektaş, 2012). In a CCT, at first, a question is asked in order to find out students' misconceptions and create confusion. Later, by establishing the common misconceptions related to that subject, the reason why this knowledge is incorrect is explained. In this way, students realize the insufficiency of their own knowledge by questioning their misconceptions. Lastly, the correct information about the topic is explained and it is enriched with examples (Pınarbaşı & Canpolat, 2002).

It was determined in a lot of studies that CCT eliminate the misconceptions, increase the students' academic success and facilitates meaningful learning (Diakidoy, Kendeou & Ioannides, 2003; Akbaş, 2008; Birinci-Konur, 2010; Çetingül & Geban, 2011; Çobanoğlu & Bektaş, 2012; Demircioğlu, Demircioğlu & Aydın, 2012). In addition, Güveli, Baran-Bulut and Güveli (2018) expressed that prospective mathematics teachers would prefer concept change texts in order to eliminate misconceptions. Besides, Toka & Aşkar (2002) carried out a study in order to compare the effect of cognitive conflict, CCT and the traditional mathematics teaching methods on the students' success. It was found that the success average of the classes to which cognitive conflict method was applied was significantly higher than the classes to which CCT were applied. In a research carried out by Guzzetti (2000), it was pointed out that CCT cannot change any of the misconceptions of students who have an insufficient ability to read texts by themselves. As a result of this study, it can be said that using the CCT alone will not be sufficient. This idea led us to discover another assisted and enriched model of the CCT that we will use in our study. Considering the contributions of computers to educational area, it was determined to enrich CCT via computer aid.

As a result, computers have already taken their part in the educational environment due to their features such as making the educational process interesting, concreting the abstract concepts, facilitating learning and increasing the success and motivation which was proven by some studies that were done on computer-aided teaching (Baki & Özpınar, 2007; Akinsola & Animahasun, 2007; Ke, 2014).Therefore, in CCT, it becomes inevitable to create CCT which are supported by computer animations by using visual and cognitive facilities that technology provides. It was thought that in this way a different dimension can be added to the texts. Taşdelen, (2011) prepared computer-assisted CCT on electrochemistry and carried out an experimental study with 66 students, 11th grade. As a result, he found out that students have a positive attitude towards computer assisted CCT. Kaya (2012) prepared computer-assisted CCT about photosynthesis and respiration in plants and revealed that these texts are more effective than CCT but they have similar efficiency for enabling the persistence of the conceptual change that occurred. In his study on static electrical, carried out with preservice teachers Ersoy, (2012) compared the teaching method that was prepared with computer animations and CCT and concluded that both methods are effective on the success. Although there are studies which were done on science related to computer-assisted CCT, there is not any study on ECCT related to fractions in mathematics.

In this study, CCT, which were enriched with computer animations, were prepared in order to eliminate the students' misconceptions on fractions. In order to determine whether these texts will be effective in removing the misconceptions or not, firstly teachers' opinions were taken regarding the fact that teachers' opinions are important. Experiences and opinions of teachers who will dominate the education will direct the process of this study. Thanks to this study, teachers will have documents which they can use in the educational environment and study aid that will be useful for themselves. Besides, their misconceptions about fraction will be presented and solutions for these misconceptions will be offered. These offers will have features of being used, developed and changed. They will be expected to reveal different points of view. This study aims to determine teachers' opinions related to ECCT that were prepared to eliminate the students' misconceptions on fraction.

METHOD

Qualitative study design which is one of the research approaches was used in this study. The research group consists of 12 mathematics teachers. Data were collected from interviews (unstructured) with teachers. Interviews were made before the materials were presented to the teachers, and between material sections. The data were obtained from face to face interviews which were recorded.

Table1 - Teacher profiles

Teachers	Age	Gender	Seniority	Teachers	Age	Gender	Seniority
T1	26	Female	4	T7	36	Male	14
T2	44	Male	21	T8	45	Male	19
T3	32	Female	9	T9	48	Male	21
T4	24	Male	1	T10	32	Female	8
T5	32	Female	9	T11	38	Male	14
T6	40	Female	15	T12	31	Female	8

The teachers are working in different provinces of Turkey. Teachers volunteered to participate in the study. ECCT was presented to teachers after the explanation.

Process

Before starting the research, misconceptions about fractions that were determined in literature were handled. These are;

Fraction of $\frac{2}{5}$ incorrect models

Figure 1 - Incorrect models
Source: Alacacı (2010, p.68)

Compared $\frac{6}{9}$ with $\frac{2}{3}$, $\frac{6}{9} > \frac{2}{3}$ cited by Alacacı (2010), similar misconceptions reported by Biber et al. (2013), Şengül (2015).

$\frac{5}{6} + \frac{1}{2} = \frac{5+1}{6+2} = \frac{6}{8}$ cited by Alacacı (2010), similar misconceptions reported by Biber et al. (2013), Şengül (2015), Gagatsi et al.(2016).

$\frac{2}{3} \times \frac{4}{9} = \frac{6}{9} \times \frac{4}{9} = \frac{24}{9}$ similar misconceptions reported by Biber et al. (2013), Maelasari and Jupri, (2017).

$\frac{2}{3} : \frac{4}{5} = \frac{3}{2} \times \frac{4}{5}$ similar misconception reported by Maelasari & Jupri, (2017).

$\frac{1}{4} : \frac{4}{5} = \frac{1}{\cancel{4}} \times \frac{\cancel{4}}{5} = \frac{1}{5}$ similar misconception reported by Küçük & Demir, (2009).

These misconceptions were inserted into the CCT. In preparation for the CCT, "Conceptual Change Approach" which was defined as reorganizing by Posner et al. (1982) was taken as the basis. In this approach, it cared about carrying out four conditions below in order to realize conceptual change.

a. Dissatisfaction: Students need to understand the inefficiency of existing conceptions.
b. Intelligibility: Students need to consider new conceptions intelligible.
c. Plausibility: Students need to find new conceptions reasonable.
d. Fruitfulness: Students need to be able to use new conceptions in other areas, too.

For CCT, at first, a question was asked in order to find out students' misconceptions and create confusion. These questions were chosen from the misconceptions given above. Later, by establishing the common misconceptions related to that subject, it was explained why this knowledge is incorrect. Later, students move on to the next stage. In this stage, students realize the insufficiency of their own knowledge in cognitive conflict. Lastly, the correct information about the topic was explained. It was enriched with examples.

The ECCT

Computer animations were prepared by the researchers as a video. They were inserted into the CCT which were designed as Power Point presentation. Computer animations were prepared with 3ds max. "Refutation texts" added to slide.

Prepared ECCT were analyzed by two domain experts and one computer expert. After the necessary corrections were done, it was presented to teachers. In accordance with the analysis of two domain experts, common

misconceptions that are frequently faced and solution offers were determined, and the types of these misconceptions (overgeneralization, limited conception) were established. Regarding the analysis of one computer expert, the animation speed was adjusted, its colors were changed, and the size and design of the figures were reorganized. The ECCT which was taken for their final shape was presented in a mathematics class at a university in Turkey by doing the necessary explanations to the teachers.

Data Analysis

The data which were obtained from the unstructured interview, were analyzed by one expert and one researcher with the descriptive analysis method (Yıldırım & Şimşek, 2013). The data were collected with face to face interviews, and the interviews were both sound recorded and written down. The records were transcribed, and analysed by one expert and one researcher. The scripts of the interviews which were recorded were shown to the teachers again. During the interview, they were provided with a comfortable atmosphere, and it was observed that they were sincere, honest and warm.

FINDINGS

Twelve teachers were interviewed to receive their opinions towards ECCT that was prepared for fractions. Interviews with teachers before presenting material are as below.

Researcher: Which teaching methods do you use for fraction subject?
T2: I use drama method. Like shopping.
T3: I use fraction cards. I bring round cake to the classroom. I also benefit from the models.
T4:I use a story of two double decker buses analogy to teach multiplication and division in fractions.
T6: I use the didactic method to lecture. I use question-response. I don't take the time to use other methods because of transition exams from primary to secondary education.

Teachers (T6, T7, T8, T9, T10, T11, T12) stated that they generally use question-response and didactic methods (T6, T7, T8, T9, T10). Some of the teachers stated that they use discovery method (T1), drama (T2), and analogy (T4) in addition to modelling and fraction cards (T3, T5). Among these teachers, T4 expressed that he made a story of two double decker buses analogy to teach multiplication and division in fractions.

Researcher: What are the materials and reference books you use?

Teachers stated that they mostly use course books (T4, T7, T9, T11, T12), fraction cards (T1, T3), slices of cake (T3), models (T2, T3, T4, T5), test book (T6, T8, T9), education information network (T3,T10).

Researcher: How do you carry out assessment and evaluation at the end of the subject, and What are the results?

Teachers emphasized that they carried out assessment and evaluation with written exam (T1, T2, T3, T4, T5, T7, T10, T11, T12) and multiple choice test (T6, T8, T9). While T2, T3, T4, T8 and T10 reported that the overall situation was good, the other teachers reported that the success was low in fraction subject. After these interviews, material presentation started.

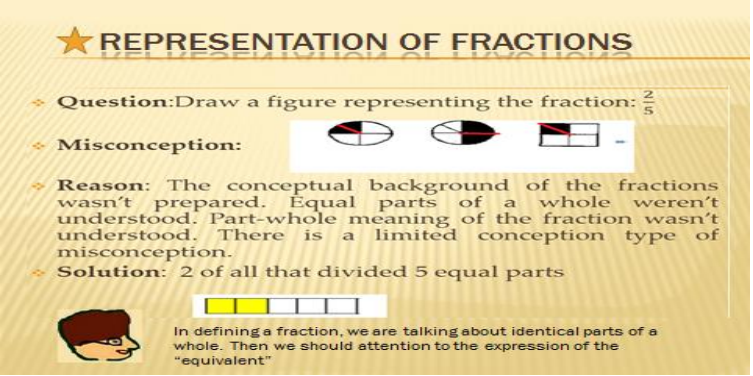

Figure 2 - Conceptual change text related to representation fractions

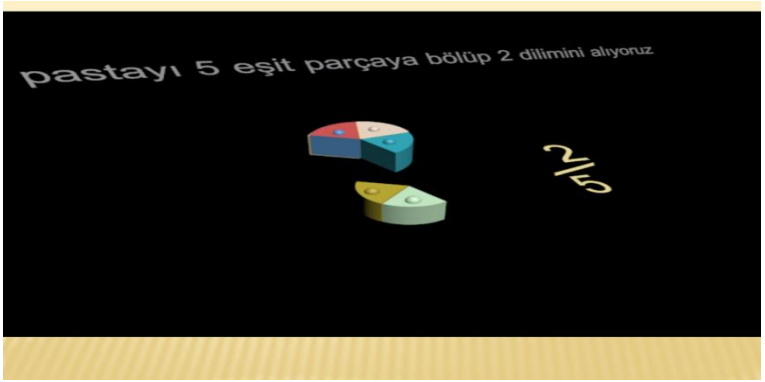

Figure 3 - 3ds max animation for representation of fraction

Researcher: What do you think about this presentation?

Some teachers reported that they came across with the similar misconception (T2, T7, T11).

T2: we should pay attention to the expression of the "equivalent". Students think fractions are just a fraction line. They don't understand the identical parts of a whole.
T3: I use fraction cards but more useful to use a computer
T5: Animations need to ensure student interaction. It should be supported with the games.

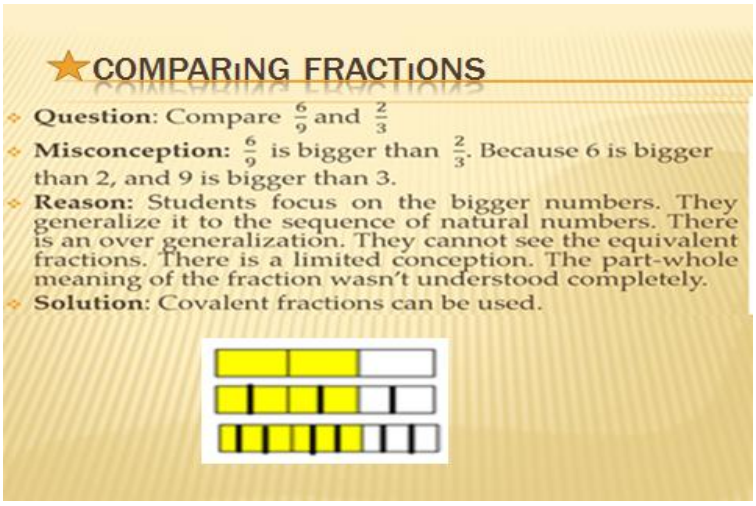

Figure 4 - Conceptual change text related to the fraction comparison

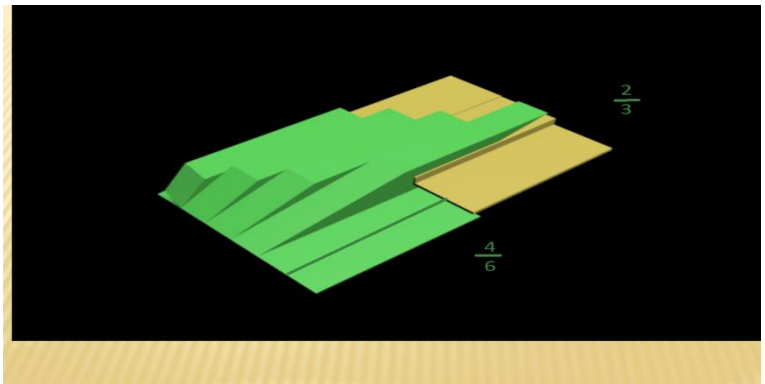

Figure 5 - 3ds max animation for the fraction comparison

Researcher: What do you think about this presentation?

Some teachers (T2, T7, T11, T12) reported that they came across with a similar misconception.

T1: They did not understand the equivalent fraction
T3: They do not match part-whole with equivalent fraction information
T5: Animation has been good
T6: Well-defined

T7: Very good!

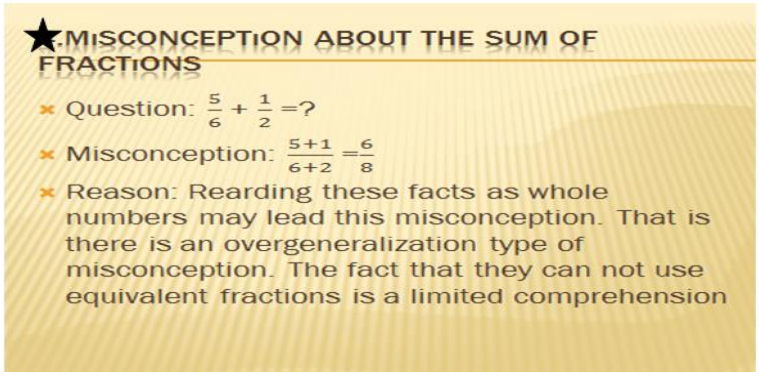

Figure 6 - Conceptual change text1 related to the sum of fractions

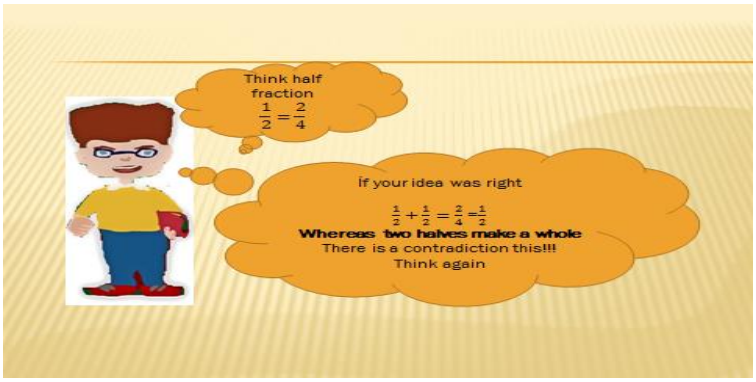

Figure 7 - Refutation text on the sum of fractions

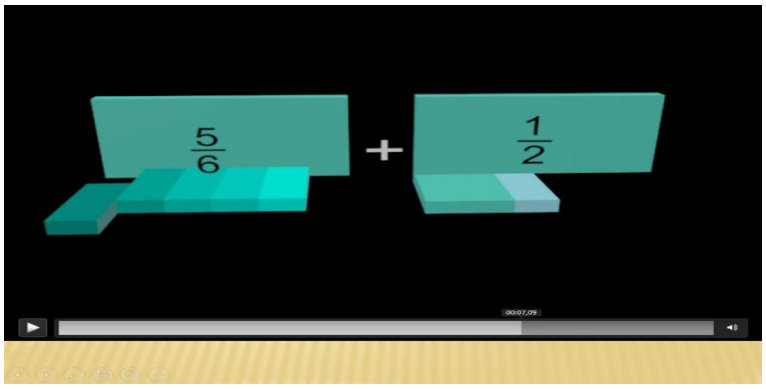

Figure 8 - 3ds max animation for the sum of fractions

Researcher: What do you think about this presentation?

Some teachers (T2, T3, T5, T7, T10, T11, T12) reported that they see misconceptions mostly about addition operations in fractions whose denominators are different. These teachers stated that while doing addition and subtraction in fractions whose denominators are different, students add (subtraction) numerators and write them to the numerator, and add (subtraction) the denominators and write them to the denominator.

T5: I came across with the same misconception. I have difficulty in explaining the fact that $\frac{5}{4}+\frac{2}{4}=\frac{5+2}{4+4}$ *is not possible to the students who did it."*

T7: The most interesting mistake I have ever seen is that a student answered the question $\frac{3}{4}+\frac{1}{2}=?$ *like that: (3+4) + (1+2) =7+3 =10*

T10: Students can produce rules that have no logical basis on the subject they have learned wrongly"

T11: When I realize the mistake I tell the subject over again, especially I do the operations again by using unit fractions.

T4: I draw attention to the part-whole relationship by using chocolate. I also use pizza model. I do fractions

by using equivalent fractions.
T6: Examples from daily life and stories can be used. Animations enriched with cartoon characters can be used, too.
T2: Two halves make a whole ($\frac{1}{2}+\frac{1}{2}=1$) Good description!

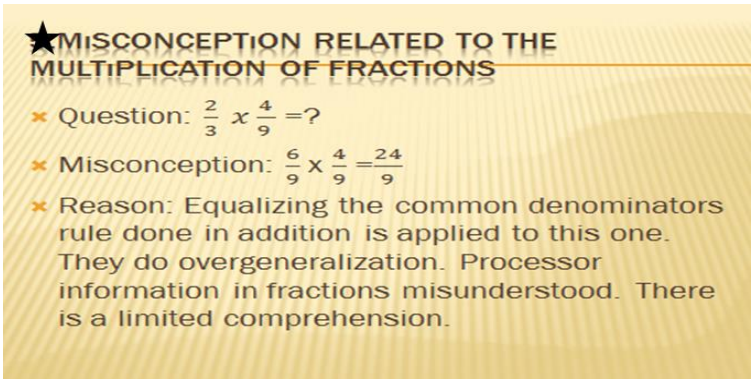

Figure 9 - Conceptual change text1 related to the multiplication of fractions

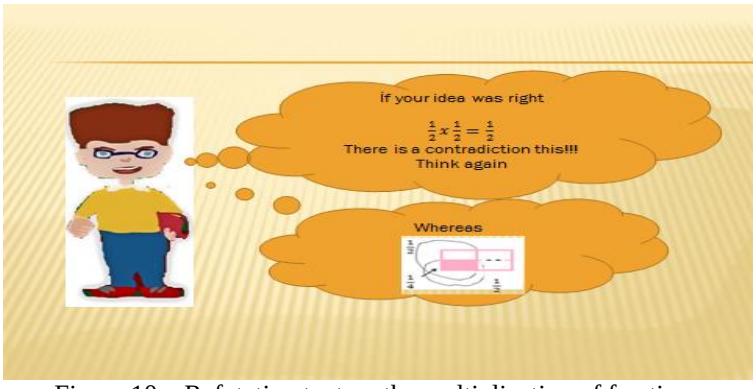

Figure 10 – Refutation text on the multiplication of fractions

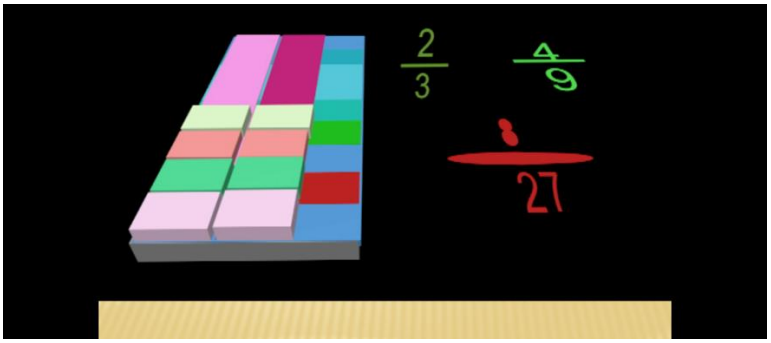

Figure 11 – 3ds max animation for the multiplication of fractions

Researcher: What do you think about this presentation?
Some teachers (T2, T5, T7) reported that they encountered similar misconceptions.

T2:While doing multiplication, students equalize denominators, multiply numerators and write them to numerator, and write the common denominator to denominator like $\frac{1}{3} x \frac{3}{4} = \frac{4x9}{12}$
Researcher: What do you do to correct the mistake when you realize them?
T2: Retelling
T7: Understanding the model is not easy. I don't think students will understand this model.
T8: Yes. Model is very difficult. Colors too much!
T3: Some students understand the model better. I use it. They understand.
T5: I use computer actively during the lesson. I don't use it constantly in the lesson, but I use it on occasion to ring the changes.
T10: I use it to answer the test questions with students after the lecturing. I solve the questions by using the

interactive whiteboard.
T3: It can be more colorful and attractive.
T4: Voiced narration can be added. Besides, it is better to be supported with more examples that provide students' participation.

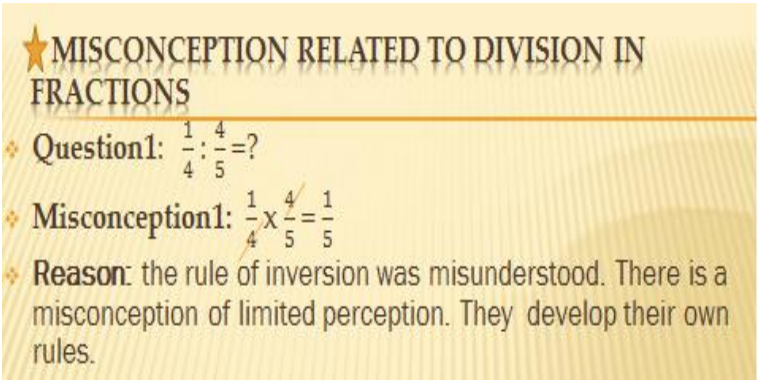

Figure 12 - Conceptual change text1 related to the division of fractions

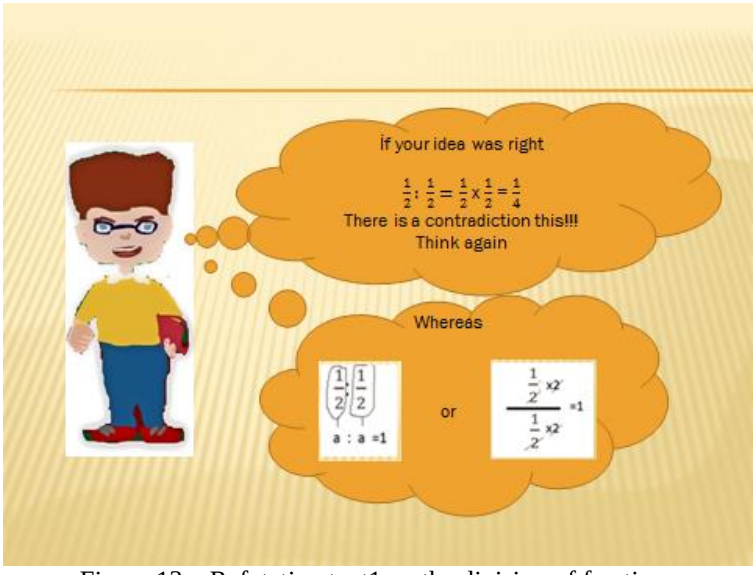

Figure 13 – Refutation text1 on the division of fractions

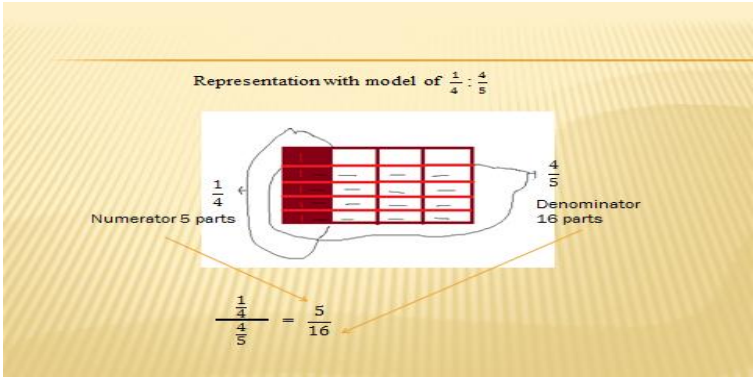

Figure 14 - Conceptual change text3 related to the division of fractions

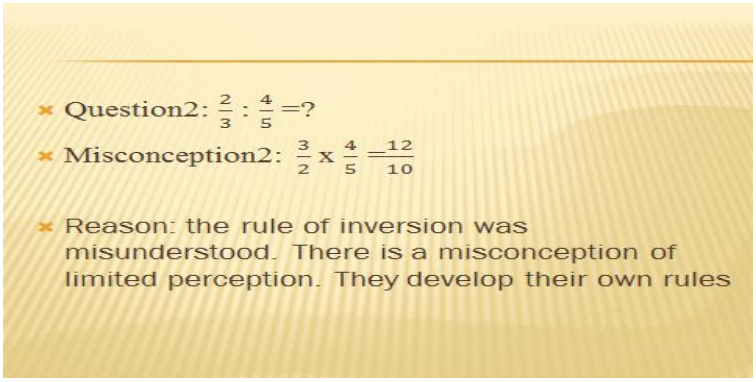

Figure 15 - Conceptual change text4 related to the division of fractions

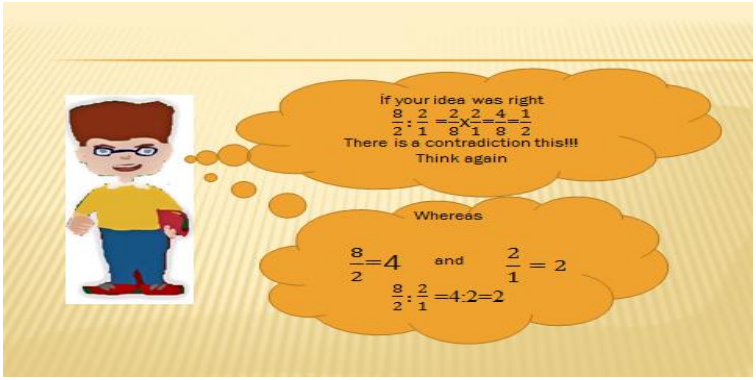

Figure 16 – Refutation text2 on the division of fractions

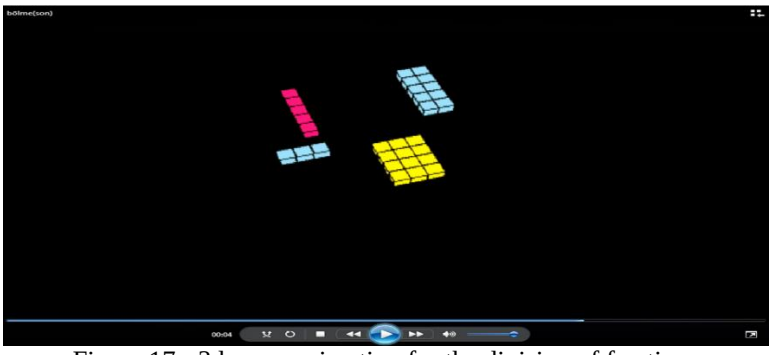

Figure 17 - 3ds max animation for the division of fractions

Researcher: What do you think about this presentation?
T3: Students directly do multiplication in division operations, or they write the inverse of the wrong fraction like $\frac{2}{5} : \frac{3}{4} = \frac{2x3}{5x4}$ *or* $\frac{2}{5} : \frac{3}{4} = \frac{5x3}{2x4}$ *or* $\frac{2}{5} : \frac{3}{4} = \frac{5x4}{2x3}$
T5: Students generally prefer dividing numerator and writing them to numerator in the division operations, and dividing denominator and write them to the denominators. For example they find out the result like that; $\frac{5}{4} : \frac{2}{4} = \frac{2,5}{1}$ *they prefer this way more.*
T12: Most of students don't understand inversion rule. if there is simplification, they convert the process to multiplication.

After these interviews, the teachers were introduced with ECCT and they were discussed. Then, the interviews continued.

Researcher: Do you use any of the computer or teaching technologies?

Some teachers (T3 and T10) stated that they use the computer and interactive whiteboard. They denounced that these materials are effective especially for drawing attention, concretizing the subject and visualization.

Researcher: Do you think that computer-assisted teaching materials will be beneficial for correcting the

misconceptions on fractions?

Teachers mostly point out that computer-assisted teaching materials are effective on correcting the mistakes and teaching fractions.

> *T2: Technology has been advancing and I think that it will be much more effective on the educational area by getting advanced.*
> *T3: I think it is very effective. It provides us with taking precautions against misconceptions.*
> *Researcher: Do you think that CCT will be effective on correcting the misconception about fraction subject?*

Teachers mostly enounced that *CCT* are effective on correcting the misconceptions, also especially they will ease teachers' work.

> *T2: It is a great facility for teachers. If teachers know what kind of misconceptions there are, it will be easier for them to see and lighten these blind spots.*
> *T8: It will be good for teachers. However, more enjoyable things should be added for students. Stories, games and visualization need to be included.*
> *Researcher: Do you think that ECCT will be effective on correcting the misconceptions about fractions?*

Mostly, teachers pointed out that ECCT is influential in eliminating the students' misconceptions about fractions. Some teachers stated that it will be difficult to understand the material without having a teacher.

> *T2: Yes. At least, they will be effective in terms of visualization. They will attract their attention. They make teaching effective with the guidance of teacher. However, it might be difficult to understand it alone.*
> *T3: Yes, they are effective because the children at that age are interested in the activities prepared in the computer environment and they can provide permanent learning since they are attractive.*
> *T4: I think they will be effective since they concretize the abstract concepts and they make students comprehend the logic of operations.*
> *T11: They will be effective because they provide visualization, attention, and enjoyable class instruction. I think that they have a pathfinder effect for teachers and the effect of correcting misconceptions for students.*
> *Researcher: What are your suggestions?*

Some suggestions of teachers about ECCT:

> *T1: There should be interaction in electronic teaching materials and students should get feedback. Visual cognitive thinking processes need to be supported with constructive questions and the development of the students' creativity should be ensured.*
> *T2: It would be better to support it with analogies. The stories can be created. Software developers, the people preparing analogies and the field experts need to work together.*
> *T8: Division subject could start with the question: how many halves are there in two complete loaves of bread?*
> *T10: Sharing a cake or slices of bread could be used.*

CONCLUSIONS

Teachers emphasized that using a model for fractions is effective; however, they can not use it because of the curriculum to be finished, the transition exams from primary to secondary education and limited time. Therefore, they stated that they teach their lesson with question answer and traditional didactic methods. A few teachers stated that they use the discovery method, drama, and analogy, and also benefit the modelling and fraction cards. Most teachers use question-answer and traditional didactic method since they provide the opportunity to teach more in less time. They prepare students for test examinations. Teachers often state their contextual causes when they are confronted with inconsistencies between their beliefs and practices. Their common cause is a test (Lim & Chai, 2008). This result has a similarity with the result of the study done by Çelikkaya & Kuş (2009). Teachers who make multiple choice exams in their classes did not talk about misconceptions because it is difficult to bring out misconceptions by multiple choice testing. Teachers pointed out that they mostly prefer private publications' test manuals. It shows that teachers would rather prepare their students for multiple choice testing than conceptual learning. Feedback and formative assessments are important to identify conceptual learning. The strong impact of formative assessment on success is meaningful feedback about what students know and where they make mistakes or misunderstandings (Gagatsis et al., 2016).

Many teachers said the success on fractions was low. Among the misconceptions that teachers frequently

encounter; the misconception of adding up (subtracting) numerators and writing them to numerator, adding up (subtracting) denominators and writing them to denominator in adding up (subtraction) of fractions with different denominators, and the misconception of equalizing the denominators and getting them to the common denominator in the multiplication of fractions; and not understanding the logic of division have similarities with the misconceptions that are present in literature (Brown & Quinn, 2006; Pesen, 2007; Fisher, 2009; Alacacı, 2010; Siegler et al., 2010; Biber et al., 2013; Şengül, 2015; Maelasari & Jupri, 2017). In their study, Brown & Quinn (2006) encountered the occasion on which students frequently divide numerators and write them to the numerator, and divide denominators and write them to the denominator. Even if this situation comes up with the correct result, it will make the situation more complicated and incomprehensible in different fraction statements. For instance; a student who does the operation $\frac{5}{6} : \frac{5}{3}$ like that: $\frac{5:5}{6:3} = \frac{1}{2}$ will be more confused about the operations such as $\frac{1}{\frac{1}{2}\times\frac{1}{3}}$ or $\frac{1}{\frac{1}{6}}$. This may cause them to make mistakes. If these errors are not reformed, they become systematic. These errors of the student may turn into misconceptions over time. Teachers state that in such situations students create their own rules. In this way, students have misconceptions about the fractions such as randomly practicing and overgeneralization or limited comprehension of the adding up, subtraction, division and multiplication that they have learnt previously in natural numbers. Most of the students, who do not know how to do, produce incorrect rules.

Teachers stated that it is beneficial to use unit fraction and modelling with figures in order to eliminate the misconceptions that they face about fractions. This result was also supported in the studies that were carried out by Pesen (2007), Alacacı (2010), Eroğlu (2012) and Biber et al. (2013). Besides, teachers stated that creating equivalent fractions (Orhun, 2007) and the part-whole relationship (Kocaoğlu & Yenilmez, 2010) are important in eliminating the misconceptions.

It was stated by the teachers that computer-assisted teaching is useful for students in terms of attracting their attention and making lessons more active. This result is compatible with the computer assisted studies which were done before (Baki & Özpınar, 2007; Akinsola & Animahasun, 2007). Bosman & Schulze (2018) reported that teachers should be creative about using visual media.

As stated in studies by Guzzetti (2000), teachers pointed out that CCT won't be enough alone in terms of students' learning the subject. But, teachers pointed that conceptual change texts will facilitate teachers' work and will lighten the blind spots.

Teachers said that ECCT will be effective in teaching the fractions and in removing the misconceptions, they can attract students' attention and make the lesson more enjoyable, and they will make it easy for teachers. These statements have similarities with the results of the studies by Kaya (2012), Taşdelen (2011), and Ersoy (2012) in science and which present that computer-assisted CCT increase the students' attitude and success.

Teachers suggested that it is necessary to prepare materials that provide more examples for ECCT that are believed to attract students' attention more in animations, that are told with daily life examples and that enable student interaction.

Suggestions

ECCT's can be used for formative assessment. It also allows students to make their own self-assessment. ECCT's can be used in eliminating misconceptions and concept change. For this reason, practices for other subjects need to be prepared in books and in electronic environment. Teachers should be able to supply the misconceptions that they have on the subject to be taught and solution offers as ECCT from the books or electronic environment. ECCT should be designed also for other mathematics subjects, researches should be done and they should be shared with other associations. With the animations that are turned into story with daily life examples and with interactive texts computer-assisted teaching materials need to be enriched. 3ds max animations are very effective in presenting visuals that are like real ones so they must be popularized in educational institutions. In order to realize it, studies should be carried out with students in schools. Its practicality in other mathematical topics, should be investigated. These animations can also be viewed with the 3D glasses. So students will be more motivated and enjoy. It is recommended to investigate the impact of ECCT on students for future studies.

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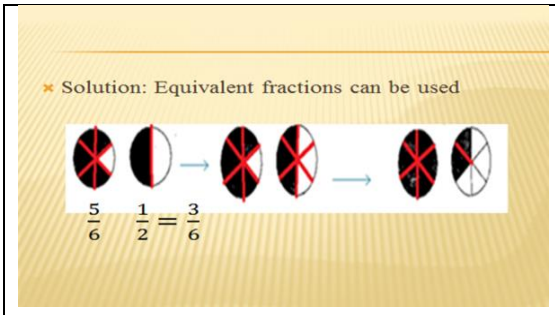
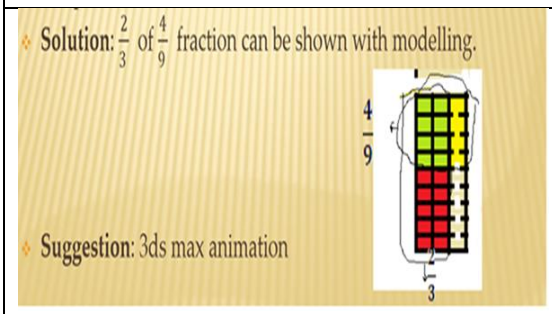
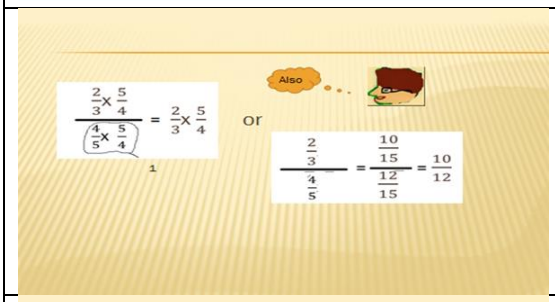
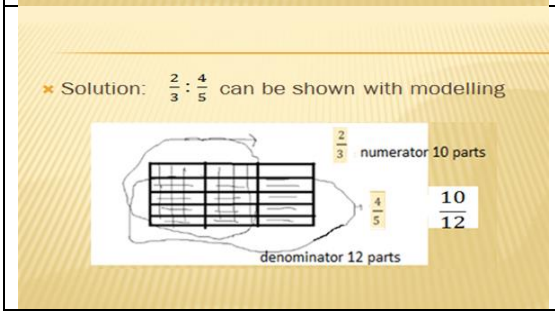
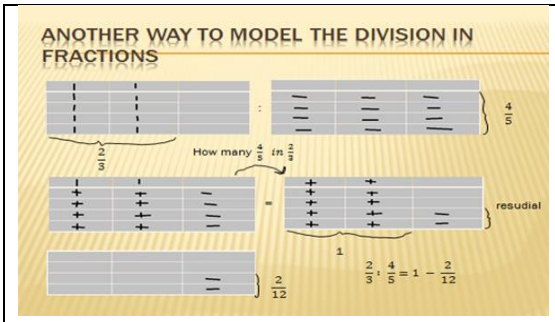
Attachments

Samples Texts of ECCT Prepared by the Researchers

	ECCT3 related to the sum of fractions models
	ECCT3 related to the multiplication of fractions
	ECCT6 related to the division of fractions
	ECCT7 related to the division of fractions

	ECCT8 related to the division of fractions